

A Guideline for Establishing Local Energy-Efficiency Programs in Virginia

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Abstract

From a big picture perspective, investing in energy efficiency in the existing stock of residential buildings in the United States brings unquestioned economic, employment and environmental benefits. The aggregation of energy and dollar savings from millions of small improvements in efficiency adds up to enormous regional and national savings. By employing cost-effective investments in building efficiency, we could reduce the cumulative energy use of America's housing stock by twenty-eight percent, save Americans \$41 billion annually, abate 360 megatons of CO-2 (Choi Granade, et.al., 2009), and meet fifty percent or more of the expected electric load growth by 2025 (EPA, 2008). In Virginia alone investing in the efficiency of our existing stock of buildings could save the commonwealth's residents \$2.2 billion annually by 2025 (ACEEE, 2008). But from the perspective of the individual property owner the potential benefits of investing in energy efficiency, although just as real, are either less obvious or have impediments to their attainment. Understanding and overcoming these micro-impediments to energy investing is essential to realizing the macro-benefits of energy efficiency. Consequently, any successful local energy program must tailor its efforts to address the barriers to investing in efficiency at the level of the individual consumer.

This thesis, through an analysis of existing and emerging residential energy programs, along with a review of the behavioral and economic literature on the subject, aims to point out the micro-impediments to achieving macro-reductions in energy use. Becoming familiar with these obstructions on the level of the individual consumer is the first necessary step in producing

model guidelines for a successful whole house local energy efficiency program. Although the basic tenets of these guidelines could be used as the basis for any locally organized energy program in the U.S., they are specifically tailored in this thesis for the Commonwealth of Virginia.

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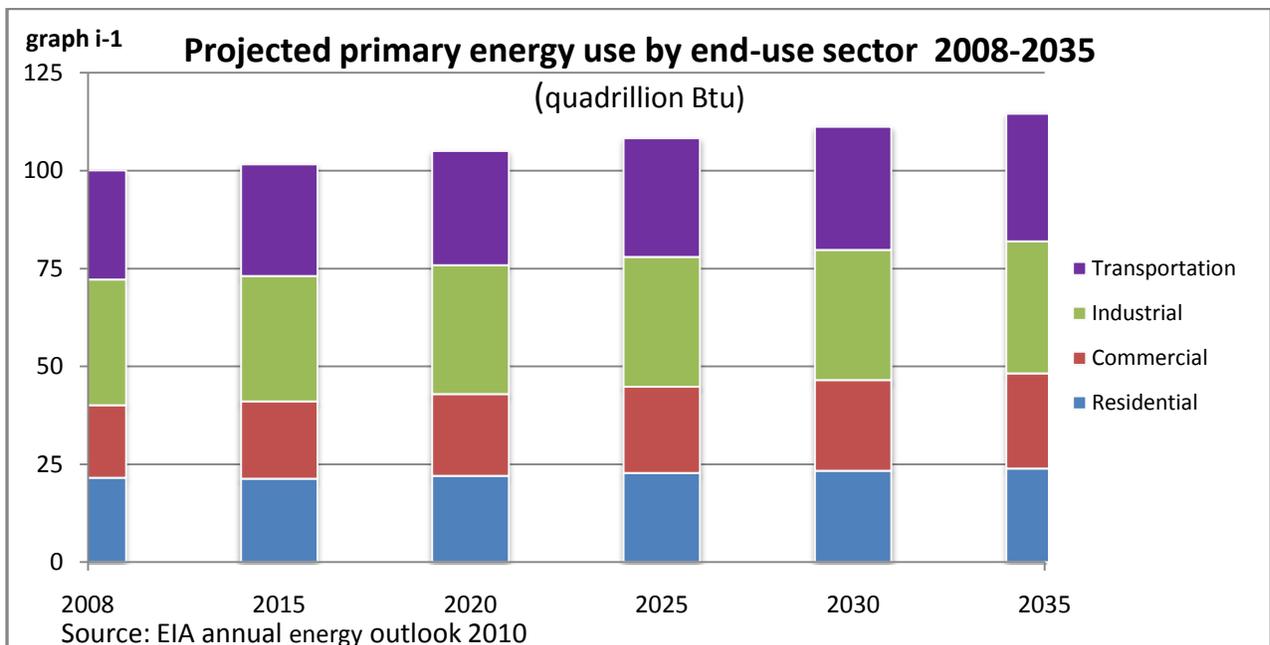
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Chapter I: Introduction

Background

It has been known for decades that existing homes in the United States waste a large percentage of the energy they use. Recent reports by the American Council on an Energy Efficient Economy (ACEEE) and McKinsey & Company (Choi Granade, et.al. 2009) inform us that there are cost effective investments we can make that would reduce the energy consumption in our homes between twenty-five and thirty percent. Virginia’s official energy plan, *Virginia Energy Plan 2007* (VEP), prepared by the Virginia Department of Mines, Minerals and Energy (DMME), states that “Energy efficiency and conservation offer Virginia the most cost-effective and most readily deployable method to manage its energy future. They should be the first actions consumers take to address future energy needs” (VEP p. 60). By 2020 residential energy use will account for twenty-one percent of all baseline energy use in the United States (graph i-1), making the loss due to inefficiency enormous.



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Concerns for climate change, energy security, and the depletion of petroleum reserves have created renewed interest in investing in energy efficiency. The last two years in particular have seen the creation of several federal, state, regional and local programs that seek to encourage and facilitate energy efficiency investments among owners of existing homes. Billions of federal dollars, mainly through the 2009 American Recovery and Reinvestment Act (ARRA) have been funneled to newly formed and longstanding local and state energy programs. The result of all this renewed interest in efficiency, coupled with billions of federal dollars targeted to reducing energy, is that non-utility based programs for residential and commercial building energy efficiency are being created across the country.

In Virginia alone, \$16.1 million of Department of Energy (DOE) funding is being channeled through the DMME to Virginia localities as part of the Energy Efficiency and Conservation Block Grant (EECBG) program. Of these funds, \$14 million is being allocated for competitive grants, and is available for the establishment of local energy efficiency programs. In part, this thesis is addressed to these new programs.

The Whole-House Approach

Except for state sponsored income based weatherization programs, nearly all energy efficiency programs in the U.S. that focus on housing are utility sponsored. A literature review and analyses of these programs shows that whereas many have been successful to a point, there is still much that can be achieved with new program design (McGrory Van Wie, McNamara, & Suozzo, 2000). Many programs have been ad hoc, short lived, or too narrowly focused to have achieved all of the cost effective reductions in energy use that are available in the housing sector (Thorne, 2003). Over the past thirty years, rather than taking a more comprehensive approach, these programs have taken a “resource acquisition approach”. Energy savings are achieved by

offering rebates and other consumer incentives for *specific energy efficient products* such as appliances, lighting, heating and cooling systems, and water heaters. This is true for most programs today as well.

Utilities have relied on a resource acquisition approach because state regulators mandate that utilities report energy savings credited to a program and compare those savings with program costs. Utilities are able to measure assumed energy savings easily using a resource acquisition approach by multiplying the number of products sold by the increased efficiency per product. Measuring energy savings from a program that includes whole house energy retrofits is more difficult, and until now whole house programs have been fairly uncommon.

Employing a “whole house approach” to reducing energy consumption in homes requires seeing a home as a system of interacting components. Energy savings that are available by employing a systems-level approach are “generally many times what can be achieved at the device level” (Harvey, 2009). Reducing energy use through the whole house approach requires using a building science methodology that typically begins with an energy assessment (audit). The energy assessment then guides the work to be performed, which can include retrofitting a home’s thermal envelope, its heating and cooling systems, its lighting, appliances, plug-in devices, and may touch on occupant behavior through an informal or formal program of information and education.

The Consortium for Energy Efficiency (CEE)¹, whose members were responsible in 2009 for 88 percent of reported budgets for energy efficiency programs, recognized the need for

¹ The Consortium for Energy Efficiency (CEE) is a nonprofit public benefits corporation that develops initiatives for its North American members to promote the manufacture and purchase of energy-efficient products and services. CEE members include utilities, statewide and regional market transformation administrators, environmental groups, research organizations and state energy offices in the U.S. and Canada. The U.S. Department of Energy and Environmental Protection Agency both provide support through active participation as well as funding. CEE

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expanding its members' efforts to include whole house retrofits and remarked in 2008 that there was a "need to generate greater energy savings to meet aggressive targets....The obvious solution to addressing these challenges was to promote comprehensive efficiency improvements in existing homes" (CEE, 2010). Rebecca Foster, CEE's Principal Program Manager of the Existing Homes Working Group commented that although a few CEE members have employed a whole house approach for the last ten years, in general it is an idea that is new to most of the organization's 141 member programs in the U.S. and Canada. She also stated that gaining market penetration for home retrofits has been much more difficult than getting consumers to purchase specific technological fixes; "It is much more difficult to get people to go along with the messy process of having their homes torn apart for days, than to suggest that they need an efficient refrigerator" (personal phone conversation December 2, 2010).

Market Transformation

Along with a shift to include a whole house approach to efficiency, programs are stressing the creation of a *market transformation* that will generate a lasting demand for, and a stable supply of, energy efficient products and services throughout society. A market transformation occurs when a market intervention causes a reduction in market barriers and the reduction in barriers remains after the intervention ends, or is reduced (Eto & Schlegel, 1996). A market transformation also stimulates an evolution of a market "*to the point where further publicly-funded intervention is no longer appropriate*"-emphasis added (Rosenberg & Hoefgen, 2009). Whereas past programs have focused on generating consumer acceptance of particular products, mainly through offering rebates and other price incentives, a wider market

members accounted for 88% of reported spending for energy efficiency programs in the U.S. in 2009. Members' estimated savings impacts for 2008 totaled 104,900 GWh of electricity and more than 367 million therms of gas.

transformation has recently taken on broader acceptance as a means to reducing national energy use.

A market transformation is accomplished in part by working to create a change in society's values regarding wasting energy. A market transformation does not rely solely on the technological and economic (techno-economic) solutions to reducing energy use, but also relies on policy and social solutions (Randolph & Masters, 2008). A market transformation approach has the potential of producing energy savings not just in program participants, but across a broader spectrum of society. Although a market transformation approach is not new to the residential retrofit industry, it has taken on new urgency due to increasingly emphatic messages about climate change, and the federal government's recent push for energy efficiency.

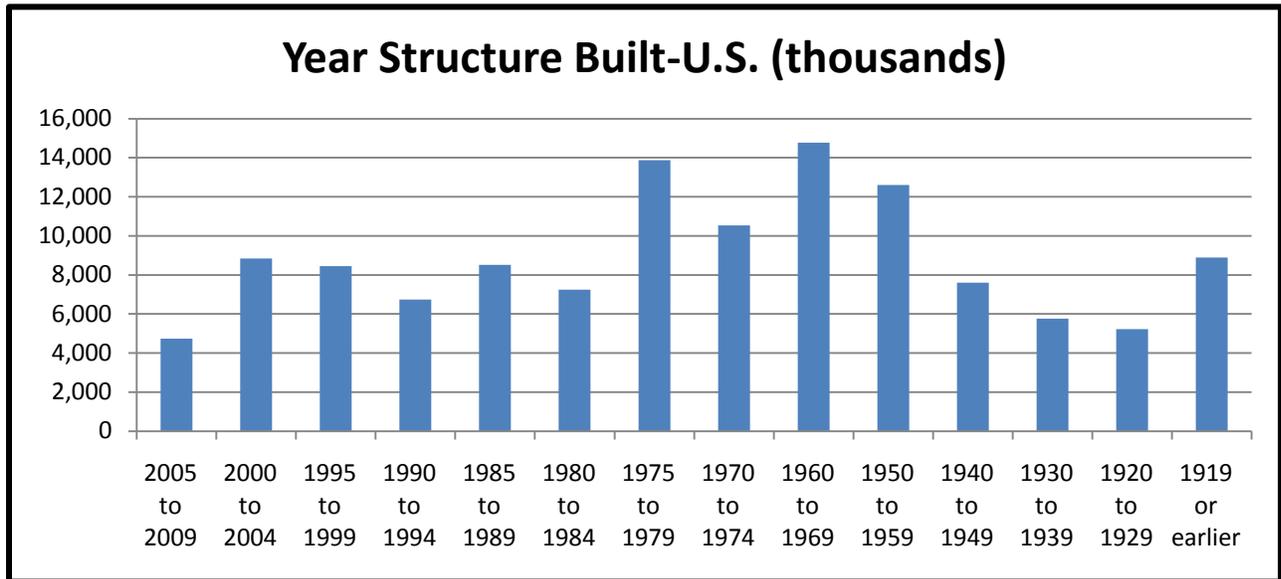
Research Focus

Throughout this thesis the focus for program design and development recommendations will be on existing owner-occupied homes, and in particular those that are not covered by state weatherization programs. A whole-house approach based on building science is taken along with employing techniques for creating a market transformation. Addressing energy losses associated with the existing homes sector is particularly important because of the size of the sector and its impact on energy consumption. Graph i-2 displays the age of the American housing stock. From the data we can deduce that 71 percent of the houses in the U.S. were built before 1992, with the median age house having been built in 1973.

Homes built before 1992 are particularly relevant to energy use because that was the year of the Energy Policy Act of 1992. The Energy Policy Act mandated that DOE participate in the model national codes development process and that the agency help states adopt and implement

progressive energy codes. Energy codes began to improve past this date, and newer homes became more energy-efficient. Implementation of energy codes by states prior to 1992 was

Graph i-2: Age of Housing Stock in U.S.



Source: American Housing Survey-2007

particularly spotty; in Virginia before 1973 localities could choose not to require an energy code for new home construction (DOE, 2010). As energy codes improved, newer buildings were built to more efficient standards,² but to date there are no programs that mandate the energy use improvement of older existing homes.

Whole house retrofits address the area of residential energy use that is not addressed by improved building codes and more rigid energy efficiency standards for appliances. As appliances and homes are replaced, the efficiency of the residential sector should automatically improve due to the new higher standards. But since homes last for decades, the long time-frame needed for the transformation to a more efficient stock of buildings will not address today's

² The 2012 International Energy Conservation Code (IECC) is slated to be 30% better than the existing 2006 IECC (DOE, 2010).

urgent environmental and security concerns. A successful effort at making existing homes more efficient through whole-house retrofits may be the only way to prevent a decades-long energy drain from the housing sector.

The inspiration for writing this thesis came from my involvement in an effort to form an independent energy-efficiency program in the New River Valley and Roanoke Valley region of Southwest Virginia. It became apparent after attending meetings with local stakeholders that we were attempting something new, and that a guide for establishing a non-utility based energy program would be an invaluable asset to us and others involved in the same effort. With that in mind, my attempt here is to create a readable primer for an audience of local government administrators, non-profits, and any others in Virginia who are, or will be, involved in establishing a locally run energy efficiency program.

This thesis provides an overview of existing academic and field literature on energy conservation and efficiency investments in buildings, in order to provide background and support for the creation of a set of guidelines for an energy efficiency program in Virginia. It is not intended as an exhaustive review on the literature of energy efficiency. The information presented is meant to serve as a source book of concepts, strategies and practical solutions for emerging energy programs in the commonwealth. The literature review focuses on identifying the structural, economic and behavioral barriers that keep individual homeowners from entering the energy efficiency market. Understanding these barriers is essential to successful program formation.

Research Questions

What are the barriers to homeowner investments in energy efficiency?

Are there added barriers in Virginia that must be overcome in order to increase homeowner investments in energy efficiency?

Assuming there are added barriers in Virginia, are there program elements that can be employed to overcome these barriers?

Hypothesis

There are market and other barriers to reducing energy use in existing homes. To be successful, a program of energy efficiency and conservation must include elements designed to overcome these barriers. These barriers will only be overcome through the sustained intervention of a professionally administered program. In order to achieve sustained intervention in Virginia the entity administering the program must become financially self-sufficient, while achieving overall cost effective energy reductions in its target area. To be cost effective, both consumer and program costs must be less than would have otherwise been spent for the energy conserved. The barriers to reducing energy use in homes are:

General Barriers

1. Occupant behavior.
2. Economic market barriers.
3. The lack of a professional home retrofit workforce.
4. The lack of appropriate financing.

Barriers specific to Virginia

1. Regulations of the Virginia State Corporation Commission and policy impediments in the General Assembly.

2. Permanent funding.

Methods

Research on the barriers to reducing energy use in the existing housing sector was conducted by performing a search and review of academic and professional journals. Journal articles were found through Google searches and through a search of the Virginia Tech Addison Library using the library's online search tools. Articles were chosen for inclusion based on the source, the article's relevance to residential energy efficiency, and the date of publication. Initial research was focused on discovering if there is a consensus, among experts in the field of energy efficiency, about which barriers to investing in efficiency are the most prominent. Once a list of the most prominent barriers was developed, each barrier was taken in turn to be discussed and analyzed.

Much of the background information on efficiency and related subject matter, as well as data collection, was performed by accessing the websites of the U.S. Department of Energy, U.S. Environmental Protection Agency, U.S. Census Bureau, Virginia Department of Mines, Minerals and Energy, Virginia State Corporation Commission, and other state and federal agencies.

Research on existing programs and current conditions was conducted through web searches and personal interviews of stakeholder professionals. Personal interviews were conducted person to person, by telephone, and through email exchanges. The people listed in Table i-1 were interviewed based on their connections to existing programs, financing, government oversight and policy, and contractor development.

Table i-1: Interviewees

Name	Organization	Method	Date
Cynthia Adams	Charlottesville LEAP	Phone, email, person to person	Several communications throughout 2010
Donna Ely	Federal Housing Finance Agency	Telephone	February, 2010
Rebecca Foster	Consortium for Energy Efficiency	Telephone	December 2, 2010
Steve Morgan	Clean Energy Solutions	Email	August, 2010
Jim McLain	Viewtech Financial Services	Telephone	August 12, 2010
H. Joseph Jones	Appalachian Power Company	Telephone	November 1, 2010
Dana Fischer	Efficiency Maine	Telephone, email	November 4-6, 2010
Patricia Mc Barron	Housing and Urban Development	Telephone	December 27, 2010
Judge Mark Christie	Virginia State Corporation Commission	Person to person	October 27, 2010
John Parish	National Association of Homebuilders	Telephone	July 26, 2010
David Eichenlaub	Virginia State Corporation Commission	Telephone	December 3, 2010
Dorian Dale	Long Island Green Homes	Telephone	February and August, 2010

Overview to Chapters

Initial research for this thesis resulted in the development of a short list of widely accepted barriers to achieving greater levels of energy efficiency in the existing housing sector. These five major barriers are individually discussed in each of the next five chapters. Each chapter looks in turn at a major barrier and offers suggestions on how good program design can help overcome the barrier.

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- Chapter II, “Economic Constraints to Investing in Energy Efficiency”, provides a discussion of some of the economic arguments both pro and con for investing in efficiency.
- Chapter III, “Behavior and Energy Use”, provides an analysis of consumers’ attitudes and behaviors about energy consumption, about conservation and about investing in efficiency.
- Chapter IV, “Financing Energy Investments”, describes existing options for financing investments in energy efficiency, explains the importance of appropriate financing, and proposes elements of a financing program that have strong potential to move the energy retrofit market forward.
- Chapter V, “Creating an Industry-Training a Workforce”, looks at the state of the “home performance” industry and analyzes some of the challenges of growing this industry.
- Chapter VI, “Efficiency in Virginia”, looks at the commonwealth’s official stance on energy efficiency and how one policy in particular stands in the way of achieving success in reducing energy use.

Building on the groundwork of the basics of efficiency laid out in chapters II through VI; Chapter VII, “Existing Programs”, describes several existing energy efficiency programs and explains how each deals with the barriers and challenges listed above. Chapter VIII, “A Self-Sustaining Program”, describes the essential elements needed in an energy program in Virginia and offers advice on creating a value-added self-sustaining program. The final chapter, Chapter IX, “Conclusion”, provides concluding remarks and a list of six specific recommendations for an energy efficiency program in Virginia.

Chapter II: Economic Constraints to Investing in Energy Efficiency

The “Efficiency Gap”

President Harry S. Truman once said that he wished he could find a “one handed economist”, who would not have the ability to say “on the one hand this, and on the other hand, that”. Current economic thought on whether the nation is investing enough in energy efficiency follows the two handed argument that vexed Truman, leaving economists unable to arrive at a single answer. Economists’ disagreement stems from two arguments that they have been debating for decades about a pair of fundamental concepts related to investments in energy efficiency, (1) does an “efficiency gap” exist, and (2) if it does, does it represent a market failure? Although the general consensus today seems to be that there indeed is an efficiency gap, and that it does represent a market failure, it is still useful to review both sides of the issue.

Economists define the term “efficiency gap” as the difference “between a consumer’s actual investments in energy efficiency and those that appear to be in the consumer’s own interest” (Golove & Eto, 1996). Importantly however, the theory of the gap deals with consumers *in the aggregate*. In other words, as a whole, in order to be economically better off, the nation needs to spend more for efficiency. Proponents argue that on average spending more on efficiency measures will lower our total costs over time to own our homes and use the energy consuming products we purchase. They arrive at this conclusion based on efficiency studies of individual buildings, which show that a large percentage of them could benefit economically from greater investments in efficiency. Aggregating these individual findings over the entire housing stock shows an overall efficiency gap. But opponents of the existence of an efficiency

gap claim that this is too narrow of a view and put forth their own arguments to support their case.

On the one hand... In defense of the existence of an efficiency gap, McKinsey and others put the average cost of conserved energy for many home energy upgrades at about one-half the cost of simply buying energy³. A 2010 review of electric and gas utility energy programs by ACEEE (Friedrich & Eldridge, 2009) puts the average levelized cost of electricity saved by these programs at a median cost of \$.027/kWh, while the national average cost for electricity for April, 2010 was \$.1175/kWh (DOE)⁴. In other words, in a basket of potential efficiency installations, the costs of an average installation, over the life of the installation, would be comparable to spending about one-fifth of what would have been spent to deliver this same energy service without making the investment. The investment is pretty cut and dry using the assumed energy savings based on an engineering analysis, but as mentioned in the previous chapter, the rebound effect will ultimately reduce some of the savings. These cost effective efficiency investments have the added advantage of making homes more comfortable to live in, and healthier. Assuming these analyses are accurate, there are obvious economic advantages to making energy investments.

³ Cost of Conserved Energy (CCE) is used to compare the cost of an energy investment to present and future energy prices. The formula is: $CCE = (IC \times CRF + O\&M) / AES$, where IC is the initial cost; CRF is the capital recovery factor (based on a discount rate); O&M is the annual operating and maintenance expense; and AES is the annual energy savings. A CCE analysis will return a dollar value for a unit of energy that can be compared with a current energy price (Randolph, 2008). Another way to look at the economic benefit of a particular investment is to use a Net Present Value over Life-Cycle (NPV) analysis. NPV analysis will return the total life-cycle savings (in present-day dollars), minus the initial cost of the investment. McKinsey uses an "NPV-positive" approach that is defined as "the present value of energy, operation and maintenance cost savings that accrue over the life time of the measure being equal to or greater than the upfront investment to deploy that measure when discounted at an appropriate discount rate". In their analysis of efficiency investments, any investment that has an NPV greater than 1, in comparison to its initial price, is cost beneficial (Choi Granade, 2009).

⁴ http://www.eia.doe.gov/electricity/epm/table5_6_a.html

Expanding on this, some economists argue that energy costs are artificially low because their high environmental and social costs are not included in their price (Gillingham, Newell, & Palmer, 2009). Because of this, energy efficiency investments are undervalued and the gap is actually larger than perceived. The undervaluation comes from the externalities inherent in the production and consumption of fossil fuels. These externalities include the support of non-democratic regimes through the purchase of petroleum, increased defense spending, military interventions, mountaintop removal, global warming, health effects, etc. Of course an increase in energy price for any reason makes investments in efficiency more valuable and the gap larger. What's more, most of the studies denying an efficiency gap are several years old and prices have increased over the last several years; therefore the efficiency gap has likely widened.

On the other hand... some economists complain that the efficiency gap either does not exist or is overstated. There are two general reasons they give for this: (1) the heterogeneity of consumers is not accounted for in gap studies and (2) gap studies do not properly account for perceived risk and hidden costs (Sutherland, 1991). Argument one is explained by pointing out that consumers are not all alike and that although some may benefit from home energy investments, many may not. These economists explain that to aggregate all consumers as a group ignores this fact and overstates the efficiency gap.

Reason two looks both at the high "risk induced" discount rate that consumers use when making efficiency investments, and various hidden costs of investing. Consumers have real concerns that an efficiency investment will not pay off for them and therefore will only invest in efficiency if they can expect a very high rate of return. Studies have shown that this discount rate is somewhere between 25% and over 100% (Sanstad, Blumstein, & Stoft, 1995). If consumers are right and efficiency investments are truly this risky, then there are valid reasons for not

making efficiency investments. Some economists argue that when taking this perceived risk into account, it reduces the actual efficiency gap.

The aforementioned hidden costs of investing are explained by the fact that most consumers are unable to accurately perform what amount to engineering calculations to determine their actual energy savings from a particular product, making their costs and savings difficult to gauge. The end result is that benefits that are difficult to calculate, added to the opportunity costs associated with researching options and other transaction costs, can explain any remaining efficiency gap. Argument two can be better understood by accepting the concept that even though it *may* be cost effective to make an investment, there are valid factors that prevent the investment from occurring. Since the efficiency gap is defined as investments in energy efficiency “that appear to be in the consumer’s own interest”, and to the consumer there are valid reasons why investing doesn’t appear to be in their best interest, there is no gap.

A point that should be made clear about the very high discount rate that consumers use to evaluate efficiency investments is that it only represents the private discount rate. Some research finds that “the social discount rate on conservation investments is likely to be below the private rate, even in the presence of a relatively competitive conservation market. The private sector will therefore under-invest in energy efficiency as compared to a social optimum” (Sutherland, 1991).

It would be nice at this point to provide a conclusive answer as to the existence of an efficiency gap, but we have to be satisfied with the understanding that there is still a debate amongst economists as to its existence. It is important to realize however that the arguments against the gap can be assuaged by good program design. If there is a concern about aggregating efficiency potential (argument 1), then a program manager needs to understand that there are some homes for which an investment will be cost beneficial and some where it will not.

Argument 2 can be overcome by providing information and tailored technical analysis for each consumer to help them overcome not only their concerns with risk, but to overcome the majority of the risk itself. Opportunity costs associated with researching alternatives can also be overcome by providing a “one stop shop” for home energy investing. It must also be remembered that in a world of quickly rising energy prices, an efficiency gap that did not exist yesterday will exist tomorrow.

Market Failures

There seems to be general agreement amongst economists that there are several market barriers and market failures to investing in energy efficiency. A 2007 report by ACEEE describes the barriers this way: “Classical economics considers that market failures occur when barriers are found to inhibit actions that would increase both energy efficiency and economic efficiency. In this context, if a barrier is found to inhibit investments that would be cost-effective in a generally accepted economic framework, it would be termed a market failure” (ACEEE, 2007). Jaffe and Stavins (1994) note that “if there is an intervention that is net beneficial (enhances societal welfare) for a specific market barrier, then this market barrier is a market failure and we have a justification to intervene” (Eto, Prahl, & Schlegel, 1996). These comments suggest that there is general agreement that some market barriers rise to the level of market failures. This is important because many economists seem to agree that when market failures occur, intervention into the market may be justified.

A list of barriers to investing in energy efficiency are included in Table II-1.

Table II-1 Market Barriers and Failures

Market Barriers	Market Failures
Misplaced incentives	Misplaced incentives
Lack of access to financing	Insufficient and inaccurate information
Flaws in market structure	Unpriced costs (negative externalities)
Mispricing imposed by regulation	
Decision influenced by custom	
Trust	
Lack of information or misinformation	

(Golove, 1996; Brown M. A., 2001)

That these lists overlap suggests that barriers and failures often are interpreted differently by different economists.

Although some of these barriers are outside of the powers and scope of a local energy program to effect, some others are readily accessible by good program design, which will be covered in a later chapter. It naturally follows that any residential energy program must be based on an understanding of these barriers and must be focused on overcoming them. It is important to initially understand that there are known and accepted reasons why optimal consumer investments in efficiency have not been made already, without help from outside the marketplace. Knowing about and understanding the practical aspect of these market barriers and failures that keep consumers from investing in efficiency are essential to the success of any residential energy efficiency program.

Chapter Conclusion

Awareness of the economic rationale behind an average consumers' reticence to invest in energy efficiency needs to guide program development. Eto points out that "the arguments against energy efficiency ... agree that market barriers exist and lead to under-investment in energy efficiency. Opposition opinions differ only regarding what (if anything) can or should be

done about these barriers” (Eto & Goldman, 1998). Although not all barriers to investing are within the grasp of a local program, such as the unpriced costs of energy due to externalities, many barriers can be addressed through program design. These barriers, with example strategies for overcoming them, include:

1. **Misplaced incentives:** an example of which is the rental housing market. Tenants’ responsibility for their own energy bills relieves building owners of much of the financial incentive to invest in efficiency. Outreach to rental building owners with an aim to create energy certifications for rental units can help provide incentives for building owners to make their buildings more efficient. These energy certifications can create competition for renters that would drive investments in efficiency.
2. **Lack of access to financing and the first cost barrier:** financing for efficiency investments needs to be tailored to meet the specific demands of this type of investment. Working with capital sources in designing a finance program requires understanding why most currently available financing models are not optimal. (See next chapter).
3. **Lack of information:** effective efficiency programs are in large part educational programs. The message may vary with the audience, whether it is focused on the economic benefits of investing in efficiency, the environmental and security benefits of reducing energy use, or a home’s increased air quality and comfort level, getting the message out while creating public trust is an essential element of spurring demand.
4. **High transaction costs:** by creating an easily accessible “one stop shop” for energy efficiency services, transaction costs can be severely limited. The one stop shop offers general information on efficiency, energy assessment and contractor services, financing opportunities and rebate information all in one location.

5. Perception of risk: the final concern, and a major one, should be for consumers' perception of uncertainty and risk when it comes to investing in efficiency. Behavioral studies have shown that people tend to give minimal weight to probable outcomes compared to the weight they give to certain outcomes (Kahneman & Tversky, 1979). If the returns from investing in efficiency can be made more certain, consumers will be more willing to make the investment. Creating a high level of certainty of the savings from an energy retrofit comes from creating partnerships with contractors who have been trained in building science and certified by a recognized certification organization. Making a workforce available that has the appropriate training and certification necessary to perform whole house retrofits should also engender trust in consumers. Contractor training and certification is addressed in Chapter five.

Chapter III: Behavior and Energy Conservation

Introducing behavior as a resource

The behavior of a home's occupants, as it pertains to how they use energy in the home, is often overlooked in energy program formation and practice. Past programs tended to rely on engineering and economic models when attempting to facilitate a reduction in energy use (Ehrhardt-Martinez, Laitner, & Keating, 2009), but in the end the attitudes of a building's occupants and their behavior about energy use play an equally large role in energy consumption. A 2007 study by British researchers points out that "policy makers should be more aware that...reduction targets will rely on individuals using energy efficiently and those individuals operate in a social context and the influence of cultural, social and emotional influences cannot be underestimated" (Faiers, Cook, & Neame, 2007). Occupant behavior is seen affecting energy use in two general ways; either through purchase decisions or through attitudes about actual energy use (conservation). The primary focus of this chapter is on behavior as it relates to conservation, whereas purchase decisions are better explained in Chapter III: "Economic Constraints to Investing in Energy Efficiency".

For the purposes of this thesis, conservation of energy is synonymous with curtailing energy use. Appalachian Power Company (APCO) in their Integrated Resource Plan describes energy conservation in this way, "Often used interchangeably with efficiency, conservation results from *foregoing the benefit of electricity* either to save money or simply to reduce the impact of generating electricity" (APCO IRP p. 70-emphasis added), but conservation does not necessarily mean foregoing the benefit of electricity. Conserving energy can eliminate energy waste that does not reduce benefits, such as turning off lights in an unoccupied room or adjusting

a thermostat when away from home. Other examples of conservation include washing clothes in cold water, taking shorter showers, turning the heat down, etc. APCO's definition likely arises from its unique position of profiting from the sale of energy.

On the other hand, energy efficiency refers to providing an equal level of energy service or function while using less energy. Efficiency does "not require any change in the end result, that is, the functions provided, people's behavior, and standard of living" (Randolph & Masters 2008). Examples of efficiency investments include purchases of efficient appliances, home attic insulation or a high efficiency heating and cooling system. In both conservation and efficiency, attitudes about energy motivate behavior and affect the amount of energy used. But whereas investing in efficiency can be seen as a one-time decision that leads to an "automatic" reduction in energy consumption, energy conservation requires ongoing efforts.

ACEEE estimates that "behaviors that drive new innovations and behaviors that change patterns of technology adoption and energy consumption" in the United States might be tapped to increase our effective energy supply by twenty-five percent or "possibly more" (Ehrhardt-Martinez, 2008). On the individual level, user behavior alone can account for up to thirty-three percent of a home's energy use (McCalley & Midden, 2002), and some research suggests that the variability of energy use between identical homes, due solely to the behavior of the home's occupants, can be a factor of three (Faiers, Cook, & Neame, 2007). Occupant behavior can also have profound effects on the assumed efficiencies from installed equipment. Programmable thermostats can be overridden, CFL light bulbs can be left on 24/7 and Energy Star refrigerators can be left on during extended vacations. Assumed energy savings based on engineering models, from energy efficient appliances to energy retrofit remodeling, can quickly be negated by

occupant behavior. Once occupant behavior is separated from “hard wired” efficiency measures, it can easily be viewed as an untapped energy resource.

Unfortunately, in order to help us understand and tap this behavioral resource we are mainly relying on research that is now at least twenty-five years old. According to a report by ACEEE, “While there has been a notable re-emergence of interest in and work on behavior and energy issues, the lack of research since the mid-1980’s has resulted in significant gaps in our knowledge regarding effective behavioral approaches” (Ehrhardt-Martinez, 2008). This lack of behavioral research is fueled in part by a prevailing belief that understanding human behavior is simply an exercise in understanding the obvious. To counter this, there has been a call in recent years for an increase in energy use behavioral studies. Some of these studies could be carried out simultaneously with energy programs; but only if an effort is made from the start to collect the necessary pre and post energy use data and behavioral patterns from program participants.

Behavior (conservation) versus engineering (efficiency)

Viewing energy use through a behavioral lens is the counterpart to viewing energy use through the “Physical Technical Engineering Model” (PTEM); and as mentioned above, the engineering paradigm will always be limited by the behavior of the end-users of technological innovations. Most of the existing energy programs today, and those from the past, have centered their efforts on a technical and economic model that lends itself to quantifiable gains in efficiency (Ehrhardt-Martinez, Laitner, & Keating, 2009). Behavior has taken a backseat due in part to the difficulty in measuring the effectiveness of behavior modification programs. Whereas measuring perceived efficiency gains from an installed product is relatively easy, measuring gains from a broad effort at changing behavior can be more challenging. Campaigns to change

behavior have virtually un-measurable spillover effects that may permeate an entire region; but they also have the possibility of delivering long term benefits through changing cultural norms (look to anti-smoking campaigns as an example). Behavior can complement, enhance, or negate gains made through the PTEM.

Knowing how to engage the public in behavioral change requires a study of social science. The overall goal of reducing residential energy use will require the efforts and expertise of both the technical/economic models and the behavioral /marketing branches of knowledge. A 2005 review of intervention studies aimed at household energy conservation had this to say about including different disciplines in an effort to reduce household energy use:

“It is therefore important to consider household energy conservation from a multidisciplinary perspective. For instance, sociologists can provide more insight into macro-level factors that shape household energy use. Also, input from environmental scientists can be of valuable importance to further improve intervention studies. The environmental sciences can help translate energy-related behaviors of households into their environmental impact, e.g. in terms of CO₂ emissions, and help select high-impact behaviors” (Abrahamse, Steg, Vlek, & Rothengatter, 2005).

Anything short of a holistic approach that borrows from both the social sciences and engineering will be destined to partial success at best (Wilson & Dowlatabadi, 2007). As ACEEE researcher Karen Ehrhardt-Martinez states, “An interdisciplinary social science approach is likely to offer the broadest set of resources for effectively addressing [the challenge of energy efficiency]” (Ehrhardt-Martinez, Laitner, & Keating, 2009). As an example, energy-efficiency programs could look to past successful efforts at engaging the public, such as anti-smoking and seat belt use campaigns, as templates for motivating behavioral change. Since past efforts at

curbing energy use in the United States have relied primarily on the physical-economic model, adding behavior change to the mix will require the employment of new methods and techniques.

Changing consumer behavior requires an entirely different focus than relying on PTEM to decrease energy use. For instance PTEM relies on the adoption of efficient technologies, and the product rebates necessary for gaining market penetration for these new products. Rather than simply marketing a particular product, behavioral change focuses on nothing less than social change (Jorges & Muller, 1983). Energy programs need to see the necessity for creating a change in social mores as much as they need to focus on the need to change light bulbs, because ignoring behavior as it relates to energy use equates to ignoring the finger that controls the on/off button. A recent study from Oxford University's Environmental Change Institute concludes that unless there is a change in behavior or lifestyle among the general population, we "will not achieve, by 2020, the reductions in carbon emissions needed to achieve sustainability by 2100" (Therivel, 2000).

Examining Current Behavior

Assuming then that behavior is an important aspect of saving energy, exactly what are the prevailing behaviors of the American public towards energy use? The Shelton Group, a marketing company specializing in consumer attitudes towards sustainability, performs an annual survey which includes questions about the public's attitudes towards energy use and conservation. The 2009 proprietary report obtained for this research finds that sixty percent of the respondents say that they've changed their behavior at home in order to conserve energy (SheltonGroup, 2009). The survey result suggests that, at the least, energy use is on the radar screens of a majority of Americans. But when asked the question: "Assuming you were suddenly

given \$10,000 to make home improvements, which two of the following would you choose?" seventy percent responded that they would either replace their home's carpets, or remodel their baths and kitchens before considering spending the money on efficiency. The response that got the next highest rating was "replace windows with high efficiency models", followed by "replace furnace with a high efficiency model". Granite countertops and new toilets trumped reducing energy use regardless of the reported change of behavior at home.

Consumers are also inadequately informed about the environmental impacts of their home's energy use. The authors of the report conclude that: "Consumer understanding of electricity generation and consumption remains low, with most underestimating their overall energy use, misunderstanding the impact of various electric devices in their homes, and failing to connect home energy consumption to carbon dioxide (CO₂) and global warming. (SheltonGroup, 2009)" An international survey by Accenture that included just over 1,000 Americans confirmed the Shelton Group's findings.⁵ When asked if "Electricity consumption of individuals has a negative impact on the environment" only thirty-eight percent of the American responses were positive. In the Shelton survey, when asked what the number one cause of global warming is, thirty percent answered Cars and trucks as the number-one cause of global warming (30%, down slightly from 33% last year), followed by manufacturing plants/industry (24%). There was a big increase in the percentage answering "deforestation" this year (11%) and the percentage responding "don't know" dropped by half to 9%. However, the percentage who knew coal-fired electric plants generate the most carbon dioxide remains low at 3%. In reality average emissions associated with residential energy use are about on a par with the emissions from cars and light trucks (EIA, Annual Energy Review 2009). Consumers also felt that replacing their windows

⁵ Accenture is a global management consulting, technology services and outsourcing company. The survey referenced was implemented in 2010 with over 9,000 participants in 17 nations.

was more important than adding insulation, whereas the opposite is true in most cases. A similar survey by McKinsey and Company found that only fifteen percent of homeowners thought that increasing the amount of insulation in their homes was important to reduce GHG emissions (ACEEE, 2009). All in all an informational disconnect exists between home energy use and its environmental impacts.

There also is a lack of knowledge about the end-use energy demands of homes. Nearly one-third of the respondents answered that taking a bath uses less energy than taking a shower; yet in reality taking a shower uses between one seventh and one third the water-and energy to heat that water-of a bath. A large majority (70%) of respondents also thought that washing dishes by hand uses less water than washing by dishwasher. The fact is that an Energy Star dishwasher will use about one-half or less water than a typical hand wash. A majority of respondents were also unaware of standby power requirements (energy being used even when the device is not turned on) from many plug in devices, whereas researchers at the Lawrence Berkeley National Laboratory state that "...a typical American home has forty products constantly drawing power. Together these amount to almost 10% of residential electricity use" (<http://standby.lbl.gov/>). It would seem that most American's behavior regarding energy use is one of good intentions, followed by a lack of understanding.

Fortunately there are several strategies and tools that a well designed energy program can employ to help consumers make good on their good intentions. Behavior changing strategies can include grassroots marketing, education and outreach programs, all with an aim to changing social norms. Energy program administrators can look to marketing research and sales methods in order to create a demand for conservation. Peer pressure can play a large part in this process. Engagement with clubs, religious organizations and civic groups can be an outlet for education

and outreach. Community wide and individual goals for reduced energy use could be proposed and contests held to drum up excitement and support. In short, these strategies should focus on emotional rewards associated with goal attainment rather than on financial leverages such as rebates (financial rewards are discussed in a later chapter).

Behavioral Change Strategies

Feedback:

The programs mentioned in the previous section target the community as a whole. An important method for changing energy-use behavior in individual consumers comes from giving them timely feedback on their energy use. Energy savings associated with providing homeowners with instantaneous feedback has been found to be in the range of five percent to fifteen percent (Parker, Hoak, Meier, & Brown, 2006; Darby, 2006). When feedback is coupled with energy reduction goals and homeowner education, energy reductions can be on the order of 20% (McCalley & Midden, 2002).

Over the last few years several consumer friendly and affordable tools have entered the marketplace that can be used to track energy use and carbon emissions in real time. These tools range from energy meters that a single device can be plugged into, to whole house energy use monitors. Recent studies in Canada and Japan have shown that monitoring home energy use and providing the information to homeowners in real time can reduce energy consumption by 12% to 18% (Ueno, Inada, Tsuji, & Saeki, 2005; Mountain, 2007) . However, a recent review of home energy monitor studies questions the longevity of the energy savings. The author points out that “the general trend seems to be that feedback devices slowly drift into the background [of people’s consciousness]” (van Dam, Bakker, & van Hal, 2010). It should be noted however that none of the studies reviewed included goal setting as part of their experiment.

A Guideline for Establishing Local Energy-Efficiency Programs in Virginia

As a program element, consumers could be provided with inexpensive home energy monitors that graphically display their energy use, GHG emissions, and dollars spent throughout the day. These monitors could be provided along with a program of goals and rewards. Rewards could be inexpensively provided by partnering with local businesses to offer coupons when goals are met.⁶ Since home energy monitors are less than half the price of a thorough energy assessment, they may provide a better initial investment for getting homeowners involved in energy saving.

There are few services or products that consumers purchase where, like energy, they do not receive timely feedback of the incremental costs of buying more. Imagine what it would be like for consumers if they were billed for groceries in the same way that they're billed for energy. Nothing in the supermarket would be individually labeled with a price, and there would be one summed up bill for groceries at the end of each month. Consumers would have no idea whether they spent more for steak or for potatoes. Such is the current case with energy. Most people don't have a strong idea of how much they are using or spending at any point in time; and if they cannot measure it, they will not reduce it.

Targeted Messages:

Having a fundamental knowledge of basic behavioral studies as they relate to energy use will help a program manager to frame marketing campaigns and develop techniques for program participation. Framing the issue of energy use can be particularly important. For instance, people respond better to messages that decry waste than they do to messages that promise savings.

Aversion to loss is a bigger motivator than the hope of a gain (Kahneman & Tversky, 1979). The

⁶ Virginia Energy Sense, an energy information source established by the Virginia State Corporation Commission, provides coupons for energy savings. "Energy Tracker" powered by Earth Aid, tracks energy use at nearly every utility in the Commonwealth and allows consumers to earn rewards from more than 245 local businesses when they succeed at saving energy.

Shelton Group found this to be particularly true, or useful, when dealing with higher income consumers. They state in Energy Pulse 2009: “We think that most would be horrified if actually confronted with the value of the energy they're wasting each month and that a ‘don’t waste’ message potentially has more power than a ‘save money’ message”. With this knowledge in hand, a program manager will more likely drive an ad campaign with a message of how much an average homeowner wastes each month on their energy bill (which is a certainty), rather than pointing out their potential savings (which is an uncertainty).

Goal Setting:

Goal setting and social marketing are two other important tools to drive behavior change. A goal, whether it is assigned by a program or an individual, provides a standard by which a person can judge if the feedback provided to them represents good or poor performance (Locke, 1991). Goal setting works best if used in conjunction with feedback, and both achieve higher results if used together rather than separately. In fact, Mc Calley and Midden go further and state that “a goal without feedback is useless and feedback that does not match an existing goal is of little use” (McCalley & Midden, 2002). As an employable tool, goal setting can be used as a motivator in driving public participation through competitive challenges and contests. Used in conjunction with a home energy monitor, goal setting has the potential to create substantial results for the individual homeowner.

Social Marketing:

Social marketing employs a normative approach to educating consumers in an effort to effect behavior change. Stressing social norms can be a powerful motivator that has a multiplying effect on individuals asked to make certain changes in behavior (Van Raaij & Verhallen, 1982). Social marketing has been used effectively to change a variety of behaviors

from seat belt use to cigarette smoking. In a study designed to reduce residential electricity use, researchers found that providing “high-energy-consuming households with descriptive normative information regarding the average home energy usage in their neighborhood constructively decreased energy consumption” (Schultz, Nolan, Cialdini, Goldstein, & Griskevicius, 2007). When average energy use in a neighborhood or region is available to an energy program, an informational campaign using a normative approach, that informs high energy users of their usage relative to their neighbors, can have a powerful positive effect.

The Rebound Effect

Research has found that too often consumers have a tendency to use more energy after an energy retrofit than before, or that the retrofit has not achieved expected savings (Greening, Greene, & Difiglio, 2000). Once a consumer realizes that they can now provide themselves with more energy services for less money per service, they tend to overuse energy. For instance, after the first month’s lower energy bill arrives, a consumer may decide that he can now afford to raise the temperature of his water heater, buy a large screen television and indulge in 72 degree summer cooling and 78 degree winter heating. For the individual consumer, this may not be such a bad thing, since they are raising their overall economic utility, but it does nothing to achieve the other goals of reducing energy usage.

This phenomenon of increased post retrofit energy use raises two questions: how prevalent is the problem, and how can it be prevented? The answer to the first question is important enough that the journal *Energy Policy* devoted an entire issue in 2000 to research focused on the empirical evidence supporting the rebound effect. A summation of the several papers on the subject in that issue reveals that the rebound effect negates something like 10% to 40% of the expected savings from efficiency investments (Schipper, 2000). The journal then

points out that this amount refers to the direct effects within a consumer's home; but that energy use is also increased outside the home because the freed up capital from savings on energy purchases causes an increase in overall spending- some of which entails energy use. But importantly, money saved can also be spent on investing more for efficiency or for renewable installations. Separate studies of rebound effects on specific end-uses by the International Energy Agency and Greening et al are summarized in table III-1.

Table III- 1: Summary of Empirical Evidence of the Rebound Effect in the United States

Sector	End Use	Size of rebound effect
Residential	Space Heating	10-30%
Residential	Space Cooling	0-50%
Residential	Water Heating	<10-40%
Residential	Lighting	5-12%
Residential	Appliances	0%

(Geller & Attali, 2005).

The second question- how can the rebound effect be prevented- lies entirely in the realm of behavioral change. Efforts focused on changing behavior are the only way to foster a sea change in peoples' attitudes about energy use. It does no good to create more and more efficient homes and products every year if people are going to see this as an opportunity to buy bigger homes and more energy consuming products. In response to this counterproductive attitude, the zero energy consuming home must be elevated to high social status.

Changing consumer behavior is a challenging goal for all energy reduction programs. Unlike installing an engineered fix in a home, such as a high efficiency furnace or more insulation, behavioral change requires a sustained effort and constant vigilance. Furthermore, intervention techniques that only change one specific type of behavior, and then only for the

duration of the intervention, have limited practical value. But if a particular behavior can be incorporated into society at large, that is if it can become the norm, as described below, then it can have lasting, even generational, effects.

A 2004 experiment by a team of researchers in the Netherlands, found that if certain factors are included in an energy reduction program, household environmental behaviors actually continue to improve two years after the end of a behavior based intervention program (Staats, Harland, & Wilke, 2004). This was accomplished by relying on techniques that combined (a) detailed procedural information, (b) individual performance feedback, and (c) a supportive social environment (Staats, Harland, & Wilke, 2004). The researchers formed “Eco-Teams” from groups of six to ten people who were already acquainted with each other. The teams were given workbooks with instructions on how to perform specific tasks such as lowering energy consumption and reducing waste. The teams then met once a month to discuss their results and to support one another’s efforts. The supportive social environment that the experiment created mirrors, on a smaller scale, precisely what would occur if an entire society’s values regarding energy use were changed. It is not too difficult to imagine that with a change in values, it would become as socially unacceptable to waste one-third of the energy in our homes as it is to, when filling up our cars, spill one out of three gallons of gasoline on the ground

Chapter Conclusion

If people were more proactive about abating the amount of energy that they waste in their homes every day there would be no need for creating programs to stop wasting residential energy. Consumer’s concerns would create a demand in the market, and the market would create a supply of efficiency products and services to fill the demand. Instead we find a general attitude of resigned acceptance of the amount of energy it takes to fuel a household, even though a large

portion of the purchased energy goes out the window. Historically low energy prices have created a mind-set that reducing the amount of energy wasted is not worth the effort or expense of re-claiming it; and this fact is particularly true in Virginia.⁷ With rising energy prices, concerns about climate change, and energy security, attitudes are poised to change, but people are caught up in old habits of thought about using energy. Changing these behavioral traits will require concerted and persistent effort.

The key to unlocking this change of attitude, and to creating a stronger demand for efficiency, is marketing. Marketing must be a major component of any efficiency program, and program managers should seek out marketing professionals to advise and guide program implementation. Energy efficiency has too long been a supply of products and services looking for a demand. Marketing is the key to informing the public about the advantages of investing in efficiency and it is the essential element needed to drive demand.

Energy program managers, who mostly hail from the ranks of public policy, engineering and environmental professionals, cannot expect consumers to be motivated by the same macro-economic and seemingly distant environmental concerns that motivate them, and program marketing should reflect this fact. (A March 2010 Gallup poll found that only half of Americans believe that global warming has human causes.) For most consumers to willingly invest thousands of dollars in making their homes more energy efficient, arguments central to consumers' lives must be put forward. Program managers must understand that the success of their program comes in part from deciphering individual motivations. They need to recognize that they are providing consumers with a product that consumers have traditionally not been motivated to purchase. As Suzanne Shelton, CEO of the Shelton Group, points out, an energy

⁷ Source: "Virginia's historically low retail electric rates have provided less of an incentive for efficiency". (VA State Corporation Commission, 2009)

program needs to “laser target an audience”, understand what motivates them, and then “create campaigns and messages that play to those motivations” (Shelton blog, accessed August 3, 2010).

Finding those motivations is one of the biggest challenges a program will face. Motivating a larger number of consumers requires focusing on more than their environmental concerns or how much money they can potentially save. There will be segments of the market that will be motivated by national energy security, personal energy independence or will simply have an aversion to waste. Others may be more motivated by the added comfort and health benefits that come from living in an energy efficient home, and are not so concerned with their financial payback or the global environment. A 2008 study on efforts to engage consumers in investing in efficiency found that “identifying populations that respond similarly to commodities and marketing messages can provide a powerful method from which to design and spur the adoption of products, services, and ideas” and that “segmentation schemes tailored to residential [utility] customers typically focus on attitudes and motivations” (Moss, 2008).

The default for a program that does not stress environmental degradation as a motivational tool is to focus on the consumer’s pocketbook. Yet energy expenditures as a percentage of the average American’s budget are still too low to confidently spur demand for efficiency. According to 1997 figures from the Energy Information Administration (EIA), American households with more than \$25,000 of income spent just 3.8% of their budgets supplying energy to their homes. Further, the Shelton Group reports that over 50% of their poll respondents would be willing to spend an added \$100 or more per month for energy before spending money on “significant energy-efficient improvements” (SheltonGroup, 2009).

Motivating consumers to change their behavior about energy use and to invest in efficiency are large hurdles to surmount; yet both goals must be accomplished in order to gain an appreciable market size. Overcoming these hurdles has been a challenge for energy programs since their inception. Even successful long-standing programs have achieved fairly low levels of energy reduction.⁸ Seeking out social scientists and marketing professionals to formulate appropriate marketing schemes can help to increase the public's awareness of, and interest in, the benefits of investing in efficiency.

⁸ Austin Energy has, since 1982, only had 12% of its customers participate in any sort of efficiency program offering; this includes rebates and loans (HPRCenter, 2010).

Chapter IV: Financing Energy Investments

The First Cost Barrier

The “first cost barrier” is one of the more significant barriers that needs to be overcome when making investments in energy efficiency (Fuller, 2008). Even when consumers are convinced that in the long run they would be better off to make investments in energy efficiency, the initial cost is enough to keep them from acting. This is particularly true for whole house retrofit programs where initial costs can approach ten thousand dollars or more. Creating a financing program that can essentially negate the first cost barrier is critical to achieving a high percentage of market penetration⁹. To do this, a financing program must overcome consumer reticence to take on more debt, as well as push investments in efficiency to the front of a consumer’s list of spending priorities. A financing program with a payment scheme that lowers payments to near the level of energy savings can help do this.

Energy programs in Virginia currently have only a few financing options to offer consumers, and according to Steve Morgan, President of Clean Energy Solutions;¹⁰ “if one cannot do PACE¹¹ or on utility bill financing, the next best options are considerably down the list in customer appeal” (email correspondence). Two logical questions follow: (1) how important is consumer financing to the success of an energy program, and (2) can the financing options available to Virginia based programs be modified to make them more attractive to energy

⁹ The Long Island Green Homes program offers consumer financing based on the PACE model, and on its website states that “Long Island Green Homes foots the entire upfront costs of the improvements”. This, along with structuring loans so that payments equal savings, has allowed the program to convert four out of five energy assessments into retrofits.

¹⁰ Steve Morgan is the president of Clean Energy Solutions: an energy consulting firm that helped establish the Cambridge Energy Alliance, the Greater Cincinnati Energy Alliance and others.

¹¹ Property Assessed Clean Energy: PACE financing is explained later in this chapter.

investors? To answer the first question we need to know how important it is for a consumer to have an attractive finance program to overcome the first cost barrier to making an energy investment. A published review in 1985 of three residential energy loan programs in the U.S. (Stern, Berry, & Hirst, 1985), found that from 55% to 78% of the participants in these programs would not have made their efficiency investment without the available low interest loan program. It is probably safe to assume that all consumers, except those in the highest income brackets, would need to borrow money to pay for more extensive retrofits and that the construct of the loan program will strongly impact their decision to invest.

Finance Models

There are five main varieties of financing models that have been used in the past to fund energy efficiency projects for homes. Each has benefits and drawbacks, and only three are currently available in Virginia. The five models are:

Unsecured loans:

Just about the only good thing about unsecured loans for financing energy efficiency is that they are widely available from local lenders in Virginia. However, their usefulness in financing energy retrofits is limited due to their high interest rates, short terms, and unavailability for certain borrowers. Some of these negatives can be overcome with “credit enhancements” that can be used to drive down the interest rate and widen the pool of acceptable borrowers. Credit enhancements can include setting up a loan loss reserve fund with the lender, or buying down the interest rate with other funds. But both of these remedies tie up funds that could be used for other program necessities.

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Fannie Mae also offers an unsecured loan that can be used for energy efficiency projects in one's home. It's a fairly popular finance product in California and over the last fifteen years has made about 100,000 loans at rates that have gone as high as 14% (Fuller, 2008). Viewtech Financial Services based in California is licensed to offer these loans in Virginia and would act as a loan program administrator for an energy program. According to Jim McLain of Viewtech, the company usually works with utilities in establishing these loan programs, but Viewtech is willing to partner with an established nonprofit in Virginia (phone conversation 8/12/2010).

Secured loans:

Secured loans include home equity loans as well as loans that accept some other form of collateral such as an automobile, or the equipment being installed. Secured loans can be used to finance efficiency improvements, but the need for collateral locks some potential borrowers out of the market. However if collateral is available, the interest rate will usually be lower than an unsecured loan and the term can be longer. Secured loans are also widely available from banks in Virginia and their rates can be lowered using the same credit enhancements as unsecured loans.

Energy improvement mortgages (EIM):

EIM's should not be confused with Energy Efficient Mortgages (EEM), which are used to stretch the underwriting criteria of potential home buyers, or to lower an interest rate for a buyer. EEMs are available for homes that have been built, or are being built, that have been certified by an accepted certification system, such as Energy Star. EIM's on the other hand are a Fannie Mae product and are used to include proposed efficiency retrofits into a mortgage when buying an existing home. The biggest problem with EIM's is that they complicate an already complicated process: buying a home. They also require time to assemble, and during that time a

homebuyer may lose the home they are bidding on. The Residential Energy Services Network (RESNET) puts the time for processing an EIM at about five weeks from the signing of a sales contract to closing. A local energy program could conceivably shorten this time by having all of the pieces in place for a buyer so as to streamline the process.

Tariffed Installation Program (TIP):

TIP is also known as Pay As You Save (PAYS), is an “on- bill” financing mechanism that, although not widely available, provides several advantages for consumers. TIP programs work by having either a utility or a third party absorb the first cost of an energy retrofit or other energy efficiency installation, and then allow the homeowner to pay back the loan as an increase to their utility bill. These forms of on bill finance programs require a network of certified contractors and assessors working with the finance program to provide program prescribed services. This is a fairly new type of program and its acceptance by utility companies has been very limited.

Utilities have two major concerns with TIP programs:

1. Utilities don't want to be responsible for, or pay for, the cost of administering these loans.
2. TIPs programs generally require shutting off the power for non-payment, and utilities are afraid of the bad publicity that would follow after shutting off a customer's power¹².

¹² A study by the Energy Efficiency Institute and the Pace Energy Project confirmed that the possibility of disconnection dramatically decreased the number of defaulting customers (DASNY, 2008).

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Because of this, less than 6 of these programs currently exist for homeowners in the U.S.

Midwest Energy in Kansas and First Electric Cooperative in Arkansas are two of the oldest. Both utilities are customer owned cooperatives, and neither has a penalty of utility disconnection for non-payment. (There are a few more utilities that offer on bill financing to small businesses and local governments, but not to homeowners).

Locally based energy programs would probably have more leverage dealing with co-ops and municipally-owned utilities (muni's) than investor owned utility companies. There are thirteen customer owned electric cooperatives and muni's serving sections of Virginia. The largest of these is NOVEC in Northern VA with 142,000 customers. Energy programs set up in areas served by one of these customer controlled co-ops or muni's may have a better opportunity to set up on bill financing programs than the rest of the state, which is covered by three large investor owned utilities. On September 16 of this year, the U.S. House of Representatives passed a "Rural Star" bill (H.R. 4785) to help customers of electric coops finance energy retrofits. The program, to be administered by the Agriculture Department, would make zero interest loans to coops that would then make low interest loans to their customers. The loans would then be repaid within ten years through the customer's utility bill. The Senate has yet to consider the bill (Abrams, 2010).

Portland Oregon started an on bill financing pilot program last year (Clean Energy Works Portland) which is expected to grow in 2010 to about 500 homes. There seems to be an interest in creating or expanding this type of financing in several areas of the U.S. The advantages to a TIP program are twofold:

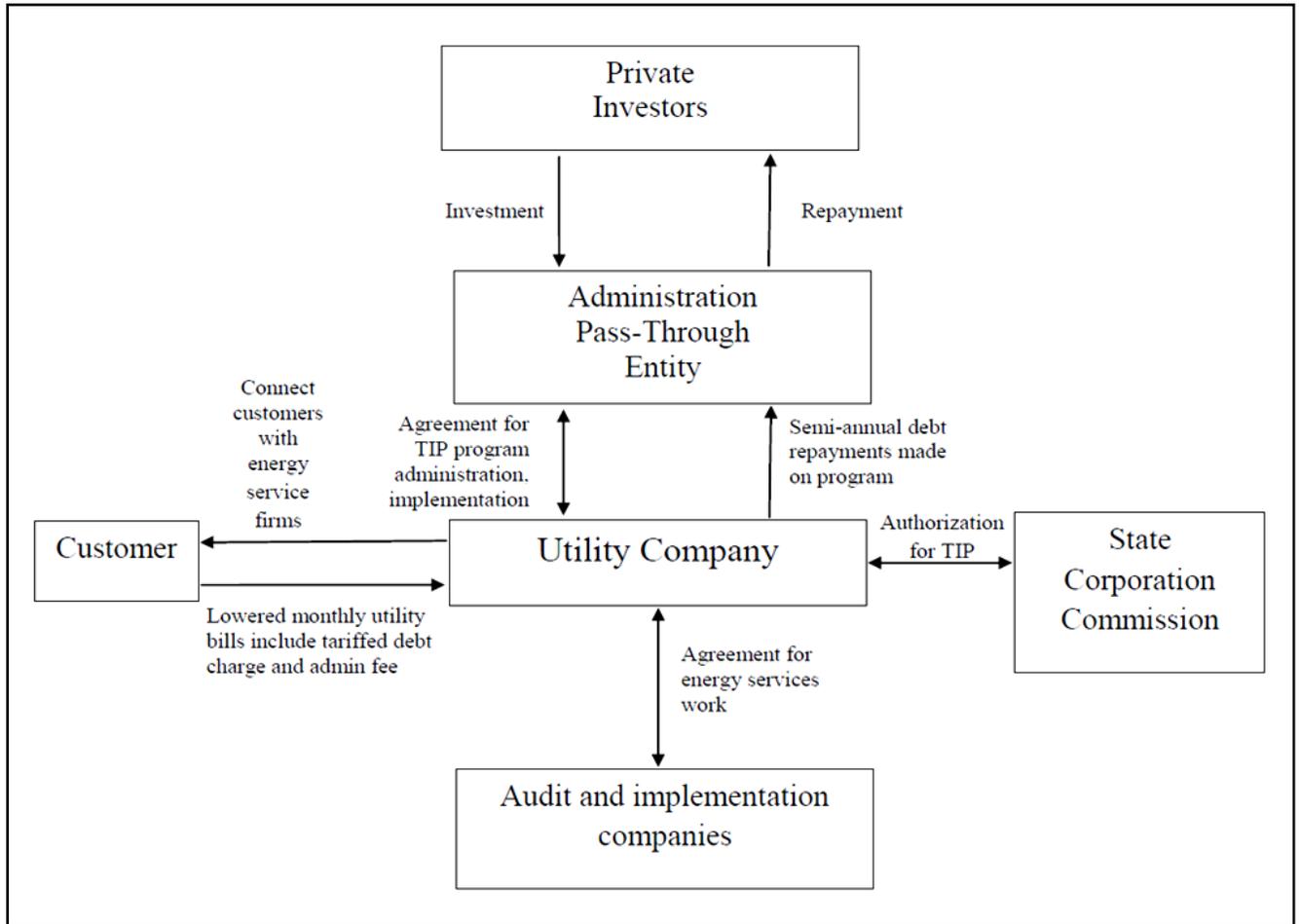
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1. Customers typically can qualify for loans based solely on their utility payment history.
2. The loan may transfer to the next homeowner when the home is sold.

Easy qualification allows for a wider range of participants in the program, and transferring the loan allows homeowners to participate even if they plan on moving before they realize the full energy savings.

The downside of a TIP program is in getting utilities to agree to host them. For most of Virginia, this would require working with large, investor owned utilities that have been historically averse to establishing TIP programs. A telephone conversation (November 1, 2010) with H. Joseph Jones, Director of External Affairs for Appalachian Power (APCO), a unit of American Electric Power (AEP), confirms that the investor owned electric utility industry in Virginia has no interest in administering a tariffed installation program in the commonwealth. Mr. Jones mentioned as reasons for not offering a TIP program those that are laid out above, plus his additional concern about the difficulty in apportioning a customer's partial bill payment between the TIPS loan and the actual cost of service. Mr. Jones stated that "AEP is in the business of generating, transmitting and billing for electricity, not socializing the costs". Figure IV- 1 below displays the relationships within a TIP program.

Figure IV- 1 Tip Relational Chart



Adapted from DASNY, 2008

Property Assessed Clean Energy (PACE):

PACE is another form of on bill financing, but property tax bills are the vehicle for loan repayment. The concept for PACE financing was first conceived in 2007 by Cisco Devries,¹³ the mayor’s chief of staff in Berkeley, CA. He realized that local governments have for decades used property tax assessments to finance special projects in neighborhoods, such as the installation of streetlights and sidewalks, and that the same mechanism could be used to finance energy efficiency retrofits and renewable energy installations for homeowners. Voluntary property

¹³ Cisco Devries is now president of Renewable Funding, a finance firm specializing in clean energy financing.

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assessed tax loans have several advantages over other types of finance mechanisms for energy investing:

- (1) The loan stays with the home when the home is sold and the payment obligation is transferred to the next owner
- (2) The loan program can be created and administered by localities without the involvement of large utility companies
- (3) Credit worthiness can be extended to include a wider pool of program participants (4) aggregating the pool of funds from several loans makes them potentially attractive to the secondary finance market, and
- (4) The loans have the potential for carrying lower interest rates than many other types of financing.

These advantages are particularly pronounced in Virginia (which enabled local governments to create PACE financing programs in 2009 (SB 1212)), since the state does not operate a public benefit fund to help finance energy efficiency programs, and the largest utilities operating in the state have not expressed an interest in a TIP program. Unfortunately however, in 2010 the Federal Housing Finance Agency (FHFA), which controls Fannie Mae and Freddie Mac, has taken a stance against PACE financing. The effect of this decision is to effectively halt nearly all PACE financing programs across the country. There are currently legal challenges to this ruling, as well as a federal bill to override the FHFA, but both may take months or years to come to fruition.

PACE in Virginia:

Although PACE type financing is currently suspended due to the opposition of the FHFA, it is useful to look at the possible options for Virginia if it becomes available in the future. A PACE financing program may still present the best hope of being able to offer attractive financing to a wide variety of homeowners. For example, a program in Long Island New York (Long Island Green Homes-LIGH) has been able to get nearly 75% of its audit participants to follow through with retrofits by using PACE type financing. This proportion of audit to retrofit is nearly unheard of in other energy programs.

Other than an on bill utility financing program, PACE financing may be the only mechanism available that allows administrators to structure notes so that payments are less than savings. Unfortunately, the final bill from the Virginia Senate has clouded the future of PACE in the state. The final version of the state legislation enabling PACE type programs in Virginia (SB 110) appears to have hobbled their effectiveness. Section (d) of the code reads as follows:

In order to secure the loan authorized pursuant to this section, the locality shall be authorized to place a lien equal in value to the loan against any property where such clean energy systems are being installed. The locality may bundle or package said loans for transfer to private lenders in such a manner that would allow the liens to remain in full force to secure the loans.

The above section has been interpreted such that the state has not specifically enabled localities to place a lien in front of (senior to) a mortgage as is the case with typical property tax liens. Placing a loan “in front of, or senior to” a mortgage means that in the event of foreclosure, the senior loan will get paid first. Once this position is taken, selling these aggregated loans through a municipal bond offering becomes problematic. According to a letter from Barclays Capital to Jeffrey Tannenbaum of PACENOW, on the potential limitations of placing PACE

loans subordinate (pari passu) to existing mortgages, Barclay's states that "there would be little to no meaningful bond buyer interest" in the bonds (Moriarity, 2009). A market for PACE bonds that requires the loans to be subordinate to first mortgages may develop over time, but the interest rates and loan terms will almost certainly be higher than they would otherwise be in a program that allowed the loans to carry senior status.

The "Problem" with PACE:

The primary problem that the FHFA has with PACE loans is based on the loans' senior status position to first mortgages; and the reaction of their staff to PACE has been decidedly negative from the beginning. Donna Ely an attorney with the FHFA, castigated PACE loans in February, 2010, stating that they were everything from a constitutional taking from mortgage lenders,¹⁴ to saying that she didn't know if the state had a right to place a lien over a mortgage (personal telephone conversation). Since localities have been placing liens in the form of property tax assessments in front of mortgages for over 100 years, her reaction, and that of her agency, seem to be a more of a knee jerk reaction than a considered analysis.

However, the validity of the agency's initial reaction must be measured against the way that the early PACE programs were established and operated. Both Boulder Colorado and Palm Desert California's programs lacked appropriate underwriting criteria, among other issues. All of the objections against PACE financing that the FHFA raised were later answered both at the federal level (WhiteHouse, 2009) and by PACE supporters (Appendices A, B, C). But in an August 26, 2010 letter addressed to congressional PACE supporters Edward DeMarco, the

¹⁴ This issue was addressed in favor of PACE in a white paper prepared by a California law firm in May, 2010 (Ranchod, 2010)

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Acting Director of the FHFA, stated that “no satisfactory conclusion has been reached to address problems associated with liens created after a mortgage is in place” (Appendix D).

The FHFA has retained this stance despite lawsuits from the Natural Resources Defense Council, the State of California, the Town of Babylon N.Y., Placer and Sonoma Counties in California and Leon County Florida, and despite letters of support for PACE from the Governor of California and several U.S. Congressmen and Senators. In July, 2010, the FHFA released a statement requiring Fannie Mae, Freddie Mac and the Federal Home Loan Banks to, among other things: (1) adjust loan-to-value ratios to reflect the maximum permissible PACE loan amount available to borrowers in PACE jurisdictions and (2) tighten borrower debt-to-income ratios to account for additional obligations associated with possible future PACE loans (Appendix E). These new mortgage requirements were enough to shut down existing PACE programs that had first lien status. As it now stands, since the language in the Virginia legislation enabling PACE financing disallows first lien status, PACE programs may go forward.

However, allowing localities to create programs that are restricted from successful implementation is hypocritical and counterproductive. The only solution to making PACE loans viable in the state will be to create credit enhancements that will overcome the subordinate position of the loans in order to make PACE backed bonds appealing to private investors. To this effect, given the federal government’s interest (other than the FHFA) in seeing successful PACE financing programs, as is evidenced in DOE, EPA and White House announcements, such credit enhancements may be forthcoming. With federal guarantees backing PACE bonds, private capital may once again be attracted to investing in them.

PACE in Maine:

This year (2010) the state of Maine received \$30 million from the DOE to establish a statewide PACE type loan program. The state is using the DOE grant to set up a revolving loan fund based on the PACE model. Since the state has set up the program to make the loans subordinate to existing mortgages, it has not adversely affected Maine's mortgage market. According to Dana Fischer, Efficiency Maine's Residential Program Specialist, the grant money is being directly lent to homeowners and business owners and is then paid back through the property tax. The loan also stays with the home and becomes the obligation of the next owner if the home is sold before the loan is paid off. Payments are rolled back into the program to fund more loans (personal phone conversation 10-04-10).

Mr. Fischer says that eight local governments in the State have already established PACE financing districts and that several more are in the works. He also stated that the State has been talking to the FHFA about what sort of underwriting standards the State needs to have in place. Mr. Fischer's hopes are that after Maine has developed a track record of the PACE loan model, including data on default rates, that the private secondary finance market may become interested in funding future rounds of bond sales.

Although a \$30 million loan fund sounds generous it will only provide enough money, at an average \$6,000 per job, to perform retrofits on less than 1% of Maine's housing stock of 544,000 units. To reach 50% market penetration in Maine, it will require a loan fund closer to \$1.5 billion. It seems like a more successful way to have used the grant funding would have been to create a loan loss fund that would have attracted private investment firms. If the \$30 million was set aside as a loan loss reserve to cover a (very high) five percent default rate, it may have

freed up \$600 million in private capital. In a follow-up clarification email exchange with Mr. Fischer, he stated that:

“There is no question that somewhere in the magnitude of 1.5 Billion will be needed to accomplish our goals, and it is also that without question that one of the quickest ways to get the promise of that kind of capital is to eliminate risk.

The problem doesn't appear to be the availability of capital; it's the demand for loans. Loan programs for energy efficiency even at exceptionally low interest rates have to date never attracted many applicants.

Even if you were to go the Loan Loss Reserve path, if your payment performance is not good, your seed fund will diminish and capital will become more expensive. On the other hand, if you do not have a large enough volume of transactions, the seed capital sits and the per unit loan costs go up and partners lose interest.

In terms of getting 1.5B, I am confident that capital markets will keep our fund fed as long as we have demonstrated performance, underwriting standards and quality control. When Efficiency Maine gets 2000 loans out on the street, we will have wildly exceeded the track record of virtually every other energy loan program”.¹⁵

Efficiency Maine expects the first PACE loans to be available in October of 2010. Before these loans are made available, localities across the state need to vote to adopt a Property Assessed Clean Energy Ordinance to establish a PACE program. Efficiency Maine has provided two templates to localities for the adoption of such an ordinance (Appendix F). Since Virginia's PACE enabling legislation, like Maine's, places the loan secondary to existing mortgages, Virginia will need to watch the progress of the Maine program to determine the effectiveness of PACE financing that is placed secondary to existing mortgages.

¹⁵ Email correspondence with Dana Fischer, Residential Program Specialist, Efficiency Maine Trust. October 5, 2010.

The Next PACE Thing?

Partly as a response to the shut-down of PACE financing, the Department of Housing and Urban Development (HUD) is, in consultation with the DOE, attempting to implement a pilot financing program for existing homes. The program is called “FHA PowerSaver Home Energy Retrofit Loan Pilot Program”. The program is to be offered through private, Federal Housing Administration (FHA) approved lenders to the partner programs of DOE’s Better Building Program. As of this writing (December 2, 2010), the program is listed in the Federal Register¹⁶ awaiting “comments and expressions of interest”. The comment due date is December 27, 2010 and according to Patricia Mc Barron, HUD’s contact person for the pilot, there has “not yet been a single FHA approved lender express any interest in the program”¹⁷.

The purpose of the pilot, if it takes off, is for HUD to “assess the extent to which energy retrofits under the Pilot Program have delivered expected benefits in terms of energy reductions, cost savings, and property value improvement, among other results”¹⁸. To accomplish this goal, HUD will ask lenders to get releases through utility companies for two years pre and post energy retrofits from participants.

According to Patricia Mc Barron, the hoped for scope of the program is between 200,000 to 300,000 participants. The maximum dollar amount of loans is \$25,000 with a term of up to twenty-five years. PowerSaver loans are only available to borrowers with good credit, manageable overall debt and at least some equity in their home (maximum 100% combined loan to value) (National Mortgage Professional, 2010). Loans over \$7,500 must be secured by the home.

¹⁶ Federal Register / Vol. 75, No. 217 / Wednesday, November 10, 2010 / Notices (Docket No. FR-5450-N-01)

¹⁷ Personal phone conversation December 3, 2010.

¹⁸ From the Federal Register.

If the pilot is successful and able to achieve the number of participants it hopes, the information received from it will be invaluable. Assuming that it shows positive results, the secondary market would be encouraged to provide funds for efficiency loans. PACE financing could benefit from positive results also in that once energy loans have proven to have low default rates, the secondary market may not be so concerned with the loan's junior status to existing mortgages. According to Ms. McBarron, "if we can show that savings from energy reductions are enough to pay the note, then capital would be much more attracted to these types of loans".

Chapter Conclusion

The challenge of energy financing is to offer a loan program attractive enough to consumers to get them over the first cost barrier. A loan program must be able to do this while being available to a wide range of borrowers. A program that is able to structure loans so that the monthly payments are less than the monthly expected savings from conserved energy would allow borrowers to be cash positive from day-one. That is, if a retrofit is expected to save a consumer \$100 per month on their energy bill, then the loan payment should be less than \$100 per month. In order to achieve this, loan terms must be long enough so that payments can be spread out over several years (just not longer than the life expectancy of any installed equipment). Unfortunately, this extended term is longer than is common with traditional consumer loans (ignoring home equity loans, which would exclude many borrowers). Since it is also very difficult to measure precisely just how much energy any particular home will save, loan payments should not exceed a conservatively assigned percentage of expected energy savings. For instance, structuring a loan so that the loan payments are only 80% of expected savings would provide a good cushion against inaccurate savings assumptions.

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To put this into perspective, Virginia's Department of Mines Minerals and Energy estimates that a typical home in Virginia spends about \$1,900 annually for energy, or \$158 per month (VA DMME website, accessed 08/13/2010). Assuming this typical home was retrofitted to the point where it would use thirty percent less energy, the energy savings would be worth \$47 per month. Assume also that the retrofit would cost \$6,000. The payment term for a \$6,000 loan at ten percent interest (or higher with an unsecured loan) would have to be longer than forty years for the monthly payment to be equal to the monthly \$47 savings. If the interest rate could be lowered to five percent, the term would shrink to fifteen years. If the interest rate could be bought down with program funds, the term would be only 12 years. This is a good argument for creating some sort of credit enhancement, such as a loan guarantee, to lower the interest rate as well as shorten the length of the term.

Consumers should also be offered several different options for the structure of their loan, because there are going to be pros and cons for every type of loan program. Some consumers may want to pay off the loan early in order to avoid finance charges, while others will prefer to take advantage of being cash positive from day one. Although allowing a longer term allows customers to be immediately cash positive because of lower monthly payments, for lenders the longer a loan is out the greater the chance for default and the higher the interest rate they must charge. Making payments over a longer term also may be difficult if energy prices rise during the term. Once energy prices go up, the borrower's costs will increase, making payment more difficult. With the types of financing mechanisms available in Virginia, energy programs will need to be creative to arrive at loan packages that will motivate the market.

Other than a home equity loan, which is only available to homeowners who have substantial equity in their homes, there are only two types of efficiency financing arrangements

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in practice today, property assessed clean energy (PACE) and tariffed installation programs (TIP), that allow for long enough payment terms so that loan payments are lower than expected energy savings. Both of these financing mechanisms are able to extend the payment term by attaching the loan to a residence rather than to an individual. In Virginia, an imperfect form of PACE financing has been enabled at the local level, whereas TIP programs face what is probably insurmountable resistance from the utility industry.¹⁹ In light of these barriers, energy programs in the commonwealth should focus on finding sources of loan capital for PACE programs that will accept having the loan in a secondary position to existing mortgages.

¹⁹ In private conversations with Joe Jones, the director of external affairs for APCO (telephone conversation Nov.1, 2010) and Judge Mark Christie, member of the VA State Corporation Commission (personal conversation October 27, 2010), neither knew what a tariffed installation program was, and each expressed resistance to the concept.

Chapter V: Creating an Industry-Training a Workforce

The Home Performance Industry

The previous three chapters focused on the demand side of investing in energy efficiency. We've looked at the behavioral, economic and financing barriers that consumers face. It is time now to turn to the supply side of efficiency retrofits; energy contractors and their employees. This chapter examines the current state of the "home performance" industry, what it means to be a home performance contractor, and the employment creation opportunities of growing a home performance industry.

The State of the Industry

Imagine yourself as a homeowner who wants to reduce her utility bills and consequently wants to find a business to help her do this; who would you call, an insulation company, a heating company, a remodeling contractor, a window installer, a weatherization company? If you think to look for a "home performance" contractor or "home efficiency" contractor, you are unlikely to find one listed. If you are lucky enough to know that there are organizations that certify contractors to do energy efficiency work, you are likely going to be disappointed to learn that the nearest accredited professional is hundreds of miles away.

The Building Performance Institute (BPI) is one of the leading accreditation and standard setting organizations in the home performance industry. Their website has a nationwide list of "Gold Star Accredited Contractors", and searching their database reveals that in most states it may be easy to find someone to perform and energy

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assessment on your home; but that there are far too few accredited contractors to actually do the work (table V-1).²⁰ Such is the current state of the “home performance” industry.

An online survey of telephone listings in several metro areas in the U.S. shows that there is no single category where a consumer will find a business that specializes in home energy efficiency. Searching the Richmond VA phone book for “home performance” or “home energy efficiency” will return a variety of results, none of which are pertinent. The point is that “home performance” as a type of business does not exist on a large enough scale to either qualify as a separate business category, or to retrofit the number of homes we are hoping to retrofit.

Table V- 1 BPI Gold Star Accredited Contractors

State	# GS contractors	State	# GS contractors
VA	12	MD	8
NY	260	KS	0
NJ	180	CO	0
OH	3	MN	1
FL	4	MA	9
TX	3	CA	8

Source: <http://www.bpi.org/companies.asp>

Efficiency First, the only national nonprofit trade association that represents the home performance industry, lists 953 members nationwide. There are only twenty-seven members in Virginia, sixty-two in New York, twenty-six in Texas and six in Minnesota.

On the other hand, the National Association of Home Builders (NAHB) lists 60,000 home builders or remodelers as members. Delving further into the NAHB site reveals that

²⁰ New York and New Jersey are exceptions to this rule. Both have state-wide programs that have partnered with the Home Performance with Energy Star (HPwES) program that requires contractors to be BPI certified.

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the NAHB makes reference to its own “Certified Green Professional (CGP)” designation, its own “National Green Building Standard” and the NAHB National Green Building Program”. Yet searching the NAHB site for “home performance” does not yield information on home performance contractors or contracting. A call to John Parish, the marketing director of the Richmond, VA chapter of the NAHB (July 26, 2010), confirms that the NAHB does not recognize “home performance” as a specific type of contracting service. Mr. Parish tries instead to tout the NAHB’s own CGP certification.

One of the first tasks of the home performance industry will be to create a standard title for its members, so that consumers will know to look for a specific type of contractor. Whether the title is “home performance”, “green contractor”, “energy efficiency contractor”, or any other designation does not matter so much as it is a single title. Once a widely recognized and accepted title has been established, the industry can decide on the training, accreditation and credentialing that is required to call oneself by that title.

Certification and Accreditations

A home performance contractor must look at a building as a system of interconnected parts that are constantly interacting with one another. BPI calls this the “building as a system” approach. This is a bit of a different focus than that of a traditional remodeling contractor. A traditional remodeling contractor’s focus is primarily on the narrow concerns of the job at hand, and not on finding ways to lower the overall energy consumption of a building. For instance, if asked to add more insulation to an attic, a traditional contractor will add the specified amount of insulation and then move on. The

traditional contractor will not see it within the scope of her job to inspect the HVAC system to determine if it will now be oversized once the insulation is put in place. Or if asked to weatherstrip and seal a home, a traditional remodeler will not have the training to recognize what effect this will have on the home's combustion appliances; which could lead to condensation, mold and serious health problems for the home's inhabitants. Ideally, in contrast, a home performance contractor has received training that stresses that changes made to one part of a building may have ripple effects throughout the entire building's structure and operations. This training is vital to understanding how to stop the flow of wasted energy without creating an unhealthy home as a consequence.

Over the past eighteen months the U.S. Department of Energy (DOE), through the National Renewable Energy Lab (NREL), worked with experts in the building science and credentialing industries to create a set of voluntary national residential retrofit guidelines. The guidelines were developed because energy officials realized that there is a "lack of a skilled and credentialed workforce" in the U.S. The guidelines' purpose is to "stimulate the growth of a vibrant, private sector-led market for residential energy efficiency retrofits" (DOE, 2010). The guidelines were published in November of 2010, and an implementation plan is to follow. The guidelines have 4 basic components:

1. Identify and catalog all of the steps a worker takes in completing an energy efficiency improvement in a home.
2. Identify the minimum knowledge, skills, and abilities that workers should possess to perform high quality work.
3. Create a technical standards reference guide.

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4. Define the performance requirements for high quality work-including minimum standards.

Accompanying the guidelines is a Home Energy Score that informs a homeowner of their home's relative efficiency and makes recommendations for reducing energy use.

The DOE describes the program this way:

Under this voluntary program, trained and certified contractors will use a standardized assessment tool developed by DOE and Lawrence Berkeley National Laboratory to quickly evaluate a home and generate useful, actionable information for homeowners or prospective homebuyers. With only about 40 inputs required, the Home Energy Scoring Tool lets a contractor evaluate a home's energy assets, like its heating and cooling systems, insulation levels and more, in generally less than an hour. That means a homeowner can see how their home's systems score, regardless of whether a particular homeowner takes long or short showers or keeps their thermostat set high or low. A score of "10" represents a home with excellent energy performance, while a "1" represents a home that will benefit from major energy upgrades. Along with the score, the homeowner will receive a list of recommendations for home energy upgrades and other useful tips. For each specific improvement, the estimated utility bill savings, payback period, and greenhouse gas emission reductions are included. (Accessed 12/2/2010 from <http://www.energy.gov/news/9784.htm>)

The score format that is given to homeowners looks a good deal like the energy labels that have been affixed to appliances for several years now. The retrofit industry

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could get a boost from these guidelines because they are likely to raise the public's awareness of energy retrofits in general; and by more specifically defining the nature of a residential energy contractor.

These guidelines should prove invaluable to a regional energy efficiency program. With the possible passage in 2011 of the House of Representative's Home Star program (H.R. 5019) its \$6 billion in rebate funding for home retrofits would likely be available to programs that follow these new federal guidelines for acceptable practices. Creating national standards for the industry should also provide the added benefit of encouraging public trust in energy retrofits.

As it now stands, there are several organizations that offer training and certifications to home performance workers. BPI seems to have gained the most momentum and credibility since its standards are being required in several states (including the large programs in New York and New Jersey) in order to participate as a contractor in each state's Home Performance with Energy Star program. The Gold Standard of the proposed Home Star program also requires BPI certified building analysts. But there are many other organizations that offer training and certifications, including the Residential Energy Services Network (RESNET). RESNET offers a HERS Rater certification and is required by the California Energy Commission. Others include: North American Technician Excellence, Inc. (NATE) is a certification for HVAC workers, LEED for Homes, and a host of utility sponsored programs such as the Performance Tested Comfort System (PTCS) a certification program run by the Bonneville Power Administration in the Pacific Northwest. It is yet to be seen how the

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federal guidelines will affect these organizations and the energy programs that require their training and certifications.

There are actually two types of energy workers that need to be trained and certified in order to get a retrofit program up to speed. Not only is there a need to train contractors and their employees to do the actual work, but energy assessors will also be needed in greater numbers. Assessors (or raters in the RESNET system) are needed to perform the preliminary and post energy use checks on homes. Preliminary checks are needed before work begins in order to determine the scope of the work, and post testing is essential for a program to verify results. Assessors use a variety of diagnostic tools including blower doors, duct blasters and infrared cameras to detect air leakage, insulation gaps and a host of other issues related to a home's energy use. Assessors will also be needed to perform 3rd party post assessments on a percentage of completed jobs. Performing this post retrofit measurement and verification (M&V) step keeps contractors honest, bolsters the public's confidence, and provides useful information to an energy program.

Job Creation

Nationally, the demand for energy efficiency workers is expected to grow by more than a quarter million workers by 2020 (Goldman, Peters, Albers, Stuart, & Fuller, 2010). In order to meet this expected demand for new workers, the federal government through the Department of Labor and the DOE has allocated hundreds of millions of dollars for new and expanded training programs. Community Colleges, Universities and non profits are in the process of creating curricula and training workers to fill the

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expected need. For many employers however, this push is being seen as “putting the cart before the horse” since they have not yet seen an increased demand for home energy retrofits (Redman, 2010). But it is probably inevitable that there will be a time lag either as production follows demand or as demand follows production. If it is the case that workers are being trained before there are available jobs for them, then we can expect that the \$6 billion of rebate funding being made available by the passage of the Home Star program will spur demand for retrofits, and employment for these newly trained workers.

Considering the above, job creation can be viewed as both a precursor to, and a result of, investing in efficiency. Efficiency programs find themselves in the position of having to simultaneously increase the supply of efficiency products and services (home performance contractors) and the demand (consumers) to invest in them. Programs achieve the supply side of the equation by collaborating with professionals in the building industry, and by forming partnerships with educational institutions such as community colleges to provide worker training. Because creating a professional workforce addresses some of the risk factors that consumers have in the past experienced as a barrier to investing, providing these trained contractors should spur consumers’ willingness to invest.

Flooding the market with a supply of energy workers before demand has increased could, at least temporarily, lower costs for efficiency installations. Programs could simultaneously offer rebates, and working with local government, could arrange for tax incentives to further reduce the costs of investing in efficiency. These lower costs for efficiency could spur large numbers of investments in energy retrofits throughout the

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homeowners of a region, and this in turn could be a powerful driver of employment opportunities. Jump-starting a market for efficiency gives an energy organization an opportunity to have community wide impacts beyond the sum of individual consumer benefits.

The energy efficiency service sector is fairly labor intensive and estimates for job growth from consumer investments in residential energy efficiency range from 10 to 21.5 direct and indirect jobs per \$1 million invested (table V-2). Nationally, employment from energy retrofitting has been estimated to potentially create up to 1.3 million jobs by 2020 (Goldman, Peters, Albers, Stuart, & Fuller, 2010). The Virginia Department of Mines, Minerals and Energy (DMME) projects that 421 jobs will be created through 2009 federal funding for energy efficiency (EECBG June 25 application from DMME to U.S. DOE). Assuming an average retrofit of \$4000 per home, the size of the market is enormous; potentially \$400 billion in the U.S (Pollin, Heintz, & Garrett-Peltier, 2009). For a local energy program this would mean that for every 250 homes brought into the program, about a dozen jobs would be created. It must also be remembered that these jobs will be entirely filled by local residents. Recruiting expenses and exorbitant tax breaks given to lure an outside firm are completely unnecessary.

The types of jobs created would range from entry level installers to sales and management staff (table V-3). These jobs would mostly be provided by small firms, many of which exist now as remodeling and building contractors. Specialty subcontractors such as insulation installers and HVAC companies would also see an increase in business. These companies would need to retrain and certify existing employees and new hires in order to meet the requirements set forth in many retrofit

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regimes such as the EPA’s Home Performance with Energy Star program. Requiring more training personnel adds another layer of direct employment.

Table V- 2 Job Creation

Jobs Created per \$1 million Invested	Source of Estimate
11.9 direct and indirect jobs (including manufacturing jobs)	Pollin, Robert, Heintz, James and Garrett-Peltier, Heidi. <i>The Economic Benefits of Investing in Clean Energy: How the economic stimulus program and new legislation can boost U.S. economic growth and employment.</i> Department of Economics and Political Economy Research Institute (PERI), University of Massachusetts, Amherst ,and Center for American Progress, June 2009.
21.5 direct and indirect jobs	<i>New Energy for America: The Apollo Jobs Report: For Good Jobs and Energy Independence.</i> Institute for America’s Future, the Center on Wisconsin Strategy, and the Perryman Group, January, 2004.
11.11 direct jobs	HOME STAR economic model for Silver Star prescriptive track created by Matt Golden of Recurve, Inc., and colleagues
10 direct and indirect jobs	UC-Berkeley RAEL Jobs Calculator, Daniel Kammen and Max Wei
8.32 direct jobs	Kevin Doyle, <i>Final Report of Investigation into Residential Energy Efficiency Workforce Needs</i>

Source: (Redman, 2010)

Table V- 3 Wages

Job Type	Wages
Field Technicians (entry-level)	\$10-\$20/hour
Crew Leads	\$14-\$20/hour
Building Analysts/Raters	\$15-\$22/hour
Mechanical Systems and Skilled	\$25/hour and up
Sales	Generally salary or fee per job plus commission

Source: (Redman, 2010)

This type of local employment has the added benefit of being non-exportable, with spillover effects into other areas of the local economy. Job creation through residential energy investing also allows capital to be re-cycled throughout a community rather than exporting it to an out of state utility company. This makes a powerful political argument that has the potential of garnering bipartisan support from local officials. The energy efficiency industry can be homegrown by localities all over the U.S.

Chapter Conclusion

Up until the last few years, since the advent of home energy labeling programs such as Energy Star for Homes, LEED for Homes, Earth Craft and the now new Home Energy Score, most of the weatherization and energy efficiency professionals were affiliated with the Weatherization Assistance Program (WAP). Unlike companies servicing the state-sponsored Weatherization Assistance Programs, the for-profit home performance industry is in its infancy. Although the WAP programs have been successful up to the level of their funding (Berry & Gettings, 2003), their business plan, which relies on public funds, cannot be used as a model for moving the effort into the private sector. Home performance companies and professionals must form an identity of their own and be recognized for the service they perform in the same way that plumbers, electricians and bricklayers are recognized for what they do. What's more, the home performance industry must work to establish high levels of consumer trust, since the nature of their work is often "invisible" to the consumer until their energy bills arrive. Energy programs can help build consumer trust and confidence by performing an oversight role for the

industry that includes facilitating training and certifications for contractors, as well as performing post retrofit audits.

Chapter VI: Efficiency in Virginia

State Funding for Efficiency

The greater part of this thesis has explored the many behavioral, economic, financing and supply (aka qualified energy workers) problems of driving the market for investing in energy efficiency. But all of these issues have to be looked at through the lens of the particular constraints faced in Virginia. As mentioned earlier, Virginia does not have a public benefit fund or any other type of permanent, or semi-permanent, fund available for operating an energy-efficiency program independent of a utility²¹. Since the availability of outside funding, at a minimum in the beginning stages of an energy program, seems to be a necessity, it is useful to know where Virginia governmental policies stand on the issue of efficiency.

According to an annual “state energy efficiency scorecard” published by ACEE, Virginia ranks 34th out of the 50 states in its support for energy efficiency (ACEEE, Energy Efficiency Scorecard, 2010). The scorecard is based on six state energy policies: (1) Utility and public benefits programs and policies, (2) transportation policies, (3) building energy codes, (4) combined heat and power, (5) state government initiatives, and (6) appliance efficiency standards. The Database for State Incentives for Renewables and Efficiency (<http://www.dsireusa.org/>) lists two state-run programs in Virginia that target efficiency and are available to homeowners. One of the programs is administered by the Virginia Department of Mines, Minerals and Energy and offers federally funded appliance rebates, and other program is

²¹ Investor-owned utilities (IOU) may establish demand side management (DSM) and efficiency programs in the commonwealth. The programs have to be individually approved by the SCC, and the utility may recoup its expenses from rate-payers. Dominion Virginia Power is currently the only electric IOU in Virginia that runs a DSM program. Several natural gas companies provide rebate programs for the purchase of high efficiency water heaters and furnaces.

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offered by the Department of Taxation and is a four-day “tax holiday” that runs every year for purchases of Energy Star products²². Other than these modest programs, one of which simply passes federal funds through to homeowners, no other state funding, or policies that mandate funding from utilities, is available to help homeowners invest in efficiency.

In most states, funding for a non-utility based efficiency program typically arises from a utility bill add-on charge, usually called a public benefit fund (PBF), which has to be mandated at the level of a state legislature.²³ In 2007, the commonwealth passed legislation (SB 1416 and HB 3068) that reinstated regulatory control by the State Corporation Commission (SCC) over the electric industry, thereby giving Virginia the means to mandate a public benefit fund, but the mandate has to come from the commonwealth’s legislature, not the SCC. Of the eighteen PBFs in the U.S., none of them are in the Southeast.

The idea of a PBF is not new to Virginia politicians and administrators. According to David Eichenlaub, Assistant Director, Division of Economics and Finance at the SCC, the idea of establishing a PBF in Virginia has been “floating around for years” but none have made it through the legislature (personal telephone conversation December 3, 2010). As of this writing, there is one bill being composed by legislative services for Virginia Senator Mary Whipple (Democrat, 31st District) that would create a PBF to support solar PV installations. Eichenlaub remarked that one problem with past bills is that they called on the SCC to administer the PBF and distribute its proceeds, but that the agency does not have the ability or the mandate to do that. However he states that Whipple’s bill would seek the Virginia Department of Mines, Minerals and Energy to perform administrative and disbursement tasks, and that they are enabled

²² The tax holiday is written into the Code of Virginia (section 58.1-609.1).

²³ In 2010, 18 states plus the District of Columbia run PBFs.

and capable of these tasks. According to Senator Whipple's office, the bill is to be introduced in the spring of 2011.

Official Attitudes toward Energy Reduction and Efficiency

Legislative bill SB 1416 not only called for the reregulation of the electric industry, but it also called for a ten percent reduction of energy use based on 2006 levels by 2022. Concurrent with the passage of SB 1416, the commonwealth created the 2007 "Virginia Energy Plan" (VEP). The VEP has much to say about efficiency and sets as one of its goals a reduction in the rate of growth of energy use by forty percent in order to meet the ten percent reduction in electric energy consumption mandated in SB 1416. The Third Enactment Clause of SB 1416 states:

That it is in the public interest, and is consistent with the energy policy goals in § 67-102 of the Code of Virginia, to promote cost-effective conservation of energy through fair and effective demand side management, conservation, energy efficiency, and load management programs, including consumer education. These programs may include activities by electric utilities, public or private organizations, or both electric utilities and public or private organizations. The commonwealth shall have a stated goal of reducing the consumption of electric energy by retail customers through the implementation of such programs by the year 2022 by an amount equal to ten percent of the amount of electric energy consumed by retail customers in 2006.

Expanding on SB 1416, the VEP also has goals that aspire to:

- Expand consumer energy education to overcome barriers to implementing energy-efficiency and conservation actions.
- Reduce greenhouse gas emissions by thirty percent by 2025, bringing emissions back to 2000 levels.

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The Plan also states that “energy efficiency and conservation provide the least costly and most readily deployable energy resource options available to Virginia” (VEP, p.6). Further, that “reaching the ten percent goal would defer or postpone the need for approximately 3,900 megawatts of new electric generation capacity by 2022, equivalent to four or five large generation stations” (VEP, p.7). Clearly, the commonwealth sees a place for efficiency in offsetting future energy needs.

In an effort to get at the “cost effectiveness” and achievability of meeting the goals of SB 1416, the Third Enactment Clause of the Act directs the SCC to develop recommendations to: “Determine whether the ten percent electric energy consumption reduction goal can be achieved cost-effectively through the operation of such programs, and if not, determine the appropriate goal for the year 2022 relative to base year of 2006”. The SCC answers this question in a report issued in November of 2007.²⁴ The conclusion of the report, based on input from “extensive stakeholder participation”, is that: “The Staff believes that the 10% goal as set forth in the Third Enactment Clause of SB 1416 can be achieved even using a relatively conservative test for “cost-effectiveness”. The report then goes on to qualify the above statement by saying that: “This conservative test requires that electric rates do not rise as a result of the deployment of cost-effective conservation of energy through fair and effective demand-side management, conservation, energy efficiency, and load management programs, including consumer education”. The report also agrees with “the findings of the Virginia Energy Plan and other studies that generally conclude that there is much cost-effective conservation ready for harvest”. But to drive home the SCC’s concern with keeping the cost of electricity as low as possible for

²⁴ Commonwealth of Virginia State Corporation Commission Staff Report to the State Corporation Commission in preparation for the Commission’s Report to the Governor and the General Assembly as Required by the Third Enactment Clause of SB 1416, Enacted as Chapter 933 of the 2007 Acts of the General Assembly November 16, 2007.

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consumers, the final paragraph states that: “The Staff further believes that while the 10% goal is attainable, only ‘cost-effective’ conservation should be undertaken whether that turns out to provide 8%, 10%, 12% reduction in consumption”. The SCC’s existing statutory mandate is “to ensure just and reasonable rates” for consumers, and its reports generally like to remind readers of this fact.

In 2009 the SCC, at the request of the Governor and General Assembly, revisited the issue of demand-side management and energy efficiency. This time, the Commission was asked to conduct an evidentiary proceeding to consider achievable, cost-effective energy conservation and demand response targets that could realistically be accomplished by Virginia’s electric generating facilities. The SCC was to determine:

1. The range of consumption and peak load reductions that are potentially achievable by each electric generating utility.
2. A just and reasonable ratemaking methodology to be employed in the implementation of demand side management programs.
3. Which industry-recognized test should be given the greatest weight when conducting a cost-benefit analysis of demand side management proposals.

The SCC’s final report, presented in November of 2009, was able to answer two out of the three questions.²⁵ The report stated that:

1. The Commission “did not receive any evidence demonstrating that the existing policy of the commonwealth regarding reduction in consumption through DSM, DR and energy efficiency programs is unrealistic or unachievable” (p.35).

²⁵ Commonwealth of Virginia State Corporation Commission Report to the Governor of the Commonwealth of Virginia and the Virginia General Assembly Report: Study to Determine Achievable and Cost-effective Demand-side Management Portfolios Administered by Generating Electric Utilities in the commonwealth Pursuant to Chapters 752 and 855 of the 2009 Acts of the Virginia General Assembly November 15, 2009.

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2. The Commission will give the greatest weight to the Ratepayer Impact Measure (RIM) test, “which focuses on the impact on customer rates, [and] generally fits with the Commission’s existing statutory mandate to ensure just and reasonable rates” (p.35).
3. The Commission is “not recommending herein any specific mandate to utilities regarding particular targets to be achieved, programs to be required, specific technologies to be used, or narrowly tailored analyses to be performed” (p.36).

The first response above is simply a restatement of the Commission’s findings from their November 2007 report. The Commission’s inability to give a response to question three is blamed on a lack of time and on inadequate responses from the commonwealth’s investor-owned utilities.

The RIM test of response number two is the key response. It confirms the Commission’s mandate “to ensure just and reasonable rates”, by confirming that it is making certain that no energy conservation program will cause rates to go up. In short, the RIM test “provides a measure of the impact of a conservation or energy efficiency program on customers who do not participate”. But the Virginia Energy Plan has this to say about which test should be used in determining acceptable costs of conservation programs:

The State Corporation Commission has historically given different weights to financial tests when considering the cost effectiveness of energy-efficiency programs. It historically has used the Rate Impact Measure Test as the primary test of cost effectiveness. The Total Resource Cost Test indicates whether an energy-efficiency measure or program has a cost per lifetime kilowatt- hour-saved less than the avoided cost of electric generation, transmission, and distribution. The Societal Test assesses costs not directly attributed to utility services. A 2004 study found that twenty-eight states used either the Total Resource Cost or Societal Test as the main determinate of the cost effectiveness of energy-efficiency programs or measures. Virginia should use a mix of the Total Resource

Cost Test, Societal Test, Utility/Program Administrator Test, Participant Test, and Rate Impact Measure Test. No one tool should be used solely as a go-no go decision point (VEP, p. 61).

The SCC however, relies on an explanation that its legislative mandate prevents it from accepting any other sort of criteria when recommending a costs test. In the 2009 report, the SCC states that, “Ultimately, the choice of which of the various tests should be emphasized could be considered a policy decision, which is embedded in the statutes governing the Commission” (p.33).

When considering the possibility of including environmental externalities as part of its decision on costs, the Commission states that “it would be contrary to its legal authority to include adjustments to rates for external environmental factors” (2007 report, p.71). Yet the Commission stated in a 1991 report that “the Commission clearly has an obligation to consider environmental factors in acting on behalf of the public’s interest”.²⁶ Virginia’s largest supplier of electricity, Dominion Virginia Power, disagrees with the Commission’s use of a single test. Dominion advocates “the Commission’s continued consideration of all four tests set forth in the Commission’s DSM Rules” (SCC 2009 report, p.10). American Electric Power however argues that “the Commission does not have jurisdiction to consider environmental factors (or other societal externalities) when adopting a test” (SCC 2009 report, p.12). It is a shame to see the Commission hamstrung by a narrow interpretation of its mandate, when it seems open to accepting other means of determining costs in its rulings.

²⁶ Review of Commission Policy toward Conservation and Load Management Programs, page 41. Virginia State Corporation Commission Staff Report Case number PUE 900070. April 26, 1991.

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In response to the SCC's concern for higher rates, Jeffrey Loiter, a representative for the Southern Environmental Law Center (SELC), which was a respondent to the evidentiary hearing held to form the SCC's 2009 report, noted that:

“Consumers pay monthly electric bills, not rates. A customer's bill is based on their usage and the rate per kWh (and for some C&I customers, demand charges). Ultimately, customers want to spend less each month on energy. It is true that cost-effective efficiency programs may at time raise rates, primarily because they result in the utility's fixed costs being spread over a smaller number of kWh, making each one more expensive . Customers who choose not to participate in efficiency programs may face slightly higher bills as a result, but these amounts are less than the amount saved by participants. A well designed portfolio of programs will provide opportunities for all customers to participate and strive for high participation rates. By this means, most customers can reduce their energy bill despite small increases in rates”.²⁷

That the Commission focuses on rates rather than monthly bills suggests that a legislative act aimed at re-defining, by a few words, what the Commission's goals are could be a very useful effort.

Both the VEP and reports from the SCC conclude that low costs for energy in Virginia have kept the commonwealth from investing in efficiency. The VEP states that, “Virginia has a history of relatively low energy costs compared with other states-which means financial returns and payback from implementing efficiency and conservation measures have been limited” (VEP, p.58). The SCC also recognizes the relationship between low prices for electricity and consumption when it notes that:

²⁷ Testimony of Jeffrey Loiter on behalf of Southern Environmental Law Center SCC Docket # PUE-2009-00023 July 31, 2009

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“Most of Virginia has enjoyed low electric prices for many years. Low electric prices are good for economic growth, and economic growth leads to higher levels of electricity consumption. Virginia now seeks to reduce the rate of growth in electricity, yet still keep electricity prices low. Staff believes that the price mechanism can be the most efficient and thus “cost-effective” allocator of goods and services in our economy. Unless the demand for electric service is totally insensitive to its price, increasing electricity prices will reduce demand, other factors held constant. Given historically low prices and the above stated economic law of demand (i.e. price goes up, usage goes down – holding other factors constant), the 10% goal is achievable by raising electricity prices and then allowing customers to react to those prices” (SCC 2007 report, p.12).

However in the 2009 report from the SCC, the Commission states that “Staff does not advocate raising electric rates solely for the purpose of repressing electric demand” (p.21). But this is quite different from saying that a fund for efficiency programs that results in a rise in rates should be summarily dismissed.

The Commission acknowledges in the 2009 report the connection between energy cost savings and efficiency. The Commissioners reason that “there are potential offsetting cost savings associated with efficiency programs that result in the reduction of energy consumption and peak load; however, attempting to quantify with specificity such cost savings based on the record before us would be speculative” (p.35). The report notes elsewhere that in order to make an assessment of offsetting cost savings there is a need for better data from utilities and others on the savings and costs associated with energy efficiency and conservation programs. Mandating that utilities keep records of cost savings from efficiency programs is another area for legislative action.

In an effort to keep consumers better informed on energy matters, the Virginia State Corporation Commission (SCC) was directed by the General Assembly in 2008 to “develop and

implement an electric energy consumer education program to provide retail customers with information, regarding energy conservation, energy efficiency, demand-side management, demand-response, and renewable energy”.²⁸ The result of the SCC’s effort to comply with this directive is *Virginia Energy Sense*, a web-based information portal for energy consumers in the commonwealth. Besides the usual energy tips for consumers offered on similar websites, *Virginia Energy Sense* offers consumers an opportunity to earn money saving coupons as they save energy. By allowing access to personal utility data at the site’s “Energy Sense Energy Tracker”, consumers can earn rewards from more than 245 local businesses when they succeed at saving energy. This is an innovative marketing tool that could be adopted by a local energy program.

Both the Virginia Energy Plan and the Code of Virginia call for ten percent reductions in energy use by 2020, based on 2006 levels. The VEP goes to some length to make policy recommendations to achieve this goal; but over the ensuing three years since the plan was published it is difficult to see much real change in state support. The VEP proclaims that “Government...has a significant role to play to increase implementation of energy-efficiency and conservation measures by providing incentives, broadening public awareness, and through its role as a regulator of utility-service pricing” (VEP, p.58), yet the SCC ignored the VEP when it decided to use the RIM cost test. The VEP also acknowledges that “Virginia has no established funding source for energy-efficiency and conservation programs” and that “Most states with a successful history of efficiency programs provide significant funding resources” (VEP, p.61). But the commonwealth seems no closer today than it did three years ago to creating such a fund, and the legislature’s inability to move forward on funding for efficiency programs calls into

²⁸ The Commonwealth of Virginia State Corporation Commission Consumer Education Plan. December 17, 2008; pursuant to section 56-592 of the Code of Virginia.

question the commonwealth's commitment to achieving the ten percent reductions in energy use called for in SB 1416.

Chapter Conclusion

A few small changes to the mandate of the State Corporation Commission would create the possibility of major helpful changes in Virginia's progress towards using energy more efficiently. The SCC claims that its mandate, narrowly defined as it is, disallows the commissioners from determining the value of efficiency outside of possible rate increases. Defining its mandate in this way has caused the commissioners, against the advice of the Virginia Energy Plan, to opt for using a single measure to determine the costs of investing in efficiency. If the Commission decided instead to allow for other factors when determining a cost-benefit analysis, as the VEP recommends, there would be a far greater chance to establish a public benefit fund.

Establishing a PBF may be the only way for non-utility energy programs in Virginia to become successful. Comparing ACEEE's State Energy Efficiency Scorecard with DSIRE's list of states with PBFs shows that the top five scoring states in ACEEE's list have established PBF's. Since it is likely that federal funds for efficiency will not remain at such historically high levels for long, states will have to rely on funding from other sources. In order for Virginia to reach its stated goal of a ten percent reduction in energy use by 2022, based on 2006 levels, the legislature will likely have to get serious about establishing a funding source to meet the goal.

Chapter VII: Existing Programs

Overview

The Commonwealth of Virginia is in an unenviable position as concerns the establishment of an independent energy efficiency program. Virginia is a state that, despite its re-regulation of the utility industry, lags behind in funding for efficiency;²⁹ and trying to get a non-utility energy program established in a state that has no reliable source of funding will pose several serious challenges. At the national level, no independent, non-utility, energy program has been implemented in a state that has Virginia's constraints. At least this was true until the last couple of years when the federal government began to distribute money for efficiency programs to the states through the American Recovery and Reinvestment Act (ARRA). The future of any program that has been established using ARRA funds, that does not have recourse to any other funding after ARRA funds are no longer available, is uncertain.

With the aforementioned knowledge in mind, it is difficult to find energy programs that Virginia can use as models. Still, having at least a passing familiarity with existing energy programs in the U.S., and understanding how and why they were formed, will help an emerging program in Virginia refine its own vision, goals and structure. Although the funding picture for other efficiency programs will be different for a program in Virginia, there is still much to learn from them; including their methods for overcoming the many barriers to getting people to invest in efficiency. This chapter provides a brief analysis of several energy programs from different states as well as a short discussion on utility regulation and how it led to the formation and funding of some programs.

²⁹ ACEEE 2010 State Energy Efficiency Scorecard.

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At its most fundamental level, an energy efficiency program will have as a goal the reduction of energy use in its service region, and there are a variety of ways to go about reaching this goal. Studying other programs informs us that there are three broad avenues for pursuing energy reduction goals:

1. Some programs rely on market transformation to create a lasting change in consumer behavior.
2. Some focus on resource acquisition and the measurable goal of obtaining savings from installed technology (resource acquisition programs can focus either on specific technologies or a whole house approach).
3. While others see these two methods as complementary and try to house them both under the same roof.

Further, while some programs concentrate on achieving energy reductions through installations of specific technologies, some take a whole house approach. Understanding the difference in these approaches, and how each requires different efforts, should help a local program in Virginia become more efficient and effective at reaching its ultimate goal. Understanding also that no program currently stands head and shoulders above the others, and that all programs are still adapting to market forces, will encourage any interested parties to think outside the box in formulating their own program.

Administration of energy programs has traditionally been through states, as in the federally funded Weatherization Assistance Programs, or through utilities. In 2008 alone, energy savings from utility programs totaled more than 104,900 GWh of electricity and more than 367

million therms of gas, which led to the abatement of over 61 million metric tons of CO₂ (Nevius, 2009).

Recently, many localities and nonprofits have gotten involved in establishing and running efficiency programs. There have been two reasons for the recent influx of local programs:

1. Many localities have signed a commitment to reduce GHG emissions, and energy efficiency ties into the goals established in these agreements³⁰.
2. The federal government has begun funding local programs through formula and competitive grants such as the Energy Efficiency Community Block Grant program and the American Recovery and Reinvestment Act of 2009.

When funds arrive at localities that have no history of promoting energy efficiency and no utility partners, which is the predominate case in Virginia, options for implementing programs are limited. Compounding the issue is the fact that energy efficiency investments per capita in the Southeast region are the lowest in the nation (Brown, et al., 2010), and Virginia ranks thirty-fourth out of the fifty states on ACEEE's 2010 State Energy Efficiency Scorecard.

It is worth noting that decreasing the flow of wasted energy from our existing stock of buildings has not historically been undertaken as a grass roots movement. On the whole it has not been consumers who have pressed for more energy efficient appliances and HVAC systems, tighter building shells, or CFL light bulbs. Nor has there been a movement of traditional building professionals and tradespeople requesting more efficiency in the stock of existing buildings. In

³⁰ These agreements include: The Mayors Climate Protection Agreement (1044 signatories); Cool Counties Initiative (42 county signatories); ICLEI (over 600 members in the U.S.)

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fact, there has been a good deal of trouble getting both groups to accept many such products and standards, as can be seen by the fairly low market penetration of many efficiency products.³¹

Rather than the demand for energy efficiency coming from building owners and building contractors, most of the push for energy efficiency programs has come from those who see a bigger picture. A few utilities, environmentalists and federal, state and local government have led the way, basing their leadership on issues such as global climate change, energy security and macroeconomics. The problem arises when efficiency programs rely on these big picture motivations to lead consumers. This technique has not helped energy program managers create much of a market for energy efficiency

The Connection between Energy Programs and the IRP Process

The recent history of energy efficiency programs in the U.S. is tangentially tied to the deregulation and re-regulation of utilities, as well as to the Energy Policy Act (EPACT) of 1992. One provision of the EPACT was to require utilities to conduct “Integrated Resource Planning” (IRP) or “Least Cost Planning”. IRP is a unique process of multi-input planning for future electric generation needs, and the subsequent need to build new power plants. The IRP process includes not just anticipated customer demand, as was true in the past, but also reductions in that demand due to cost effective investments in energy efficiency. A utility’s IRP, and the process by which it is approved, are important to efficiency programs because programs are often funded through the IRP process.

³¹ Although many specific efficiency products have higher market penetration rates than energy retrofits, some important products, such as Energy Star air source heat pumps, with a 2005 penetration rate of 27%, would be much higher if there was greater demand from consumers. See Appendix G for a list of Energy Star market penetrations.

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In the IRP process, changing demand through- demand-side management (DSM) - is valued as a resource option that is equal to traditional supply resources such as building new power stations (Shrestha & Marpaung, 2006). The rule is that if abating a kWh through an efficiency effort is cheaper than producing those same kilowatts through new generation, then an investment in efficiency is called for. A paper by the Center for the Study of Energy Markets (a program of the University of California Energy Institute) explains IRP in this way:

Proponents of energy efficiency received the Energy Policy Act (EPACT), passed by the US Congress in 1992 (P. L. 102-486), with satisfaction because of provisions in the Act that encouraged utilities to conduct Integrated Resource Planning. Integrated Resource Planning, also known as Least-Cost Planning, is a process in which utilities plan for the future needs of their customers by considering and assessing benefits and costs to society, the utility, and customers of a broad range of resource options including new generation, transmission capacity, and demand-side alternatives. In the Integrated Resource Planning context, energy-efficiency programs were seen as one mechanism for ensuring that the supply of electricity was adequate (Blumstein, Goldman, & Barbose, 2003).

Virginia Code (section 56-597) defines IRP as “a document developed by an electric utility that provides a forecast of its load obligations and a plan to meet those obligations by supply side and demand side resources over the ensuing fifteen years to promote reasonable prices, reliable service, energy independence, and environmental responsibility”. Virginia Dominion Power in their 2010 IRP defined that its objective “was to identify the mix of resources necessary to meet future energy and capacity needs in an efficient and reliable manner at the lowest reasonable cost”. And that the company “remains committed to meeting its renewable energy and energy efficiency goals in a cost-effective manner”.

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Under the IRP process energy efficiency programs can be seen as an energy resource, and a means to ensure that the supply of electricity is adequate to meet demand (Blumstein, Goldman, & Barbose, 2003). The efficiency programs established by the IRP process were (are) focused on providing customers with incentives for purchasing products such as appliances, insulation and HVAC systems. These incentives are structured so that the assumed energy savings from them will cost less than building a new power plant to supply that same energy. These energy efficiency programs are also known as “resource acquisition programs”, and unlike market transformation programs, they have the advantage of easy verification of energy savings (at least the theoretical savings are easy to deduce).

A good example of this type of program is a stand-alone duct sealing program.³² The Sacramento Municipal Utility District and the Northwest Energy Alliance both run duct sealing programs using a proprietary sealing technology called “Aeroseal”. If the market penetration of a stand-alone program such as this becomes large, it can reduce as much overall energy use as a smaller program dedicated to whole house savings.

Working counter to IRP is the ongoing attempt by some states to deregulate and restructure the utility industry. Before some states deregulated the industry, state corporation commissions would simply tell the utilities to run efficiency programs and include the costs of the programs in their customer’s rate schedule. After deregulation, many states lost the ability to do this. Several states have since replaced this ability by setting up public benefit funds (PBF) to collect fees from ratepayers to fund energy efficiency and renewable energy programs. PBF’s are essentially an add-on tax to a utility customer’s bill that in current programs ranges from \$.001 to

³² Duct sealing is particularly important due to the average high rate of leakiness from installed ducts. Once all of the ducts are sealed in a home, average HVAC energy savings are on the order of 20% during the heating and cooling seasons (McIlvaine, 2001).

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\$.01 per kWh. But an issue with PBF's is that the legislation that establishes them sets time limits on their existence. For instance in the year 2008, twenty-three states had established PBF's; by 2010 only eighteen states plus the District of Columbia still run a PBF. In 2010, state revenues from these funds range from \$632,000 in Maine, to \$364 million in California.

As a portion of all ratepayer funded energy efficiency programs in the U.S, the funding from PBFs is fairly small. The combined total of United States and Canadian energy efficiency program budgets for ratepayer funded electric and gas programs reached nearly \$6.1 billion in 2009, up from \$4.5 billion in 2008 (Nevius, 2009). The total funding of all PBFs in the U.S. in 2010 is \$551 million; however California is responsible for two-thirds of the funding. Each fund is subject to political pressure at the time of renewal and this adds to the uncertainty of their continued existence, and their level of funding every few years.

States with PBF's have arrived at different methods for using these funds for energy programs (Blumstein, Goldman, & Barbose, 2003):

- California, with the largest PBF, administers how the funds are used through the California Public Utilities Commission (CPUC), which until recently has given the largest portion of the funds to the 4 major utilities operating in the state. The CPUC approves and oversees the energy programs run by these utilities. However in 2002, the CPUC decided to transfer a large proportion of the PBF money to locally operated energy programs.
- In the Pacific Northwest states of Washington, Idaho, Oregon and Montana, public benefit and utility funds are dispersed to two large regional nonprofit agencies: the Northwest Energy Efficiency Alliance (NEEA) and the Energy Trust of Oregon. Neither

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of these organizations is involved with actual program implementation, but rather fund smaller local organizations (implementation contractors) that run independent energy efficiency programs. Instead, both organizations focus on their main mission which is market transformation.

- New York State chose to keep control of its PBF by assigning fund administrative duties to the New York State Energy Research and Development Authority (NYSERDA).

NYSERDA was created by the Legislature of the State of New York in 1975 as a public benefit corporation with the mission of conducting an energy R&D program. NYSERDA began administering energy efficiency programs in 1996, after the public benefit charge (in NY called a systems benefit charge) was established. NYSERDA is the statewide program administrator, much like the NEEA, and funnels money for program implementation to other organizations.

Although these are not currently the only active PBF programs in the country, a literature review of how PBF programs are administered in other states suggests that their methods of establishment and operation are not uncommon. Of the seven programs reviewed below, only Colorado does not have a statewide PBF in 2010. The purpose behind analyzing PBF's in this thesis is that they have become a major source of revenue for energy efficiency programs. Energy program managers in Virginia may find it useful to lobby the state legislature to establish a PBF in the commonwealth.

Program review

The four programs reviewed below were chosen based on two factors that are relevant to establishing a program in Virginia. Prerequisites for each program are that it is not utility-based,

and operates a whole house program; because a local, non-utility program is the sort of program that is likely to be established in Virginia. The Boulder, Colorado program was chosen because it is a local program that was established without the benefit of state or utility funding. Babylon, New York made the list because it is also a locally established and operated program that created its own locally controlled funding source. Babylon also runs an exemplary, well focused non-nonsense program that targets whole-house retrofits using a PACE financing model. Palm Desert was chosen because it is an example of what not to do in an energy program. The national Home Performance with Energy Star (HPwES) program was chosen due to the success of the HPwES model, and its growing popularity as a platform for whole house retrofits.

Boulder, Colorado:

Boulder is a city of about 93,000 people with 41,000 housing units and a median home value of \$474,000 (U.S. census). Boulder's motivation for their energy program(s) stems from their 2002 city-wide climate resolution. This resolution requires that the city meet the Kyoto Protocol carbon reduction goal of 7% below 1990 levels by 2012. Boulder has shown a rare combination of political and public dedication to meeting this goal. In 2006, residents passed a resolution to institute a Climate Action Plan that included a user tax on electricity, effectively creating their own local PBF. Revenue from this tax funds the City's energy programs. Climate Action Plan revenue from this carbon tax was \$877,000 in 2008 and grew to \$1.6 million in 2010.

Boulder has undergone a series of efforts to involve building owners in investing in energy retrofits since the inception of the Climate Action Plan. All of the administrative efforts to date have been undertaken by a department of the city with city employees. The current

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gateway for homeowners and businesses is called the “Climate Smart” program. The Climate Smart Program contracts out actual implementation and customer interface with a nonprofit that runs a separate program called the “Residential Energy Action Program” (REAP). The REAP program is accessed through the website of the parent nonprofit (Center for ReSource Conservation) with links for energy assessments and information. It is all a bit confusing, and the entire effort could benefit from some streamlining.

In July, 2010, the City received the final “Two Techs Implementation Plan” report from a hired consulting firm. The basics of the consultant’s recommendations were to hire outside contractors to administer an energy program. Administrative functions would include assisting the City with the “structure and systems necessary to deliver services at the volumes needed for the City and County to meet their participation and GHG goals” (Ellsworth, 2010). One aspect of the program administration would be to assist homeowners with “energy concierge” services. The Energy Concierge would act as an independent homeowner’s advocate and would guide the homeowner through the retrofit process. The Concierge would arrive with the energy assessor and while on site would install low cost measures such as low flow showerheads and CFL bulbs. The Concierge would then assist the homeowner with such things as finding a pre-approved contractor, filling out rebate forms, getting financing in place and guiding the homeowner throughout the actual retrofit. A major driving force behind the concierge concept is to increase the rate of follow through after an assessment. If Boulder accepts the consultant’s recommendation, daily program administration and services will no longer be a City function.

Boulder also established a PACE type financing program in May of 2009 which has financed \$10 million in energy efficiency and renewable installations since its inception. The program is funded through a \$40 million bond issuance from the City. The program funds both

residential and commercial projects. Due to the current holdup of PACE type programs at the federal level, Boulder has put the program on hold for the foreseeable future.

Babylon, New York:

Babylon is a town of 212,000 people on Long Island, NY with 72,000 housing units and a median home value of \$406,000 (U.S. census). In 2006 the town created the Long Island Green Homes (LIGH) program to help residents lower their utility bills and to meet the town's commitments to reducing its carbon footprint. LIGH focuses almost exclusively on energy efficiency rather than renewable installations. It also is focused on resource acquisition rather than market transformation. Essential to the creation of this program was town supervisor Steve Bellone, who is a dynamic and committed "champion" of environmental stewardship. This program as much as any other shows the importance of having at least one committed person to see the program through to completion.

LIGH is administered by the town and hires private contractors to perform energy assessments and retrofits. The gateway for homeowners is an interactive website that serves as a first step to getting an assessment. The program has performed over 450 assessments since 2006 and 145 of the first 200 assessments transitioned into retrofits by March 2010 (HPRC, 2010). The program maintains a list of participating contractors who, among the usual licensing requirements, must meet specific program requirements of BPI certification and must have performed at least 10 assessments or energy retrofits.

The cornerstone of the LIGH program is its financing mechanism. LIGH runs a PACE type program that is financed with money from the town's existing solid waste fund. (Babylon was able to re-define solid waste to include carbon dioxide, and in so doing created a \$2 million

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dollar revolving loan fund.) The program aims to keep loan payments³³ below the expected costs of the energy savings, and although there has not been a formal analysis of this effort, Dorian Dale the town's energy manager, says that all indications are that the loan program is working as advertised (telephone conversation with Dorian Dale, Aug.10, 2010). During the assessment a savings to investment ratio is calculated by a software program, and if it is higher than 1, the retrofit may proceed. According to Mr. Dale the average cost of a retrofit is just under \$9,000 with a payback period of 8.7 years (average payment of about \$98 per month). Of course, this low payment is only possible with the program's current 3% interest rate. Unlike Boulder, LIGH has decided to keep their finance program going despite the federal governments red-lining of PACE enabled communities.

Palm Desert, California:

Palm Desert is a city just northeast of San Diego with a population of about 50,000 people and 33,500 housing units. The median home value of \$431,000 is more than twice the national average. Palm Desert has a two pronged approach to its energy programs. There is a PACE-like financing program called the "Energy Independence Program" (EIP) and a utility/nonprofit/city partnership program called "Set to Save" that mainly offers rebates for equipment purchases. Customer access to both of these programs is through websites; EIP is accessed through the City's web portal and is administered exclusively by the city and Set to Save has its own website. Neither of these programs focuses on whole house efficiency retrofits.

Palm Desert's energy programs are focused on reducing the city's carbon footprint 30% by 2011, but there does not appear to be any plan to achieve this goal in the most cost effective

³³ Technically, the program does not lend money to homeowners, but rather pays the contractors directly and then charges homeowners for the cost of the project, with payments spread out over time. This may prove to be an important facet of the program from a legal standpoint in the town's lawsuit with the FHFA.

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manner. By focusing on funding renewable installations before efficiency, the program encourages, or at least does not discourage, residents to install expensive PV systems on inefficient buildings. Efficiency is relegated to the Set to Save program which offers a free home efficiency “tune up” that promises to have the home “operating at maximum energy efficiency” for about \$200 worth of work (Appendix H). This low price for achieving maximum efficiency is highly unlikely since all studies on residential energy efficiency place the figure to achieve this in the thousands of dollars. Furthermore, the EIP finance program does not require any sort of energy assessment on a building before loaning money for PV systems. There is also no requirement for homeowners to provide the program with prior or post utility bills. Energy savings are calculated exclusively from assumed product performance specifications. The investment to savings ratio for Palm Desert’s program may never be accurately known.

The first 2 phases of the EIP program were funded by the city’s general fund at \$7.5 million. Loan proceeds ranged from a minimum loan of \$5,000 to a maximum of \$60,000, or \$100,000 with approval from the City Manager. By March of 2010 the program had dispensed 70% of the allocated funds for expensive solar PV installations, even though only 98 of the first 206 projects were for PV. The guidelines for phase 3 are to use 50% of the \$6 million in funds for efficiency. Unfortunately however, the administrative guidelines for the loan program do not require participants to hire contractors with any sort of home performance certification. Without such guidelines, or any form of M&V requirement post retrofit, there are sure to be less than ideal results.

Home Performance with Energy Star:

Home Performance with Energy Star (HPwES) is a national “whole home approach” energy efficiency program established and administered by the EPA and the DOE. Nationally to date, over 75,000 homes have received work through the program. There are approximately 42 local program sponsors in 30 states including 1 sponsor in Virginia (Charlottesville’s LEAP program) and an unsponsored pilot program in Northern Virginia. Austin, Texas, New Jersey and New York State host 3 of the largest programs.

Austin’s HPwES program is sponsored by Austin Energy, a community and city owned utility with 388,000 customers. Austin started offering energy efficiency programs for residents through its Housing Department in 1982, but in 1998, transferred those programs to Austin Energy. The HPwES program was started in 2004 and in 2009 alone completed work on more than 2600 homes (<1% of customers). The 2008 budget for the program was \$329,000 and financing comes from a local add-on to all customers’ base rate. Interest rates for unsecured loans were bought down to between 0% and 6% and are available for loans up to \$11,000.

New York State’s HPwES program is administered by a state agency, New York State Energy Research and Development Authority (NYSERDA). There are approximately seven million homes in NYSERDA’s jurisdiction and over 29,000 HPwES projects have been completed since the program’s inception in 2001(<1/2% of homes). NYSERDA offers other residential energy programs as well, and the combined budget for all residential programs from 2006 to 2011 was \$147 million. All programs are funded through a public benefit charge, and the HPwES program is administered by a nonprofit (Conservation Services Group). Loans are available with reduced interest rates through a program interest rate buy down. NYSERDA also

administers a unique marketing approach through a cooperative marketing fund with participating contractors.

Although a whole house retrofit program does not need to partner with the federal HPwES program, there are several reasons why it can be beneficial. HPwES sponsors are provided with marketing tools, program templates, assistance with program design, sales force training and help with contractor development. Most importantly though, is that program sponsors get access to the Energy Star logo to use as a marketing tool. Since public recognition and acceptance of the logo as a symbol of energy efficiency is high (Goldberg, Goepfrich, Spielman, & Johnston, 2006), using the logo in advertising could conceivably raise the public's recognition of a local program.

Obtaining HPwES certification for one's home can also be marketed as a way to increase the value of a home. A 1998 article in *The Appraisal Journal* found that there is an increase in incremental home value of \$10 to around \$25 for every \$1 reduction in annual fuel bills. (Nevin, 1998). An Energy Star labeled home must show reductions of energy use of at least 20%. For an average home in Virginia that spends \$1900 per year on energy (DMME website), a 20% reduction in energy costs equates to \$380 of annual energy reductions. Using the results from the study by *The Appraisal Journal*, a HPwES home would have an increased value of between \$3,800 and \$9,500.

The HPwES program is flexible enough to accept partnering with differing forms of local programs. The general guideline that sponsor programs must follow is that the sponsor: "agrees to promote whole-house evaluation and building science-based energy improvements to existing homes" (from HPwES sponsor guide version 1: 2008, appendix). Beyond this there are

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requirements related to the proper use of the Energy Star logo and that a program includes all aspects from the list below:

1. A goal and accompanying plan to employ energy efficiency measures, using building science and cost/benefit analysis, to reduce the service area's energy use in its existing building stock.
2. Recruitment, training and certification of participating contractors.
3. The requirement of an initial energy performance assessment before accepting customers for retrofit work.
4. Provision of 3rd party oversight including measurement and verification (M&V) of the work performed by the contractors.
5. Marketing the program.
6. Program data recordation.

Chapter Conclusion

Energy-efficiency programs work, but the question remains about how to achieve greater market penetration. ACEEE determined that the ninety most successful utility based programs in the U.S. saved 2,400 GWh of electricity and 125 million therms of natural gas in 2007 (York, 2008). In that same year, the U.S. consumed 4.16 million GWh of electricity (DOE-EIA, Electric Power Annual: 2007); putting the savings from these efficiency programs at about .17% of total U.S. consumption. ACEEE also reports that average annual local reductions in electricity consumption from all of the energy efficiency programs existing in the country in 2006 was .24%; with Vermont's program leading the pack at just over 1% (EPRI, 2009). ACEEE estimates

that current efficiency programs will need to expand by 40% to reach the “realistic achievable potential” of energy efficiency.

Studying existing energy efficiency programs leaves the impression that they are not trying to *sell* anything. The prevailing attitude amongst energy programs is that they exist to *offer* a valuable service, but there is too little effort to sell that service. Yet from the position of the homeowner who is going to shell out thousands of dollars, it certainly feels like they are buying something; or it should feel that way.

It should not come as too much of a surprise that energy programs haven't focused on sales techniques, since the majority of management and staff come from the ranks of public service organizations, many with degrees in environmental science or public policy and administration. If energy programs ever hope to reach their ultimate goals, and stand on their own feet they will need to take on some of the aspects of a business that is trying to sell a product to a reticent public.

One particularly exasperating problem that is prevalent amongst existing energy programs is how complex the process of getting a home retrofit is for a consumer. The initial contact and entrance point for most energy programs is through a website, and most energy program websites are far too complex. LIGH and Charlottesville, Virginia's LEAP program are two exceptions to the rule. LIGH's site in particular is very straightforward and simple for a consumer to find what she is looking for. In particular, it looks like it is designed to sell a product, and is focused on doing just that. Most other energy program sites are far too cluttered with information about the energy program itself, rather than what the program provides. When a potential customer goes to the home page of an organization that wants to help consumers save

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energy, the customer should not be required to go through several mouse clicks and read through several pages of information before the customer finds the service they are looking for.

There is no single program design that is going to be successful for all market segments in all areas of Virginia. Acknowledging customer segmentation based on local conditions is important to identify appropriate solutions with unique challenges of that particular customer group (Foster, 2010). For instance, an energy program establishing itself in the Tidewater region will use different marketing techniques, symbols and branding than a Richmond or Southwest Virginia based program. Financing mechanisms, rebate incentives, marketing and customer intake will be different for each program type and focus. Each program must gauge its strengths and weaknesses before deciding on which path to take. Further, a regional program with limited resources that focuses on the adoption of a single technology may be more successful at overall energy reduction than taking a more comprehensive approach. An evolving program has to take into account its sources of financial backing, the particular strengths and interests of its members and its jurisdictional composition before deciding which type of program approach to take. In other words, an approach that works in Northern Virginia that gets its electricity from a co-op is going to be different from an approach that will work in Southwest Virginia that gets its electricity from APCO. Lastly, keeping an eye on the many evolving local energy efficiency programs across the U.S. that are still in their infancy may help Virginia based energy programs grow into successful ventures.

For Virginia, the lack of a statewide public benefit fund leaves the creation and implementation of programs to rely on what may be very short-lived federal funding. Efficiency program managers in the commonwealth need to consider where their funding will come from as federal stimulus funds dry up in the next year or two. Virginia's DMME states that the money

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that the commonwealth received from the U.S. DOE in the 2009 stimulus bill will be used “to create and encourage enduring, self-sustaining programs to improve energy efficiency in public and private buildings” (EECBG June 25, 2009 application from DMME to U.S. DOE). Just how these programs are to become self sustaining in the next few years presents itself as a challenge.

Chapter VIII: A Self-Sustaining Program

From the Consortium for Energy Efficiency (CEE)-Existing Homes Program Guide-2010:

“The energy efficiency program needs to build a network of contractors who employ trained and certified technicians to assess and complete the needed efficiency upgrades while simultaneously increasing consumer understanding of and willingness to pay for these services in a manner that motivates action and by reducing first cost barriers, all in a manner that leverages existing infrastructure and delivers energy savings cost effectively over both the short and long term.” (Foster, 2010)

Reading the above statement in light of the information supplied in the previous seven chapters allows us to see the challenges inherent in each of the Consortium’s admonitions. Energy programs need to be engaged in the act of simultaneously providing supply and demand, while having to create both on the run. Accomplishing this task requires the inclusion of actors ranging from contractors to bankers, to marketing professionals to utility companies. A program that enhances energy efficiency in a community is an active and complex endeavor that requires a range of talents and a breadth of knowledge.

Essential Elements of Whole House Retrofit Programs

As argued throughout this paper, there are four prerequisites that a whole house energy program must have:

1. An understanding that consumer behavior has a large influence over conserving energy and investing in efficiency.
2. An understanding of the economic barriers to investing in energy efficiency.
3. An understanding of the importance of appropriate financing.

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4. A program element of partnering with properly trained and certified contractors and auditors.

Once these prerequisites are understood the program can look to adopt the several tools and methods available for tackling each of these issues, given in table VIII-1.

Table VIII-1: Energy Program Prerequisites

Program Element	Method of Addressing the Element
Consumer Behavior	Marketing campaigns designed with knowledge of general behavioral guidelines coupled with an understanding of local demographics, culture and market segments.
Economic Barriers	Comprehensive program design focused on lowering transaction barriers by creating a “one stop shop” for energy efficiency. Energy assessments tailored to help overcome consumer information deficits as well as uncertainty about investment payback.
Financing	Loans attached to the property with an extended payment term to help overcome the first cost barrier.
Contractor Partners	Contractor development, certification requirements, and work guidelines that help to overcome consumer distrust, and that facilitate post retrofit M&V.

The element missing from the above list is sustained funding for program implementation. In Virginia, in addition to the usual difficulties in convincing home and business owners to invest in efficiency, there is the reality of uncertain future public funding. Because of this issue, program managers need to consider alternative sources of funding to keep their programs afloat over the long term. Possible sources of income for a program include:

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- Charging participating customers a fee based on a percentage of work done through the program.
- Charging an increase to the interest rate customers pay for program sponsored loans. (Long Island Green Homes covers its administrative costs using this method.)
- Charging partner contractors a percentage fee for jobs passed through the program.

The problem with the above solutions is that they all add costs to building owners and make investing in efficiency more expensive and less likely. The only possible solution to increasing investments in efficiency, while at the same time increasing the costs of efficiency, lies in creating a proper finance program. A proper finance program is one that allows customers to be cash positive from day one, and allows the loan to be transferred with the property. A consumer who sees that their monthly bills are going to decrease because of program participation may not focus so much on the total cost. Looked at this way, financing investments in efficiency begin to look like a traditional energy service contract in which all up-front costs are paid by another entity.

Considering the above information, programs in Virginia will likely need to focus on developing a business plan that includes generating income from program participants, as well as establishing a PACE or TIPs financing program. Since PACE is subordinate to existing mortgages in Virginia's current enabling legislation, finding an outside funding source that will insure PACE loans may be necessary. There are four other possibilities that would make subordinate PACE loans workable: (1) federal backing of PACE loans may become a reality; (2) the Maine PACE program may show good enough results that private financing may become available, or (3) either congressional action will overrule the FHFA, or (4) one of the lawsuits against the FHFA may be decided in favor of PACE, allowing financing to go forward.

The Business Model

Few if any independent energy programs have developed a business model that will allow them to continue to function without outside capital. This is true even though the ultimate goal of market transformation is for investments in energy efficiency to evolve into a natural market without the need of subsidies (Rosenberg & Hoefgen, 2009). The Virginia Department of Mines, Minerals and Energy (DMME) states that the commonwealth's energy strategy is to "create and encourage enduring, self-sustaining programs to improve energy efficiency in public and private buildings" (EECBG June 25 application from DMME to U.S. DOE). Studying the features of a closely aligned business (residential and commercial remodelers) may give insight into how to create a sustainable market for efficiency.

Successful remodeling firms have something that is missing from all of the energy programs studied in this paper: an outside sales staff. CEE importantly points out that although efficiency programs are doing a good job of focusing on technical training, sales training is also critical to securing efficiency upgrades in homes (Foster, 2010). The consultant for Boulder's energy program comes close to this missing element in the recommendation for training and deploying energy "concierges" to assist homeowners. A good sales staff is essential for a service based business to grow, and without one even companies that offer something customers want will stagnate. Following this model of successful business practice may be one of the missing elements that is keeping energy programs from reaching the number of customers they would like to see.

Outside sales staff can act as an essential element in getting customers to cross the threshold of the first cost barrier. A highly trained and motivated sales staff deployed by a

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nonprofit energy program can engender trust and confidence amongst potential customers. They can act not only as sales personnel, but also as advocates for the homeowner during the entire efficiency project. Properly trained, they could help to explain potential savings to the homeowner as well as smooth the progress of sales. With such an advocate at her side, a homeowner would likely feel less uncertainty and risk associated with the initial expense.

Perhaps the next level of experimentation for energy programs should be to adopt many of the features of a for-profit business model, and all of its accompanying sales and marketing techniques. As they now exist, most energy programs see themselves as public benefit organizations. But the problem is that the public does not seem very interested in the benefits being offered to them. The for-profit business model has been able to convince Americans to spend billions of dollars per year on a product that they can get free from their water tap. It may work just as well at convincing Americans to invest in a much more beneficial product.

The self supporting program

Sustainable funding may be one of the biggest challenges for energy programs in Virginia. Although there are currently federal dollars that can be used to create an energy program, there are no guarantees that these funds will last more than two or three years. In a state that has no other funding source, an energy program that relies on federal funding will cease to exist once it is gone. Unless Virginia establishes a public benefit fund, or local energy programs can find a way to be self-supporting, they may not last long. Even if federal funding is extended into the next administration, the expanding number of new local and state energy programs nationwide will likely drain the fund very quickly.

In light of this challenge, and in order for energy programs to control their own fate, they should pursue avenues for self financing. This may be achieved in part through adding a fee,

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calculated on a percentage of retrofit sales, to each job. Justification for this fee arises from the value added through an energy program’s marketing, management and customer interface roles. Since an energy program would relieve participating contractors of these costs, an assumption can be made that these costs are simply being shifted, and that overall retrofit costs would not increase for the homeowner. Start-up funding from federal and other sources should only be relied on for the first few years to get the program off the ground. After this, if the program is successful, customer participation should be enough to make the program self supporting, or nearly so.

A quick analysis of program income can be generated using housing data from a region of Southwest Virginia. An estimation of income for an energy program established in the Roanoke/New River Valley region of Southwest VA, having the housing characteristics from Table VIII-2 (from US Census 2008 estimates) is shown in Table VIII-3.

Table VIII-2: Housing Data

	Roanoke City	Roanoke Co	Mont. Co	Floyd Co	Blacks- burg	Christia- nsburg	Total
Owner occupied homes	23,637	26,783	18,921	4,745	4,003	4,747	82,836
Rental homes	18,366	7,903	14,081	1,046	9,159	2,346	52,901
Percent owner occupied	56%	77%	57%	82%	30%	67%	61%
Median family income	\$37,215	\$56,450	\$42,633	\$ 31,585	\$ 51,810	\$47,428	\$44,520
Average family size	2.86	2.88	2.87	2.83	2.79	2.86	2.85
Light Commercial	2237	1322	1402	157	614	548	6280

If an energy program has an initial focus on owner occupied homes³⁴, and is able to achieve a market penetration of one half percent annually, it would complete over 400 projects per year.

³⁴ Owner occupied housing is the easiest market segment to reach because of the lack of the principle agent problem. Other market segments (light commercial and rentals) can be added later.

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Chart VIII-2 displays program income based on an average cost per retrofit of \$4,000 and a five to ten percent (\$200-\$400) fee per job with income ranges from \$80,000 to \$160,000 per year.

Table VIII-3: Program Income

Fee	Annual Number of Jobs	Average Cost per Job	Annual Income
5%	400	\$4,000	\$80,000
7.5%	400	\$4,000	\$120,000
10%	400	\$4,000	\$160,000

Program expenses, based on hiring an outside sales staff, are developed in Table VIII-4.

The Energy Concierge

This section will attempt to arrive at an estimate for annual program expenses. Annual total program expenses are calculated based on using an “energy concierge” as described in the consultant proposal to Boulder, CO, but are here called “Energy Advocates” or EA’s. Using EA’s to interface with customers helps to overcome several of the existing market barriers that have resulted in a national efficiency gap. An EA system helps customers surmount information and transaction barriers, as well as supports the facilitation of financing and contractor/customer relations. CEE promotes hiring “energy efficiency case workers” who help consumers work through the process of making decisions (Foster, 2010). The Cambridge Energy Alliance (CEA) in Massachusetts also offers program participants the services of an “Energy Advisor”. The CEA Energy Advisor contacts participants by telephone after an energy assessment on their home and connects the homeowner with information on how to proceed with getting the work done. In the system described in this thesis, EA’s would serve a broader role. EA’s would be trained specifically to interact with customers to encourage investing in efficiency measures. A primary

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function of the EA would be to act as the outside sales force for the energy program, and as a surrogate sales force for partner contractors.

An EA would first interact with the customer over the telephone when scheduling the initial energy assessment, and would at that time inform the customer that he or she would be seeing them through the entire process and would act as their advocate throughout. An independent energy assessor³⁵ would then perform the assessment (energy audit) and give the final report to the EA. The EA would take the report and send it to the program's list of approved contractors for estimates.³⁶ The EA would then schedule a visit with the customer at their home. During this visit the EA would explain the written assessment report, and would then offer an explanation of the recommended work, as well as offer financing options and help with getting any rebate forms completed. The EA would also then provide the customer with the contractors' estimates and contact the chosen contractor for the customer. When an energy program, through its EAs, performs what are essentially sales functions for the contractor, it allows the contractor to focus on performing the retrofit itself, saving the contractor time and money.

The EA then stays in touch with the homeowner by phone as the work progresses, answering any questions and resolving any concerns. After the retrofit and the post retrofit energy assessment, the EA calls the customer and discusses the final assessment as well as reminds the customer of their responsibility to continue to provide the program manager with utility data for a specific period of time.³⁷ Creating a personal connection between the customer and their advocate (the EA) will help in many ways, not the least of which is enhancing the

³⁵ Assessors would need to tailor their assessments to provide the information necessary for contractors to provide estimates based on the information in them.

³⁶ In this scenario, the energy assessor writes a report that details the scope of the job in a way that contractors can create estimates from the final report.

³⁷ Energy programs need to track changes in participant's energy consumption in order to assess program successes, and to guide any needed improvements.

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energy program's control over program implementation. Without an EA, a customer's entire personal contact with an energy program will be through the partner contractor. Although contractors are an invaluable part of any energy program, with an EA their role would be restricted to performing the actual retrofit work. EA's would: (1) add some consistency and predictability to all homeowners' experiences with the energy program (2) reduce the number of stressful relationships that a homeowner must endure while going through a complicated retrofit process, and (3) with their added training and focus, likely be more successful at closing sales on a fairly complex product that will be new to consumers. Since an EA system could in effect act as a sales co-op for participating contractors, negating the need for each contractor to retain their own specially trained sales force, the EA system could ostensibly lower the overall costs per retrofit.

Chart VIII-1 displays the steps taken by an EA for a typical retrofit job. It is important for EA's to be disciplined in the amount of time spent with each customer in order to keep program costs down. Table VIII-4 displays estimated time segments for customer-EA interactions.

Chart VIII- 1: The EA Work Path

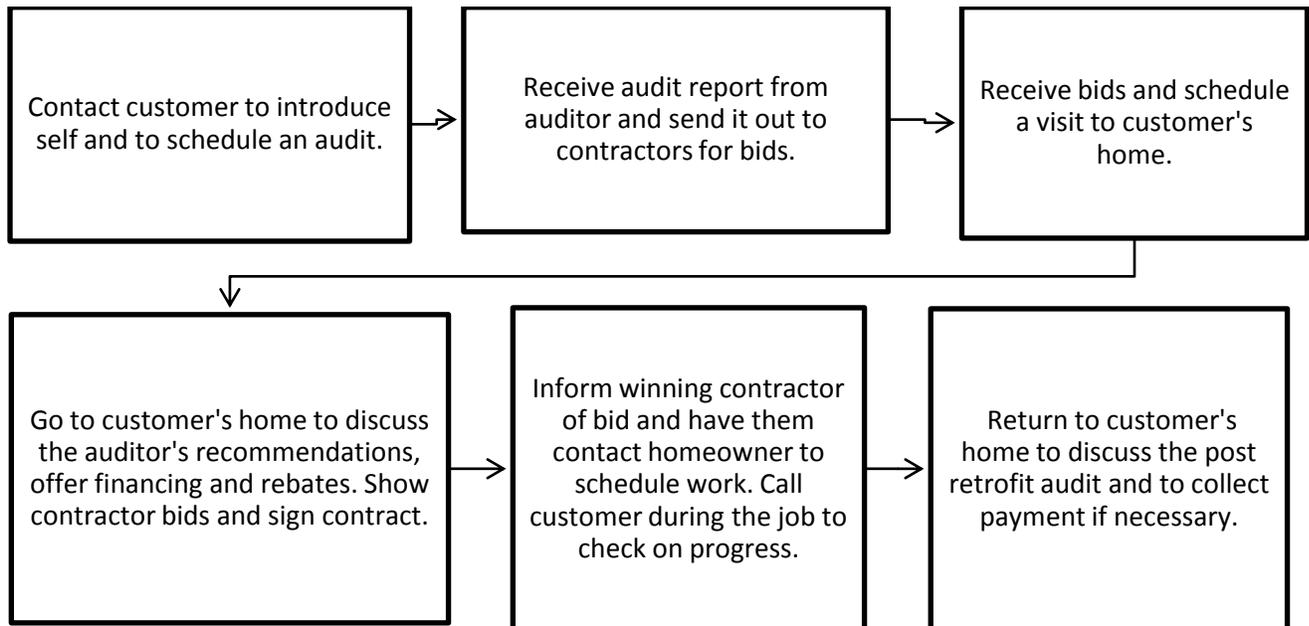


Table VIII- 4: EA Labor per Job

Task	Hours	Method of Interface
Initial contact and assessment scheduling	.5	Telephone
Post assessment conference*	2	At customer’s home
Retrofit progress report	.5	Telephone
Post retrofit consultation and payment collection	1	Customer’s home
Bookkeeping	1	None
Total	5	

*the post assessment conference will include explaining the assessment and the recommended installations as well as offering financing options and choosing a contractor for the job.

Accepting the above assumptions; each EA could complete on average eight jobs per week (of course, this “week” would be spread out over several months). With fifty work weeks per year, each EA could oversee 400 projects annually. For a program that completes 400 retrofits annually, one EA would need to be employed. Annual salary and other expenses-not

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including start up costs, advertising or customer incentive programs-are in Table VIII-5 (all salaries below are based on multiplying a base salary by 1.3 to include taxes and benefits).

Table VIII- 5 Program Expenses

Salary for Executive Director	\$78,000
EA salary	\$52,000
Rent	\$9,600 (\$800/month X 12 months)
Office equipment, utilities, telephone, internet, etc	\$6,000
Web site	\$4,000
Travel (based on 15,000 miles X \$.50/mile – 2010 IRS standard reimbursement rate.)	\$7,500
Total annual salary and overhead expenses	\$157,100

Without any outside source of income, a program would need to charge 10% per job (an average of \$400) to break even (See Table VIII-2)

For comparison, the HPwES sponsor guide provides a sample budget for a local energy efficiency program (Table VIII-5). The job goal total for each year rises in this chart, beyond what would be considered likely for our subject region of Southwest VA. Since an annual market penetration of one-half percent is about as high as any HPwES program has been able to achieve, the maximum number of jobs for this region would be reached during the second year. Of course, since all aspects of the program would be scaled for this size market, it can be assumed that the maximum market penetration would take longer than two years.

Some of the expenses in Table VIII-5 may be deferred to another organization if separate funding is available and has been allocated for job training. Under the stimulus program from the federal government, separate funding has been allocated for “green” job training. Some of this money is being funneled through community colleges and nonprofits to train and certify workers

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and contractors for participating in local energy efficiency programs. Partnering with these training organizations would relieve a local energy program of many of the associated contractor recruitment, training and certification costs.

The costs for program development in Table VIII-6 seem reasonable, but may fall into succeeding years beyond the two year time-frame that is shown. Costs for contractor recruitment are not broken out, but it is likely that if an energy program partnered with a training institution or organization, contractor recruitment will already have occurred as contractors joined the training program. Some costs labeled such as “contractor job incentives” and “homeowner incentives” may be pass-throughs from state or federal agencies.

Table VIII- 6: Example Budget for HPwES Program Sponsor

(from HPwES sponsor guide)						
Budget Category	Pilot Phase	Year1	Year 2	Year 3	Year 4	Year 5
Management	\$156,000	\$160,000	\$225,000	\$242,000	\$259,000	\$276,000
Program Development	\$52,000	\$53,000				
Contractor Recruitment	\$65,000	\$323,000	\$323,000	\$323,000	\$323,000	\$323,000
Training/Certification	\$29,000	\$59,000	\$88,000	\$88,000	\$88,000	\$34,000
Mentoring	\$13,000	\$25,000	\$38,000	\$38,000	\$38,000	\$14,000
Marketing	\$78,000	\$191,000	\$305,000	\$467,000	\$627,000	\$770,000
Contractor Job Incentives		\$39,000	\$117,000	\$234,000	\$351,000	\$468,000
Homeowner Incentives		\$216,000	\$647,000	\$1,295,000	\$1,942,000	\$2,589,000
Infield Inspections (M&V)		\$18,000	\$40,000	\$68,000	\$83,000	\$98,000
Evaluation	\$25,000	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000
Total	\$418,000	\$1,124,000	\$1,823,000	\$2,795,000	\$3,751,000	\$4,612,000
Contractor Goal	10	31	63	94	125	136
Job Goal	0	250	750	1500	2250	3000

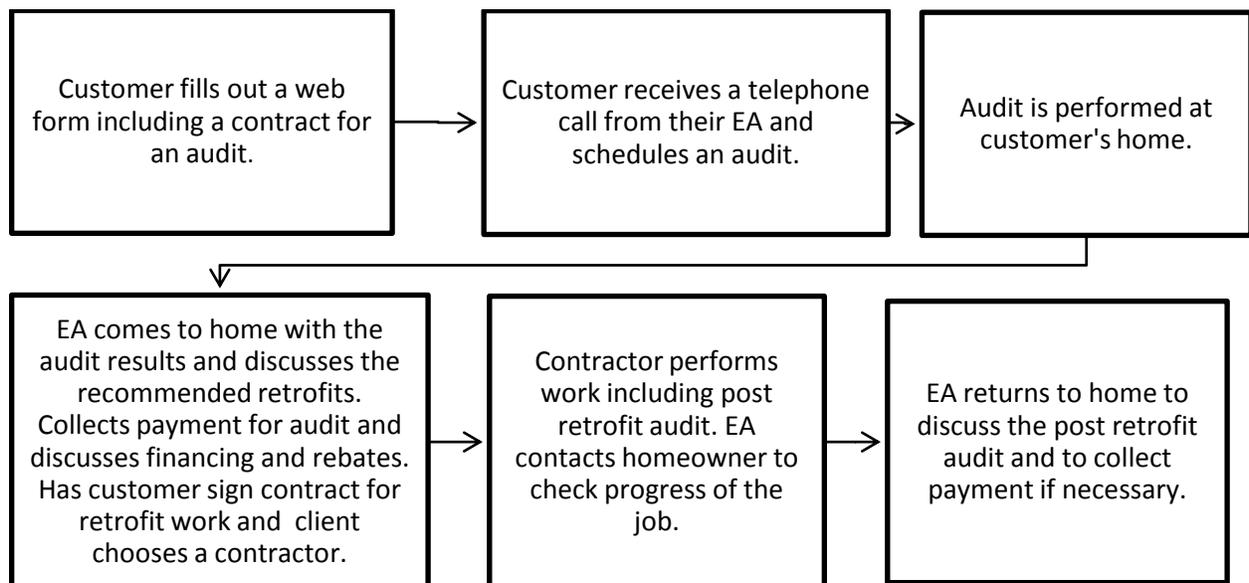
Payment for all jobs would be funneled through the energy program offices to contractors and assessors. EA’s could also work on an incentive basis of a base salary plus a commission.

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The above figure does not include any other program costs such as advertising, the post retrofit measurement and verification (M&V) program, interest rate buy downs, or other customer incentives. The one-half percent market figure is based on existing successful programs such as Austin Energy and NYSERDA's programs, but a higher market penetration rate would make the energy program more self sustaining. Other sources of income may present themselves in the future, such as selling "negawatts" on the future capacity market, but these sources depend upon factors outside of the control of the program. The above figure for annual salaries and overhead expenses can be seen as the portion of the program's expenses that could conceivably be covered by program income. The program should however continue to seek grants and outside funding for other program costs.

The customer path for working with an energy program that uses EA's is shown in chart VIII-4.

Chart VIII- 2: The Customer Path



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Using an energy concierge, or personal energy advocate, is not the only approach to operating an energy program. Most programs do not get as directly involved with the customer, and instead perform more of an oversight role. A program that operates without an EA type position relies on its participating contractors to sell and manage jobs.³⁸ An energy program's tasks in a non-EA model focus less on individual customer development and more on contractor development and training.

The Home Performance Resource Center's (HPRC) best practices guide for energy retrofit program design calls for "strong relationships with weatherization contractors who are capable of marketing the program to customers in their homes are an important component of successful residential weatherization and retrofit programs" (HPRCenter, 2010). When contractors are expected to make retrofit sales, they must retain staff who are trained in sales techniques specific to whole house performance. The sales staff must be able to educate potential customers on the benefits specific to making investments in energy efficiency. To help with this, HPwES offers a one half day training course dedicated to training contractors sales techniques specific to energy retrofits.

As contractors become more experienced both with selling and performing retrofits, they should be expected to close a high percentage of sales. But under the business model of relying on contractors to make sales, each contractor will need to hire and train their own sales staff. This necessity will negate any cost advantage of using the EA system to interface with customers. In the EA model, the EA essentially fills the role of a salesperson for all contractors.

³⁸ The LEAP program in Charlottesville, VA discussed adopting a PEA type business model and decided that they would prefer to rely on contractors "up-selling" jobs to add energy efficiency. The thought was that this benefit would be lost if sales were performed in house by LEAP (personal conversation with Cynthia Adams, executive director of the LEAP program).

Compared to having each contractor retain their own sales staff, the co-op approach could in theory lead to lower overall costs per retrofit.

Chapter Conclusion

An independent, non-utility based energy efficiency program in Virginia must look to become a self-sustaining business. What's more, an emerging program must use what seed funds are available to it in its first few years of existence to lay the groundwork for achieving this goal. A financially self-supporting business model is necessitated in the commonwealth due to the lack of state funding and the short time-frame of federal dollars coming into the state for efficiency. A program that does not try to become financially independent, and is modeled instead to rely on infusions from insecure funding sources, is destined for a short life.

To be self-sustaining a program must concentrate its start-up funds on developing a market transformation. Creating a market transformation is the only way for a program to become self-sufficient, and is likely the only way that a Virginia based program will last. To date, no program in the U.S. has found the key to creating a market transformation in home energy retrofits; and realizing this fact allows program managers creative leeway in designing program elements to spur demand. The creation of sustained demand for efficiency services and products is the promise of a market transformation. Once the level of demand is great enough, program expenses can be covered by charging fees to participating customers, and the program will move closer to financial self-sufficiency.

Creating market demand for a program's offerings requires operating the program like a business. Potential customers should be courted with sophisticated, targeted marketing campaigns based on the knowledge gained from a study of the specific behavioral and economic

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characteristics of energy use. Contractors should be developed to engender trust from program participants, and appropriate financing should be made available to eliminate the first cost barrier. “Sales” of the program’s services must be the primary goal, both in program planning and implementation.

Learning business techniques from similar for-profit businesses such as remodeling firms, rather than from state-funded weatherization programs, can help a non-profit energy program find its market niche. Adding an outside sales staff, that has been trained in the techniques of reducing energy use in the homes of program participants, as well as being devoted to serving the community, will create a value-added component to the program. When sales calls and follow-up visits with customers are made by highly trained program staff, it allows partner contractors to reduce overhead costs and focus on retrofits. Reduced overhead costs for contractors means reduced costs for customers, which frees up money for program funding.

Program sales staff provide the added benefit of helping overcome two of the economic barriers mentioned in Chapter II: lack of information and trust. Provide a sales staff with a good financing package to overcome the first cost, and economic barriers begin to disappear. Outside sales staff that arrive at the home of a potential customer armed with information gleaned from an energy audit, able to offer a good financing product, and trained to act as an advocate for the homeowner, is a program element that may be able to overcome consumers’ historical reticence to invest in efficiency.

Chapter IX: Conclusion

Results

The introduction to this thesis posed three questions:

1. What are the barriers to homeowner investments in energy efficiency?
2. Are there added barriers in Virginia that must be overcome in order to increase homeowner investments in energy efficiency?
3. Assuming there are added barriers in Virginia, are there program elements that can be employed to overcome these barriers?

Chapters II through V address the first question as the chapters discuss the behavioral, economic, financing, and structural barriers to reducing energy use. We discover that there are cost-effective investments to be made, and that successfully motivating consumers to reduce their energy use will require targeted efforts that focus on the following four barriers:

1. Economic Constraints
 - a. The existence of an efficiency gap informs us that many homeowners can make cost-beneficial investments in efficiency.
 - b. Certain market failures exist that argue for an intervention from outside the marketplace.
 - c. Good program design can overcome many of the economic barriers.
2. Behavior
 - a. Successfully changing consumers' attitudes about using energy can reduce consumption by twenty-five percent or more.
 - b. Addressing the behavioral component of energy use requires a multi-disciplinary approach that includes insights from the social sciences as well as engineering.
 - c. Marketing is important and should be based on behavioral studies.

- d. There are several strategies that can be employed to change behavior:
 - i. Feedback.
 - ii. Targeted messages.
 - iii. Goal setting.
 - iv. Social marketing.
 - e. A rebound effect has been observed that can negate ten percent or more of assumed energy savings.
3. Financing
- a. The first cost barrier prevents many consumers from investing in home retrofits.
 - b. Appropriate financing can help to overcome the first cost barrier.
 - c. Appropriate financing for homeowner energy investments should allow the homeowner to be cash positive from the first month after a retrofit.
 - d. Traditional financing mechanisms do not allow for most homeowners to be cash positive during the term of the loan.
 - e. There are appropriate financing models, but there are barriers to implementing them.
4. Structural
- a. A home performance contracting industry must be created.
 - b. Home performance contractors must be trained and certified in whole-house energy retrofits using concepts of building science.
 - c. Properly trained and certified contractors can help to overcome consumer distrust.
 - d. Increased Investments in residential energy efficiency will lead to job creation.

Chapter VI answers the second question and analyzes impediments to homeowner energy investments that are specific to Virginia.

1. Virginia ranks 34th out of 50 states in its support for energy efficiency.
2. There is no state funding for energy efficiency programs.

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3. Funding for utility-based efficiency programs could come from a re-interpretation of rule-making for demand-side management programs at the State Corporation Commission.
4. A public benefit fund will require state level legislation that will have to overcome the traditional narrow focus on utility rates.

Developing state-level funding may be a necessary element for a Virginia energy program, and Chapter VII provides background for understanding the origins of funding for efficiency. Chapter VII also describes elements of other programs that could be employed by Virginia based programs. Chapter VIII describes specific elements needed by a Virginia based program.

1. There are four prerequisites that all energy efficiency programs need.
 - a. An understanding that consumer behavior has a large influence over conserving energy and investing in efficiency.
 - b. An understanding of the economic barriers to investing in energy efficiency.
 - c. An understanding of the importance of appropriate financing.
 - d. A program element of partnering with properly trained and certified contractors and auditors.

Beyond these four prerequisites, a program in Virginia has these specific barriers:

1. A Virginia based program must become financially self-sustaining.
2. A financially self-sustaining business model may be created by providing a value-added element that does not raise the overall cost of an energy retrofit.
3. A self-sustaining model must work to create a market transformation.

Recommendations

Local Program Recommendations:

1. Sophisticated marketing should be employed as an essential tool for program success. Marketing efforts informed by behavioral studies on energy use can achieve much more than simply program promotion. Marketing research should be engaged in several aspects of program formation; from choosing the name of the program to deciding what the program should offer. Marketing must also target market segments with messages tailored to each segment.
2. Programs should offer consumers a “one stop shop” for investing in efficiency. Reducing transaction costs to consumers by minimizing the hassles inherent in engaging in a home energy retrofit can overcome a major barrier to investing. The several services necessary to retrofit a home, from financing to contracting, to audit services to rebates should be available in a package that consumers can easily access with minimal trouble.
3. Developing appropriate financing mechanisms is essential to success. Virginia programs should work with the Department of Mines, Minerals and Energy to create a fund for PACE type loans. The PACE program in Maine can be used as a template and Virginia can learn from Maine’s experience. PACE type loans are the only loan programs that offer consumers the ability to be cash positive from day one. PACE’s short track record has shown it to be a successful means to increase consumers’ willingness to invest in home energy retrofits.
4. Energy programs in Virginia have to become financially self-sufficient in order to survive. Before accepting federal funds to start a program, a program must develop a clear plan to achieve self-sufficiency, or the start-up funds will be wasted. To be financially self-sustaining a program must adopt a business plan

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similar to a for-profit service oriented business. Fees for program participation must be charged to consumers, and in exchange the program must offer consumers a value added service to justify the charge.

5. Programs should employ an outside sales staff in order to drive consumer demand, and to retain program control over implementation, reputation, and consistency of service. Retrofitting a home to make it more energy efficient is an invasive service. Many consumers would find retrofitting easier to undertake if the sort of “hand-holding” that a professional Energy Advocate could provide was available.

State Policy Recommendation:

6. Program managers should work with the Virginia General Assembly to redefine the mandate of the SCC so that the commission is not so cramped in its narrow interpretation of its mission. Broadening the scope of the definition of public benefit will keep the commissioners from being unnecessarily constrained in their cost-benefit analysis decisions when regulating demand-side and efficiency programs. In this respect, the commission should be encouraged to weigh the societal costs of rate increases against the societal benefit of energy savings and environmental protection

Next Steps

A Pilot Program to Test a Financially Self-Sustaining Business Model:

Perhaps the most pressing need for a Virginia based residential energy efficiency program is to develop a business model that will allow the program to become financially self-

sufficient. But the model cannot stand on its own, or be tested, without also incorporating the four program prerequisites mentioned in this thesis. In other words, a self-sustaining program can only be successful with increased market penetration, and increased market penetration can only occur when the four prerequisites are included. Therefore the development of a pilot program to test the model must include elements to overcome market, behavioral and structural barriers.

A pilot should be guided in part by performing a survey of homeowners and contractors in the target region. The survey should include both general population and focus group elements. Questions for homeowners' should revolve around their preferences for different finance models, and their interest in participating in a whole-house retrofit program. The surveys should be in-depth enough to inform the respondents of the possible advantages to them of engaging in a whole-house retrofit that is provided by a model program with financing that allows them to be cash positive every month. Contractors would need to be consulted to determine their interest in participating in a program that performed their marketing and sales functions.

Income, and to a lesser extent expenses, for a program are determined by the program's market penetration level. Overhead costs remain the same across a particular level of market penetration, but income is directly related to the number of jobs performed and the cost per job. Because of this connection a detailed business plan for the pilot would need to be created based in part on the expected market penetration gathered from the results of the survey. The charges to participating homeowners could also be determined based on the expected market penetration.

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The business plan for the pilot should look similar to models in the private sector that offer sales and marketing services for contractors. Similar models include Sears Cabinet Refacing services (<http://www.searshomeservices.com>), in which the parent company creates contractual obligations on the part of partner contractors. The parent company performs all outside sales and marketing functions and provides oversight of the work performed. When a parent company performs the sales and marketing functions of a contracting firm, the firm can offer its services at lower costs.

A pilot program should be of sufficient size and duration to determine these factors:

1. The level of homeowner and contractor interest.
2. The range of fees that need to be charged to homeowners to allow for program financial self-sufficiency.
3. Whether contractors can reduce their overhead by the amount charged by the program; i.e. whether there is an overall increased cost to consumers for having their homes retrofitted.
4. Whether an appropriate financing program can be developed.
5. Whether having a dedicated outside sales force can increase sales of retrofits.

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Appendix A: Letter from PACE supporters to the FHFA

Date: June 8th, 2010

To: PACE Federal Regulatory Executives – Edward DeMarco, Susan Eckert, Suzy Gardner, Virginia Gibbs, Patricia McClung, Alfred Pollard, Marvin Shaw, Marianne Sullivan

From: Jeffrey Tannenbaum

RE: PACE Lender Letter Clarifications

I want to thank many of you for taking the time to talk with me about PACE and crafting a solution so that the existing PACE programs and the Department of Energy funded PACE programs can move forward. A number of questions were raised during these discussions and below is an attempt to answer those questions below (see list). Please note that many of the answers are based upon estimates and judgments. A long list of municipalities, politicians and government officials have been eagerly awaiting the GSE clarifying letter since the initial letters more than a month ago. I understand and appreciate your concerns regarding PACE – as I had similar reservations when I first learned of it - and hope that after reading the enclosed materials, you will see that the potential risk is de minimis and that new PACE programs must have strong consumer and lender protections. I would welcome an opportunity to discuss this in person at your earliest convenience and to answer any further questions you may have. I can be reached at 212-659-4917.

Thank you for working on our nation's PACE programs.

Sincerely,

Jeffrey Tannenbaum

President

Key questions raised:

1. What is my background and my role with PACE?

2. What is happening with the PACE programs since the GSE lender letters were published?

a. Given the large number of DOE PACE programs/large populations covered (i.e. California) how can this be viewed as a Pilot?

3. How is the PACE potential senior lien exposure in foreclosure for existing mortgage lenders only \$100- \$200 per home?

4. What is the scope of PACE/How is the total potential PACE senior lien exposure from existing PACE programs and the DOE funded programs only \$20 million to \$ 70 million?

5. What is the difference between the original PACE programs and new best practice PACE programs (the DOE grant recipient programs)?

6. Safety and soundness

a. How should the Best Practice PACE programs impact borrower ability to pay?

b. Are there long term large studies and meaningful data that shows homeowner energy savings from efficiency and the various payback periods for different investments?

7. Is PACE finance an assessment or a loan and is it constitutional?

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8. Non-acceleration: Is it true that if a homeowner PACE retrofits their house in California and then suffers a foreclosure that only the delinquent assessment gets paid and not the entire assessment amount?

9. Over the long term can the existing White House Policy Framework/Department of Energy PACE guidelines be improved?

1. What is my background and my role with PACE? My involvement with PACE began when I hosted at my home many of President Obama's Cabinet members for their 100 day planning retreat on our nation's energy policy. It became clear during the retreat that our nation had not yet created a successful mechanism to finance home and building retrofits. Since I earn my livelihood as an investor, I offered to dedicate a portion of my pro bono time to think about novel ways to solve the retrofit finance barrier. My day job is running Fir Tree Partners, which is a value oriented investment firm that focuses on loan investments and which I formed many years ago after a career with the founder of Kohlberg Kravis Roberts. My work on PACE is part of my philanthropic efforts and motivated by a desire to help our nation and improve the legacy that we leave our children. The Fir Tree business has no plan to be involved in the PACE industry.

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I first learned of the PACE model about eighteen months ago and quickly recognized its appeal and the ways in which it needed to be improved to benefit homeowners and mortgage lenders. Areas that I thought needed to be addressed included: The size of a PACE retrofit relative to the home's value, eligible projects, homeowner cash flow impact from PACE, whether the entire assessment amount accelerated upon a foreclosure, duration of the PACE financing, and consumer protections. A little more than a year ago I formed PACENow.org and helped organize a PACE coalition in order to develop best practice standards so that PACE could benefit the various stakeholders – with a primary focus on existing lenders and consumers. Since then, the PACE coalition has worked extraordinarily hard to develop best practices that address virtually all of the issues outlined above.

2. What is happening with the PACE programs and the DOE PACE grantees since the GSE lender letters were published? Since the May 5th lender letters were published virtually all of our nation's PACE programs (both existing and the DOE grant recipients) have been put on hold as they await the GSE clarification letter.

a. Given the large number of DOE PACE programs/large populations covered (i.e.

California) how can this be viewed as a Pilot? Though I cannot speak for the government agencies that have designed the PACE programs, my sense is that the grantees are defined as pilots due to the limited timeline (approximately 24 months) and the limited penetration that will happen within that period (see below estimates). By the end of 2012, information will have been gathered and decisions can be made then by the overseeing agencies/regulators about the future of PACE. To the extent unanticipated yet significant problems emerge before the end of 2012, the government has the clear power to stop the programs.

3. How is the PACE potential senior lien exposure in foreclosure for existing mortgage lenders only \$100- \$200 per home? The small seniority risk is due to the fact that PACE typically represents a retrofit of \$15,000 (average of 5% of a home's value or less – best practices cap PACE at 10%) and that as per best practices ONLY the delinquent payment (1 to 1.5 years of payments out of 15 years) gets paid ahead of the mortgage – the remaining assessment balance transfers to the new owner of the property.

Senior lien exposure math:

Sample assumptions - \$300,000 home value, \$15,000 retrofit, 8% interest rate, 15 year amortization, 5% foreclosure rate, 1 year of delinquent payments

1) Base Case

Rough foreclosure math: 5% of home value * 6.7% (1/15th of the PACE amount gets seniority treatment) * 5% foreclosure rate = .02% of the Homes value = **\$50**

Actual math: Includes amortization and interest expense

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Step 1: 1 year of interest expense: \$1,200 * 5% foreclosure rate = \$60 per home

Step 2: Add amortization: \$534 annual amort. * 5% foreclosure rate = \$26 per home

Total Per Home Senior Lien Exposure **\$86 Per Home**

2) Sensitivity: Assuming the foreclosure rate goes to 8% and average foreclosure stretches to 1.5 years the \$86 per home rises to \$208 per home and with a 10% foreclosure rate the potential exposure becomes **\$260** per home. Note: Sonoma's initial delinquency rates for PACE are lower than its county wide rates. Attached Exhibit 1 is a PACE exposure excel model which will enable you to vary the assumptions and see the results.

4. What is the scope of PACE/How is the total potential PACE senior lien exposure from existing PACE programs and the DOE funded programs only \$20 million to \$ 70 million? In order to estimate the scope of PACE there are five steps we have taken:

1) Determine the "PACE Municipalities" - List existing PACE jurisdictions and estimate the new jurisdictions slated to receive the DOE PACE grants (see Exhibit 2). Please note these are our estimates and the Department of Energy will have better estimates of the municipalities.

2) Determine potential "owner occupied units" - From the PACE Municipality list, we estimate the total number of "owner occupied units", which is approximately 9 million (again, see Exhibit 2). Note that this number is most likely very high as it assumes that PACE programs will be up and have 100% coverage throughout each municipality which is unlikely.

3) Estimate penetration rates - One must then estimate penetration rates. Sonoma County, the most successful PACE program to date, is averaging less than 1% penetration. Our belief is that 1% penetration would be a reasonable success over a 24 month period, 2% penetration

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would be a large success and 3% would be extraordinary success.

4) Estimate “Total PACE Homes” based upon penetration rates - Based upon the above penetration rates, there would be between 90,000 and 270,000 PACE homes two to three years from now (1%-3% times 9 million).

5) Calculate scope of potential senior lien exposure - Assuming the senior lien exposure “per home” from item 3. above, this results in total scope exposure on the low end of about \$18 million (\$86 per home * 90,000 homes) to \$70 million on the very high end (\$260 per home * 270,000 homes). Please note that we believe the best means to look at PACE scope is to estimate penetration rates as opposed to “leverage ratios” on the DOE approximately \$153 million in awards. The reason for this is that in many PACE jurisdictions there is not a precise metric for how many PACE loans can be issued for each DOE grant e.g. a grant might be used to pay for marketing costs while a bank funds the PACE retrofits entirely with no link to the DOE grant size.

5. What is the difference between the original PACE programs and new best practice PACE programs (the DOE grant recipient programs)? Listed below are some of the most material differences between early PACE, and the newer PACE programs/DOE grantee requirements. There were no standard rules for the early PACE programs so the protections for lenders and consumers varied from jurisdiction to jurisdiction. The White House Framework/DOE Guidelines provide standardization and represent substantial improvements specifically designed to benefit existing lenders and consumers.

Some Early Best Practice/DOE

PACE Programs Grantee PACE Programs

Lender protections

Annual savings targeted to exceed annual assessment
(to improve borrower cash flow and reduce the risk of No Yes default)

10% Cap on PACE retrofits as % of property value No Yes

Non-acceleration of total PACE future assessment

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payments upon foreclosure (so that only delinquent No (not required by guidelines) Yes assessments get paid)

Positive equity requirement No Yes

Consumer protections

Annual savings targeted to exceed annual assessment No Yes

Assessment should match useful life of measures No Yes

Quality assurance mandated No (note: most programs had) Yes

6. Safety and soundness

a. How should the Best Practice PACE programs impact borrower ability to pay? The PACE best practices/DOE grantee requirements have been designed so that homeowners choose PACE projects where the annual energy savings exceeds the annual tax assessment. In effect, the objective is to improve the borrower’s ability to make mortgage payments and therefore decrease the risk of borrower default. Note, however, that the cash flow positive nature of retrofits over the short term can be impacted, positively and negatively, by changing energy prices.

b. Are there long term large studies and meaningful data that shows homeowner energy savings from efficiency and the various payback periods for different investments? To my knowledge there are not very long term studies and deep analyses of payback periods. My understanding is that the Department of Energy/HUD/CEQ/NEC/and the White House intend for the PACE grantees to provide data over the next several years that can be used to analyze the efficacy and payback from retrofits.

7. Is PACE finance an assessment or a loan and is it constitutional? The California Attorney General and Paul Hastings law firm believe strongly that PACE is both an assessment and constitutional (see Exhibit 3 legal opinion from Paul Hastings and Exhibit 5 California Attorney General letter).

8. Non-acceleration: Is it true that if a homeowner PACE retrofits their house in California and then suffers a foreclosure that only the delinquent assessment gets paid and not the entire assessment amount? Yes, this is very clearly settled law. See attached legal opinion from Jones Hall (Exhibit 4)

9. Over the long term can the existing White House Policy Framework/Department of Energy PACE

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guidelines be improved? The guidelines can certainly be improved over the long term. A lot of resources from the inter-agency task force were put into developing the existing guidelines over several months and they represent substantial improvements for consumers and existing lenders. But more will be learned over time as the PACE market develops and data is gathered. If there are future items that the regulators believe should be required improvements it would be prudent to seek municipal feedback to understand the cost, feasibility of administration and how to best achieve the additional objectives.

Attachments:

Exhibit 1 – PACE Potential Seniority Per Home

Exhibit 2 – PACE Penetration Analysis

Exhibit 3 – PACE Legal Opinion on Assessment & Constitutionality

Exhibit 4 – Jones Hall Opinion

Exhibit 5 – California Attorney General Letter

Appendix B: PACE supporters' response to FHFA

Date: June 23, 2010

From: Jeffrey Tannenbaum

To: Alfred Pollard

Re: Final Steps for PACE DOE Programs

Dear Alfred,

Thank you for the time yesterday. As promised, outlined below are the steps that we discussed your taking the lead on over the next several days in order to resolve the current "on hold" status of our nation's PACE programs. After our meeting, I discussed the below steps with a number of senior administration officials and am confident that once you provide the below items they meet immediately to work toward a final resolution. I also made it clear to them that to the extent the FHFA gives clearance for PACE for the 24 month trial period, whether PACE will be permitted to continue and potentially expand after the trial period will be a function of how material or immaterial the risk associated with the senior lien proves to be as well as the efficacy of the energy retrofits.

I will call you shortly to walk through the below items. In the interim, if there is anything more I can do in the near term to facilitate the existing and DOE programs moving forward, please do not hesitate to call. I hope we can look back in two years and clearly see that FHFA and the administration helped start a responsible program for all stakeholders and our nation.

Sincerely,

Jeffrey Tannenbaum

FHFA Critical Path Items

1. **Senior Lien:** FHFA will work to determine if the trial period design can be improved as per below ("Trial Period Design Improvements") so that potential risk associated with the senior lien during the trial is tolerable from its perspective.

2. **Final Trial Period Design Improvements from FHFA:** These are the FHFA improvements we discussed that are meant to reduce/bound the potential senior lien risk during the trial period while also ensuring that meaningful data is gathered so that the programs can move forward during the trial period. This is my best recollection of the items that FHFA needs to provide over the next several days.

I. Final list of underwriting criteria - FHFA to provide the final additions for underwriting criteria. It appeared during our discussions that the addition would be centered around the "borrower ability to pay."

II. Definition of scope/Number of New PACE Homes - FHFA to provide the scope/Number of new PACE homes permitted during the Trial Period. One of the concerns you have raised during our conversations relates to the scope of the trial period given that PACE has been approved in much of California. We discussed the concept of "maximum penetration rates" as a means to bind the number of PACE homes during the trial period. In the earlier note to you, I mentioned that a 3% penetration rate would most likely be at the very high end over a 24 month period.

The rate is more likely to be in the 1-2% range. Though there will always be critics on any cap, I am reasonably confident that a cap at or near that penetration level would be acceptable to the municipalities. Based upon the earlier exhibit I sent you, we estimated that at 3% it could be up to 270,000 homes but would most likely be closer to 200,000 homes.

III. Metrics to determine Trial Period success/failure – FHFA to provide list of any additional metrics that they would like included in the Trial Period and that would be helpful in determining success/failure of the trial. Metrics we discussed included:

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- a. Foreclosure/Delinquency comparisons – How foreclosure rates and tax delinquency rates compare between non PACE and PACE homes
- b. Sale price comparisons – How sale prices compare between non PACE and PACE homes
- c. Energy savings – What were the achieved energy savings vs. the hoped for/“benchmarked” savings (e.g. are savings approximating the annual tax assessment – see item iv. below)

IV. “Benchmarks” for energy savings – FHFA to approve “Benchmarks” for PACE programs to be used by the Department of Energy. For example:

- a. Foreclosure/Delinquency - PACE properties must not have foreclosure or tax delinquency rates above those for the jurisdiction as a whole (currently, in the largest PACE municipality, Sonoma, the tax delinquency rate on PACE is running at half the rate of general delinquency rate).
- b. Energy savings - I have been thinking about this for some time and it is complicated by the fact that benchmarks would vary depending upon where you live (climate will impact your savings, the mix of the improvements that are made, and behavior changes all impact energy savings). I think the easiest benchmark is to strive for cash flow positive (energy savings exceeds annual assessment). In simple terms, this would mean that the “Benchmark” is to cover the annual tax assessment. As you mentioned, this may not be the motivating force for all retrofits and perhaps it should not be a fixed requirement. But ultimately it is the best means to ensure that the borrower’s ability to pay is improved by PACE.

i. **Micro Benchmarks** – FHFA to approve DOE micro benchmarks that outline generally the type of savings that homeowners should expect from different retrofit projects recognizing that they will vary based upon climate, house type and the combination of projects. Savings to investment ratio will be the final metric used for project approval.

V. Truth in Lending Act – FHFA to provide “Truth in Lending Act” language that they would like incorporated into all loan documents, including a phone contact requirement so that questions can be answered and compliance ensured.

Currently, the administrator (e.g. Renewable Funding) or the Municipality (e.g. San Diego) are the TILA contacts. So I think this is covered though not sure if it is a requirement within the Best Practices.

Misc. - Tax Credit/Tax Refund – I owe you an answer how this works under current best practices.

Appendix C: Legal response to the FHFA from PACE supporters.

Response to FHFA Concerns

There has been recent discussion about potential issues regarding PACE programs. This memo is in response to those ongoing conversations and focuses on the issue of a local government's rights to pursue programs in the public interest. Three related issues form the basis for much of this response.

First, PACE liens are tax liens like all other tax liens. A senior tax lien is a governmental power used to further a valid public purpose. PACE programs further a clear and compelling public purpose. There appears to be no basis whatsoever for the standard power of a local or state government to be abridged in this circumstance.

Second, the placement of super senior special tax or assessment liens is an exceptionally common practice throughout the United States. The lending, underwriting, appraising, and insuring system in this country already accepts these types of liens as standard practice. PACE liens can be accommodated in exactly the same manner.

Third, PACE liens have a uniquely positive impact on the value of a property by increasing property values and reducing the costs of property ownership. PACE programs should be viewed as a net positive.

Below we address a variety of concerns raised by FHFA, including 13 specific items:

First Lien Alternatives

The suggestion that PACE liens be subordinated will mostly likely ensure that our nation's building retrofit fails and that the benefits from moving toward energy independence and the corresponding job creation will not happen. Perhaps just as important, the notion of subordination is a direct challenge to the legal authority for a government to place a tax or assessment lien to advance a valid governmental purpose. In California, as in most other states, a priority lien is a power granted to government to allow it to further the public interest. This is neither a new power nor one that is used infrequently. Unless the public purpose is deemed invalid³⁹ or the law unconstitutional, there is no legal basis for prohibiting government from exercising its taxing power. State laws establish senior tax and assessment lien for a reason: to enhance the ability of government to accomplish its public purposes.

More practically, the attractiveness to lenders of land secured districts, business improvement districts and PACE finance is the seniority of the tax lien. Without this seniority, the availability of financing is substantially reduced, if not completely eliminated. There is a reason that existing financing options have utterly failed to support the retrofit of the nation's building stock over the past several decades. Put

³⁹ California law requires a public purpose for a valid exercise of the taxing power, California courts have concluded that public purpose may be broadly defined by legislative bodies, and California courts defer to legislative bodies in their declaration of public purpose. *Daggett v. Colgan* (1891) 92 Cal.53; *Bank v. Bell* (1923) 62 Cal.App. 320.

simply, the exercise of creating “best practices” and regulations will be moot because of the lack of a market.

Market Ramifications

The suggestion of a required subordination of the tax lien threatens any local government’s authority to use taxing and assessment powers to pay for improvements with a public benefit. In fact, the PACE program poses significantly less risk to the property owner or lender than virtually any other tax or assessment district.

1. GSEs may not purchase loans in certain communities.

Response: GSEs and lenders have been purchasing homes with assessment liens on them for decades. PACE program liens, if properly executed, could at a minimum be viewed similarly to all other assessment, special tax or other land secured liens rather than as a new product that changes the fundamental relationship to the lender.

- One of the largest title insurance companies in the country issued written formal guidance regarding “Clean Energy Assessment Districts.” After their internal review, they found that “as a title insurer, we would treat the special assessment in a clean energy assessment district the same way we treat real property taxes.”
- If GSE’s refuse to purchase loans in PACE communities, the GSEs will be in effect “redlining” communities that choose to exercise their taxing and assessment powers to pay for improvements that result in lower greenhouse gas emissions, improved local air quality, reduced stress on the local electricity grid and local job creation, all legitimate public benefits. In particular, such a refusal on the part of GSE’s could unfairly prejudice low- to moderate-income communities who elect to use their assessment authority for the public purpose of improving environmental and economic conditions for community members.

2. Lenders may lower available credit by the amount of the potential ELTAP.

Response: The GSE’s should not be concerned about purchasing loans in PACE communities, given:

- PACE programs increase a home’s value. A study in Appraisal Journal found that for every utility-bill dollar saved annually because of an improvement, you gain \$20 in property value. So reducing your utility bill by \$1,000 will return \$20,000 in home value.
- PACE liens are put in place when the ratio of projected annual savings in utility expenditures to the annual assessment payment (the “savings to assessment” ratio) is > 1 or the present value of the improvements net of the initial outstanding balance of the assessment (“net present value of the improvements”) is positive. If these criteria are met then the PACE liens enhance the credit of the home. Best Practice standards are being developed to ensure this is the case.
- PACE loans provide protection against rising energy prices. Rising energy prices will impact a borrower’s ability to repay their mortgage loan and the presence of energy efficiency or on-site generation improvements provide considerable protection for homeowners in a rising energy price

environment. In a lower energy price environment, although the value of savings generated may be reduced, homeowners overall energy cost burden is lower. Thus PACE loans provide a hedge against energy price fluctuations.

- PACE lien seniority is immaterial: In a portfolio of homes, each with a \$250,000 mortgage, the PACE lien seniority in foreclosure probably amounts to less than \$100 per home (less than 1/20th of 1% of the mortgage value).

- Explanation: In a foreclosure, most state laws provide that only the back tax lien payment gets paid off before the mortgage. The future tax lien payments remain with the property post foreclosure.

- Assumptions:

- \$300,000 home, \$250,000 mortgage and a \$20,000 20 year PACE lien at 6% interest rate.

- Annual PACE lien amortization payment is approximately \$1,700.

- Foreclosure situation: In the above situation, if the house is foreclosed on and there is 1 year of unpaid PACE liens then only \$1,700, the past due tax lien payment, gets paid ahead of the mortgage (less than 1% of the value of the home). The remaining lien balance remains as a long term lien after the foreclosure.

- Fewer than 5% of homes are foreclosed on: Historically, less than 5% of all homes have 2 or more delinquent mortgage payments (source: American Mortgage Bankers Association). That means that a "portfolio" of Fannie/Freddie mortgages that have PACE liens will be impacted by 5% x \$1,700 or \$85, on average, per home and that assumes NO VALUE from the PACE dollars that were spent. The PACE dollars invested clearly adds value such that there should be no credit impairment but instead credit enhancement.

- Note: In the worst housing crisis in decades, homes with 2 or more delinquent payments have peaked at about 10% such that the above numbers in a worst case scenario increase to only \$170 per home or less than 1/10th of 1% of the mortgage value.

- PACE liens generally represent less than 10% of the overall value of the home. These limits can be required with Best Practice safeguards.

3. Securitization of mortgage loans may be difficult with nonuniform state/municipal programs

Response: The PACE Best Practices are being developed in conjunction with advice from experts in the securitization field to ensure that mortgages with PACE liens can be part of securitization programs. This will also help ensure that mortgages on properties with PACE liens are not more expensive but potentially LESS expensive because of the credit enhancing nature of the energy savings.

4. Lenders may enforce provisions under the Uniform Security Instruments (Fannie Mae/Freddie Mac mortgage forms) which prohibit liens that have priority over first lien mortgages.

Response: To our knowledge, a government exercising its legal powers to add or enforce tax liens has never prompted a mortgage lender to enforce contractual

provisions regarding lien seniority. Such liens are standard practice.

5. State laws may trigger event of default

Response: After discussions with leading municipal law firms, there was unanimity of opinion that there is no known law in California in which a legally placed special tax or assessment lien, such as PACE, triggers a default. In California, special tax and assessment liens are senior as a matter of statute.⁴⁰

6/7. Mortgage Insurance/Title Insurance may be difficult to obtain

Response: Mortgage insurance is obtainable on land secured districts, business improvement districts and the newly enacted PACE districts. There have been no indications that mortgage lenders have any problems with PACE liens. In fact, one of the largest title insurance companies in the country issued written formal guidance regarding “Clean Energy Assessment Districts.” After their internal review, they found that “as a title insurer, we would treat the special assessment in a clean energy assessment district the same way we treat real property taxes.”

8. Lenders and mortgage investors may institute legal challenges.

Response: A legal challenge to PACE programs is speculative. However, PACE programs benefit from over a century of municipal finance experience and law. The legal challenge to a PACE program would appear to require the courts to (1) invalidate state laws, (2) strip local governments of a taxation power they have had for over a century, and/or (3) to find that reducing energy use and carbon emissions is not a valid public purpose, all of which seem unlikely based on relevant judicial precedent⁴¹.

⁴⁰ In general with respect to the lien of taxes and assessments, Revenue & Taxation Code declares: “Every tax declared in this chapter to be a lien on real property, and every public improvement assessment declared by law to be a lien on real property, have priority over all other liens on the property, regardless of the time of their creation. Any tax or assessment described in the preceding sentence shall be given priority over matters including, but not limited to, any recognizance, deed, judgment, debt, obligation, or responsibility with respect to which the subject real property may become charged or liable.”

With respect to special assessments, Government Code Section 53930 et seq. was adopted by the Legislature to make uniform the priority of special assessment liens and is controlling over other applicable general and special laws. In Section 53931, the Legislature established that special assessments constitute a lien on real property: “All special assessments in which the amount thereof is apportioned among the several parcels of land assessed shall constitute a lien in said respective amounts upon the several parcels assessed, which lien shall continue for the period of time provided in the Civil Code for enforcing same.”

In Section 53935, the Legislature established the priority of the lien: “53935. The lien of said assessments shall be coequal to and independent of the lien for general taxes, and, except as provided in Section 53936, not subject to extinguishment by the sale of the property on account of the nonpayment of any taxes, and prior and superior to all liens, claims and encumbrances except (a) the lien for general taxes or ad valorem assessments in the nature of and collected as taxes levied by the state or any county, city, special district or other local agency; (b) the lien of any special assessment or assessments the lien date of which is prior in time to the lien date of the assessment for which the deed is issued; (c) easements constituting servitudes upon or burdens to said lands; (d) water rights, the record title to which is held separately from the title to said lands; (e) restrictions of record.”

⁴¹ 3 Provident Institution for Savings in Jersey City v. Mayor and Alderman of Jersey City (1885) 113 U.S. 506 (“Even if the water rents in question cannot be regarded as taxes, nor as special

9. Higher rates may be charged in ELTAP markets.

Response: Again, this assumes that from a lender point of view; PACE programs differ in a meaningful way from other assessment or special tax districts. From lender point of view, there is no substantive different between a PACE lien and an underground utility district lien, for example. There is no evidence that properties in existing built environment tax districts have experienced higher mortgage rates.

10. Value of the energy improvements may not be reflected in appraised value of property.

Response: While it is possible that the energy improvement may not be fully

With respect to special taxes levied under the Mello-Roos Community Facilities Act of 1982, Government Code Section 53340(e) provides in relevant part: “The special tax shall be collected in the same manner as ordinary ad valorem property taxes are collected and shall be subject to the same penalties and the same procedure, sale, and lien priority in case of delinquency as is provided for ad valorem taxes ...”

recognized in every case, there is substantial evidence to suggest that appraised and market values increase when an energy improvement is made. For example, the Appraisal Journal found that home values were increased by \$10-\$25 for every \$1 reduction in annual energy bills.⁴

11. Borrowers may have reduced opportunity to refinance.

Response: Once again, there is no meaningful or tangible difference between a PACE lien and an increased property tax. In the worst case scenario, the lien is a standard property tax lien that is viewed as an additional cost burden during the refinance underwriting process.

12. Lenders will incur credit losses

Response: As described in detail above, this should not be the case for a variety of reasons. Most important, in PACE lien cases with a savings to assessment ratio > 1 (annual energy cost savings exceed the annual assessment amount); this improves the borrower’s ability to pay which will help to decrease borrower defaults and therefore reduce lender losses. In cases where the net present value of the improvements is positive, then the lender has increased collateral once the PACE improvement is in place than prior to the PACE improvement and should therefore improve net proceeds recovered in foreclosure. In such cases, lenders actually enjoy in effect an immediate improvement (i.e., reduction) in LTV ratio once the PACE improvement is installed.

13. Mortgages will be devalued

assessments for benefits arising from a public improvement, it is still by no means clear that the giving to them a priority of lien over all other encumbrances upon the property served with the water would be repugnant to the constitution of the United States. The law which gives to the last maritime liens priority over earlier liens in point of time, is based on principles of acknowledged justice. That which is given for the preservation or betterment of the common pledge is in natural equity fairly entitled to the first rank in the tableau of claims.”); *German Savings & Loan Society v. Ramish* (1902) 138 Cal 120 (“The power to levy a tax for general purposes, which shall be a lien superior to all other liens, prior or otherwise, is not doubted, and it is not because it is called a tax, but because of its object and the necessity for raising revenue in order to execute the functions of government.”)

Response: Based upon the earlier stated facts, the value of a GSE/lender mortgage portfolio with PACE liens should go up due to the improvement in the borrower's cash flow and/or the positive net present value of the projects. In those cases where a foreclosure were to happen, it will most likely not be due to a small PACE lien payment but instead due to the borrower's inability to pay the mortgage.

⁴ Nevin and Watson, Appraisal Journal, 1998

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Appendix D: Letter from FHFA to congressional PACE supporters.

August 26, 2010

The Honorable Ed Perlmutter
U.S. House of Representatives
415 Cannon House Office Building
Washington, D.C. 20515

Dear Representative Perlmutter:

As you know, the Federal Housing Finance Agency (FHFA) has had significant concerns with so-called Property Assessed Clean Energy (PACE) programs that provide loans as part of a local tax assessment and result in almost all cases in the creation of a lien superior to an existing mortgage. PACE programs are implemented state-by-state and locality-by-locality without uniform standards for consumer protections and appropriate underwriting. FHFA found this particular initiative threatening to the safe and sound operations of its regulated entities and directed that appropriate steps be taken to address such risks. At the same time, FHFA indicated its support for energy retrofit lending programs to assist with energy conservation that also protect consumers through full disclosure and prudent underwriting standards.

Given your strong interest in exploring whether a resolution to this issue was possible, FHFA has worked diligently with your staff and those of other members as well as state and local governments and federal regulatory authorities to determine if modifications could be made that would address deficiencies in these programs. No satisfactory conclusion has been reached to address problems associated with liens created after a mortgage is in place, thereby transferring credit risk to banks, secondary market parties and investors in mortgage-backed securities. Further, consumer protections and appropriate underwriting standards need to be uniform and mandatory to protect homeowners. Discussions have failed to produce concepts that would mitigate the threat to FHFA-regulated institutions or to broader financial markets.

FHFA, therefore, has determined that its guidance to its regulated entities must remain in place. FHFA will continue to work on alternative lending structures with our regulated entities and other regulators that do not pose the risks of the PACE programs with first liens.

I want to express my appreciation to you for bringing together members of the House, their staffs, committee staffs, administration personnel and various regulatory agencies. Your leadership produced a strong effort by all concerned to find a resolution to this difficult matter. I believe that FHFA has done its utmost to seek constructive alternatives. As noted above, FHFA is committed to continue to work with you in your efforts to support energy conservation financing.

Yours truly,

Edward J. DeMarco

Acting Director

Appendix E: Final rules from the FHFA on PACE financing.

FHFA Statement on Certain Energy Retrofit Loan Programs

After careful review and over a year of working with federal and state government agencies, the Federal Housing Finance Agency (FHFA) has determined that certain energy retrofit lending programs present significant safety and soundness concerns that must be addressed by Fannie Mae, Freddie Mac and the Federal Home Loan Banks. Specifically, programs denominated as Property Assessed Clean Energy (PACE) seek to foster lending for retrofits of residential or commercial properties through a county or city's tax assessment regime. Under most of these programs, such loans acquire a priority lien over existing mortgages, though certain states have chosen not to adopt such priority positions for their loans.

First liens established by PACE loans are unlike routine tax assessments and pose unusual and difficult risk management challenges for lenders, servicers and mortgage securities investors. The size and duration of PACE loans exceed typical local tax programs and do not have the traditional community benefits associated with taxing initiatives.

FHFA urged state and local governments to reconsider these programs and continues to call for a pause in such programs so concerns can be addressed. First liens for such loans represent a key alteration of traditional mortgage lending practice. They present significant risk to lenders and secondary market entities, may alter valuations for mortgage-backed securities and are not essential for successful programs to spur energy conservation.

While the first lien position offered in most PACE programs minimizes credit risk for investors funding the programs, it alters traditional lending priorities. Underwriting for PACE programs results in collateral-based lending rather than lending based upon ability-to-pay, the absence of Truth-in-Lending Act and other consumer protections, and uncertainty as to whether the home improvements actually produce meaningful reductions in energy consumption.

Efforts are just underway to develop underwriting and consumer protection standards as well as energy retrofit standards that are critical for homeowners and lenders to understand the risks and rewards of any energy retrofit lending program. However, first liens that disrupt a fragile housing finance market and long-standing lending priorities, the absence of robust underwriting standards to protect homeowners and the lack of energy retrofit standards to assist homeowners, appraisers, inspectors and lenders determine the value of retrofit products combine to raise safety and soundness concerns.

A Guideline for Establishing Local Energy-Efficiency Programs in Virginia

On May 5, 2010, Fannie Mae and Freddie Mac alerted their seller-servicers to gain an understanding of whether there are existing or prospective PACE or PACE-like programs in jurisdictions where they do business, to be aware that programs with first liens run contrary to the Fannie Mae-Freddie Mac Uniform Security Instrument and that the Enterprises would provide additional guidance should the programs move beyond the experimental stage. Those lender letters remain in effect.

Today, FHFA is directing Fannie Mae, Freddie Mac and the Federal Home Loan Banks to undertake the following prudential actions:

1. For any homeowner who obtained a PACE or PACE-like loan with a priority first lien prior to this date, FHFA is directing Fannie Mae and Freddie Mac to waive their Uniform Security Instrument prohibitions against such senior liens.

1. In addressing PACE programs with first liens, Fannie Mae and Freddie Mac should undertake actions that protect their safe and sound operations. These include, but are not limited to:
 - Adjusting loan-to-value ratios to reflect the maximum permissible PACE loan amount available to borrowers in PACE jurisdictions;
 - Ensuring that loan covenants require approval/consent for any PACE loan;
 - Tightening borrower debt-to-income ratios to account for additional obligations associated with possible future PACE loans;
 - Ensuring that mortgages on properties in a jurisdiction offering PACE-like programs satisfy all applicable federal and state lending regulations and guidance.

Fannie Mae and Freddie Mac should issue additional guidance as needed.

1. The Federal Home Loan Banks are directed to review their collateral policies in order to assure that pledged collateral is not adversely affected by energy retrofit programs that include first liens.

Nothing in this Statement affects the normal underwriting programs of the regulated entities or their dealings with PACE programs that do not have a senior lien priority. Further, nothing in these directions to the regulated entities affects in any way underwriting related to traditional tax programs, but is focused solely on senior lien PACE lending initiatives.

FHFA recognizes that PACE and PACE-like programs pose additional lending challenges, but also represent serious efforts to reduce energy consumption. FHFA remains committed to working with federal, state, and local government agencies to develop and implement energy retrofit lending programs with appropriate underwriting guidelines and consumer protection standards. FHFA will also continue to encourage the establishment of energy efficiency standards to support such programs.

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The Federal Housing Finance Agency regulates Fannie Mae, Freddie Mac and the 12 Federal Home Loan Banks. These government-sponsored enterprises provide more than \$5.9 trillion in funding for the U.S. mortgage markets and financial institutions.

Appendix F: Model Pace Financing Ordinance for Maine.

MODEL PROPERTY ASSESSED CLEAN ENERGY (PACE) ORDINANCE
[Municipal Administration – 35-A MRSA §10154 2 A (1)]
PROPERTY ASSESSED CLEAN ENERGY (PACE) ORDINANCE.

PREAMBLE

WHEREAS, the 124th Maine Legislature has enacted Public Law 2009, Chapter 591, “An Act to Increase the Affordability of Clean Energy for Homeowners and Businesses,” also known as “the Property Assessed Clean Energy Act” or “the PACE Act”; and WHEREAS, that Act authorizes a municipality that has adopted a Property Assessed Clean Energy (“PACE”) Ordinance to establish a PACE program so that owners of qualifying property can access financing for energy saving improvements to their properties located in the City/Town, financed by funds awarded to the Efficiency Maine Trust under the Federal Energy Efficiency and Conservation Block Grant (EECBG) Program and by other funds available for this purpose, and to enter into a contract with the Trust to administer functions of its PACE program; and WHEREAS, the Municipality wishes to establish and to administer the functions of a PACE program;
NOW THEREFORE, the Municipality hereby enacts the following Ordinance:

ARTICLE I - PURPOSE AND ENABLING LEGISLATION

§ XX-1 Purpose.

By and through this Chapter, the City of/Town of _____ declares as its public purpose the establishment of a municipal program to enable its citizens to participate in a Property Assessed Clean Energy (“PACE”) program so that owners of qualifying property can access financing for energy saving improvements to their properties located in the City/Town. The City/Town declares its purpose and the provisions of this Chapter/Ordinance to be in conformity with federal and State laws.

§ XX-2 Enabling Legislation.

The City/Town enacts this Chapter/Ordinance pursuant to 35-A M.R.S.A. § 10151, *et seq.*

ARTICLE II - TITLE AND DEFINITIONS

§ XX-3 Title.

2

This Chapter/Ordinance shall be known and may be cited as “the City/Town of Property Assessed Clean Energy (PACE) Ordinance” (the “Ordinance”).”

§ XX-4 Definitions.

Except as specifically defined below, words and phrases used in this Chapter/Ordinance shall have their customary meanings; as used in this Chapter/Ordinance, the following words and phrases shall have the meanings indicated:

1. Energy saving improvement. “Energy saving improvement” means an improvement to qualifying property that is new and permanently affixed to qualifying property

and that:

A. Will result in increased energy efficiency and substantially reduced energy use and:

(1) Meets or exceeds applicable United States Environmental Protection Agency and United States Department of Energy Energy Star program or similar energy efficiency standards established or approved by the Trust; or

(2) Involves air sealing, insulating, and other energy efficiency improvements of residential, commercial or industrial property in a manner approved by the Trust; or

B. Involves a renewable energy installation or an electric thermal storage system that meets or exceeds standards established or approved by the trust.

2. Municipality. "Municipality" shall mean the City/Town of

3. PACE agreement. "Pace agreement" means an agreement between the owner of qualifying property and the Municipality that authorizes the creation of a PACE mortgage

on qualifying property and that is approved in writing by all owners of the qualifying property at the time of the agreement, other than mortgage holders.

4. PACE assessment. "PACE assessment" means an assessment made against qualifying property to repay a PACE loan.

5. PACE district. "Pace district" means the area within which the Municipality establishes a PACE program hereunder, which is all that area within the Municipality's boundaries.

6. PACE loan. "PACE loan" means a loan, secured by a PACE mortgage, made to the owner(s) of a qualifying property pursuant to a PACE program to fund energy saving improvements.

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7. PACE mortgage. "PACE mortgage" means a mortgage securing a loan made pursuant to a PACE program to fund energy saving improvements on qualifying property.

8. PACE program. "PACE program" means a program established under State statute by the Trust or a municipality under which property owners can finance energy savings improvements on qualifying property.

9. Qualifying property. "Qualifying property" means real property located in the PACE district of the Municipality.

10. Renewable energy installation. "Renewable energy installation" means a fixture, product, system, device or interacting group of devices installed behind the meter

at a qualifying property, or on contiguous property under common ownership, that produces energy or heat from renewable sources, including, but not limited to, photovoltaic systems, solar thermal systems, biomass systems, landfill gas to energy systems, geothermal systems, wind systems, wood pellet systems and any other systems

eligible for funding under federal Qualified Energy Conservation Bonds or federal Clean Renewable Energy Bonds.

11. Trust. "Trust" means the Efficiency Maine Trust established in 35-A M.R.S.A.

§ 10103 and/or its agent(s), if any.

ARTICLE III - PACE PROGRAM

§ XX-5 Establishment; funding.

The Municipality hereby establishes a PACE program allowing owners of qualifying property located in the PACE district who so choose to access financing for energy saving improvements to their property through PACE loans. PACE loan funds may come from a variety of sources.

To the extent that PACE loan funds are made available from the Trust, these are made available in municipalities that: 1) adopt a PACE Ordinance; 2) adopt and implement a local public outreach and education plan; 3) administer the functions of a PACE program including, but not limited to, entering into PACE agreements with owners of qualifying property and collecting PACE assessments, all in accordance with the PACE Act and the Trust's rules and regulations; and 4) require that participants in the PACE program comply with requirements for the Home Energy Savings Program administered by the Trust.

§ XX-6 Amendment to PACE program.

In addition, the Municipality may from time to time amend this Ordinance to use any other funding sources made available to it or appropriated by it for the express purpose of its PACE program, and the Municipality shall be responsible for administration of loans made from those other funding sources.

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ARTICLE IV – CONFORMITY WITH THE REQUIREMENTS OF THE TRUST

§ XX-7 Standards adopted; Rules promulgated; model documents.

If the Trust or other State or federal agency adopts standards, promulgates rules, or establishes model documents subsequent to the Municipality's adoption of this Ordinance and those standards, rules or model documents substantially conflict with this Ordinance and/or with the Municipality's manner of participation in the PACE program, the Municipality shall take necessary steps to conform this Ordinance and/or its manner of participation in the PACE program to those standards, rules, or model documents.

ARTICLE VI – PROGRAM ADMINISTRATION; MUNICIPAL LIABILITY

§ XX-8 Program Administration.

1. PACE Administration. The Municipality will administer its PACE program pursuant to and consistent with the PACE Act, 35-A M.R.S.A. §10151, *et seq.* The

A Guideline for Establishing Local Energy-Efficiency Programs in Virginia

Municipality's administration of its PACE program shall include the following:

- A. the Municipality will enter into PACE agreements with owners of qualifying property in the Municipality's PACE district;
- B. the Municipality, or its agent, will create and record a Notice of the PACE agreement in the appropriate County Registry of Deeds to create a PACE mortgage;
- C. the Municipality, or its agent, will disburse the PACE loan to the property owner;
- D. the Municipality, or its agent, will send PACE assessment statements with payment deadlines to the property owner;
- E. the Municipality, or its agent, will be responsible for collection of the PACE assessments;
- F. the Municipality, or its agent, will record any lien, if needed, due to nonpayment of the PACE assessment;
- G. the Municipality, or its agent on behalf of the Municipality, promptly shall record the discharges of PACE mortgages upon full payment of the PACE loan.

2. PACE Program.

A. The Municipality's PACE program shall be consistent with any terms and conditions the Trust may establish by rule under 35-A M.R.S.A. § 10154(4).

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B As required by 35-A M.R.S.A. §10155(3), federal laws and regulations regarding the privacy of consumer information apply to all consumer financial information obtained by the Trust or Municipality in implementing its PACE program.

3. PACE Agreement

A. As required by 35-A M.R.S.A. §10155(1), a PACE agreement entered into by the Municipality pursuant to its PACE program must comply with underwriting requirements established by rule by the Trust.

B. As required by 35-A M.R.S.A. §10155(2), a PACE agreement entered into by the Municipality pursuant to its PACE program must provide consumer disclosure consistent

with the principles of truth in lending as specified in rules adopted by the Trust.

C. As required by 35-A M.R.S.A. §10157(2), a PACE agreement entered into by the Municipality pursuant to its PACE program shall provide that all rights related to carbon emissions reductions resulting from those improvements are deemed to be assigned by the property owner to the Trust and are held by the Trust.

4. Adoption of Education and Outreach Program. In conjunction with adopting this Ordinance, the Municipality shall adopt and implement an education and outreach program so that citizens of the Municipality are made aware of home energy saving opportunities, including the opportunity to finance energy saving improvements with a PACE loan.

5. Assessments Not a Tax. PACE assessments do not constitute a tax but may be assessed and collected by the Municipality in any manner allowed under the PACE program and consistent with applicable law.

6. PACE mortgages and PACE Assessments. PACE mortgages shall be recorded and PACE Assessments shall be assessed and collected as provided in 35-A M.R.S.A. §10156.

§ XX-9 Liability of Municipal Officials; Liability of Municipality.

1. Notwithstanding any other provision of law to the contrary, municipal officers

A Guideline for Establishing Local Energy-Efficiency Programs in Virginia

and municipal officials, including, without limitation, tax assessors and tax collectors, are not personally liable to the Trust or to any other person for claims, of whatever kind or nature, under or related to a PACE program, including, without limitation, claims for or related to uncollected PACE assessments.

2. Other than the fulfillment of its obligations specified in a PACE administration contract with the Trust entered into under Article VI, §1(A) above, a municipality has no liability to a property owner for or related to energy savings improvements financed under a PACE program.

Model PACE Ordinance 1 (Mun. Admin3) 8-4-2010

A Guideline for Establishing Local Energy-Efficiency Programs in Virginia

Product Category	2005 Units Shipped	2005 Market Penetration
Audio/DVD*	7,039,172	
Home Theater	N/A	22%
Audio Separates	N/A	21%
DVD Players	N/A	32%
Mini-Systems	N/A	22%
Boilers		
Residential Gas Boilers	55,091	25%
Residential Oil Boilers	83,434	51%
Ceiling Fans		
Ceiling Fan Only	3,022,565	39%
Ceiling Fan with Light Kit	368,355	4%
Light Kit Only	130,276	6%
Air-Source Heat Pumps	568,421	27%
Central Air Conditioners	1,245,729	19%
Commercial Fryers	5,771	7%
Commercial Hot Food Holding Cabinets	10,625	10%
Commercial Refrigerators & Freezers	104,170	44%
Commercial Steamers	4,404	11%
Dehumidifiers	1,800,949	92%
End-Use Products	891,158	N/A
Exit Signs	1,954,725	50%
External Power Supplies	15,315,731	4%
Furnaces		
Residential Gas Furnaces	1,319,905	37%
Residential Oil Furnace	Included in Gas Furnaces	7%
Geothermal Heat Pumps	32,517	1%
Light Commercial HVAC	97,084	28%
Monitors		
CRT	5,986,832	100%
LCD	18,733,033	58%
RLF	10,523,682	5%
Indoor	7,466,180	4%
Outdoor	3,057,502	11%
Roof Products		
Commercial	1,402,671,462 square feet	23%
	22,972,506 gallons	
Residential (square feet)	242,995,441	5%
Room Air Cleaners	208,583	13%
Telephony		

Cordless Non-DSS Telephones	1,714,976	7%
DSS Combination Units	6,488,116	44%

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Non-DSS Combination Units	2,050,332	27%
Traffic Signals	654,074	7%
Transformers	64,686	24%
TV/VCR/DVD*		14,512,041
TVs	N/A	39%
VCRs	N/A	28%
TV-VCRs	N/A	55%
DVDs	N/A	32%
Vending Machines	68,581	28%
Ventilating Fans	891,339	13%
Water Coolers	726,361	68%

Appendix H: Palm Desert's "Set to Save" Program.

FOR IMMEDIATE RELEASE CONTACT: Sheila Gilligan

776-6411

PUBLIC INVITED TO GET “SET TO SAVE”

PALM DESERT, CA – Palm Desert residents who would like to save money and energy while protecting the environment are invited to a free community meeting at 6 p.m. on Tuesday, July 10, in the Council Chamber at City Hall, 73-510 Fred Waring Drive.

The meeting will provide information about the City’s **Set to Save** program and how people can start saving immediately after signing up for free home energy surveys and free in-home efficiency tune-ups.

Residents who schedule a free efficiency tune-up will get a visit from a contractor who will replace and/or make minor repairs to lighting, fixtures, doors, and windows to ensure that the home is operating at maximum energy efficiency. Participants save money on energy bills and receive new energy efficient products. On average, contractors provide about \$200 worth of free material and labor. These tune-ups are funded by California utility ratepayers through the Community Energy Partnership – a cooperative effort between Southern California Edison, The Gas Company, Palm Desert and nine other Southern California cities, that is facilitated by The Energy Coalition.

The in-home surveys, provided by the City’s Office of Energy Management, identify things that Palm Desert residents can do to save energy and cash on their utility bills. Residents who schedule a free survey and who make the recommended changes can save even more, courtesy of the **Set to Save** program. For example, residents can save up to \$1,400 on the cost of a single, high efficiency air conditioner when they replace a working, older system thanks to **Set to Save**.

To learn more about in-home surveys, efficiency tune-ups, and **Set To Save** – a partnership between the City of Palm Desert, Southern California Edison, The Southern California Gas Company, and The Energy Coalition – go to the **Set to Save** web site at www.settosave.com or call the Palm Desert Office of Energy Management at 837-0287.