

State Energy Efficiency Policies Options and Lessons Learned

A Series of Briefs

Brief #2

Energy Efficiency Loan Programs

Matthew Brown



**ALLIANCE TO
SAVE ENERGY**

Creating an Energy-Efficient World

Chapter 1.
State Energy Efficiency Loan Programs

Policy Description

State energy efficiency financing programs provide loans for energy efficiency improvements at interest rates that are typically lower and with terms that are often more flexible than would otherwise be available in the market. These loans are used to fund purchases of energy-efficient appliances, installation of efficient lighting, and upgrades to HVAC systems and the building shell. These loan programs are a way for states to address market barriers that generally result in under-investment in energy efficiency, such as the externality costs of energy use, the higher up-front cost of energy-efficient products, and lack of consumer awareness.

These loans are distributed via programs that are typically administered by state energy offices, although some housing finance authorities, banks and economic development agencies also administer loan programs. The programs make loans to one or more of four sectors: residential, business, public and agricultural.

Depending on each state's situation and need, governments seed loan programs through state bond proceeds, state treasurer investments, ratepayer funds, Petroleum Violation Escrow Funds (PVEs), or a combination of these sources.¹ Brief #1 in this series, "Funding Mechanisms for Energy Efficiency", describes these funding sources in greater detail. Regardless of the source of capital, lending processes can be administratively complex: lenders must analyze the borrowers' ability to pay interest and principal on loans (through credit scores, payment histories or other metrics), and borrowers must have credit histories strong enough to take on debt, and in some cases the financial means to put up security or collateral.

The ability of state loan programs to attract borrowers has varied widely. Factors affecting the volume of loans include the interest rate at which loans are offered; the terms offered; the stringency of credit and security requirements; the effectiveness of program marketing; and the complexity of the application process. The ultimate measure of a program's success is whether energy efficiency and other objectives are being met; few programs have evaluated their impacts with any rigor, relying instead on intermediate indicators of success, usually loan volume.

This paper discusses state energy efficiency loan programs for the three major end-use sectors: residential, business (including some industrial sector loans) and public sectors. The discussion includes a survey of loan programs in operation in numerous states; analysis of ideal applications of energy efficiency loans; complementary and alternative policies; and factors influencing effectiveness of these programs.

Current Status and Experience

Thirty states have energy efficiency financing programs, and twelve of them offer loans to multiple sectors. Eighteen states have loan programs for the public sector (i.e., state agencies, municipalities, universities, schools and hospitals). Fourteen states have loan programs for businesses. Sixteen states have loan programs for the residential sector. Five states have loan programs for the agricultural sector; however these programs are outside the scope of this paper. Table 1 identifies the 30 states and the sectors for which they offer loan programs.

Table 1: State Loan Programs

State	Residential Sector	Business Sector	Public Sector	Agricultural Sector
Alabama			X	
Alaska	X			
Arkansas		X		
California			X	X
Connecticut	X			
Idaho	X	X	X	X
Iowa			X	
Kansas	X			
Louisiana	X			
Maine	X	X		
Maryland			X	
Massachusetts	X			
Minnesota	X		X	
Mississippi		X		
Missouri			X	
Montana	X	X	X	
Nebraska	X	X	X	X
New Hampshire		X		
New Jersey	X	X		
New York	X	X	X	X
North Carolina		X		
Oklahoma			X	
Oregon	X	X	X	X
Pennsylvania	X	X	X	
South Carolina			X	
Tennessee		X	X	
Texas			X	
Utah			X	
Vermont	X	X	X	
Wisconsin	X			
Total States	16	14	18	5

Source: www.dsireusa.org, accessed October 2008.

Residential Energy Efficiency Loan Programs

The ideal financing mechanism for residential energy efficiency improvements depends largely on the cost of the improvement. For purchases of appliances up to a few thousand dollars, most people will choose to pay with cash or a credit card. For costly, long-term investments, such as a significant remodeling project that incorporates energy efficiency, homeowners might take out a home equity loan, a second mortgage, or an energy efficiency mortgage. Such investments typically exceed \$15,000-\$20,000.ⁱⁱ

For items that are too expensive to put on a credit card but not large enough to warrant taking out a home equity loan or a second mortgage, consumers may consider taking out a conventional bank loan. Many of the items in this price range are “crisis purchases,” designed to quickly replace equipment that is urgently needed – for instance, a furnace that breaks down during a cold month. These purchases can cost up to \$20,000, but are more often in the range of \$5,000-\$10,000.

Residential state loan programs typically target mid-sized loans. A few states have created energy-efficient mortgage program offerings as well. Both are discussed below.

Mid-Sized Residential Loan Programs

Residential energy efficiency loan programs typically focus on financing the purchase and the installation of well-known and well-understood products, such as furnaces, insulation and appliances. In most cases, they can be used to pay for the full cost of replacement equipment, not just for the incremental cost of the energy-efficient equipment compared with conventional equipment. Lending for only the incremental cost – which is often a small portion of the

overall cost – would require small loans with a high ratio of administrative costs to loan value. In addition, administrative costs would be higher for incremental-cost loans than for full-cost loans, because in most cases the program staff must take on the duty of determining the incremental cost of a purchase. For these reasons, most energy efficiency loan programs lend for the full cost of equipment.

Residential loan funds are administered and marketed by state agencies, banks and contractors. State energy offices or state housing finance authorities perform all functions of the loan program in some states, including loan product development, marketing, loan origination and servicing, and program oversight and development. In other states, banks are either partially or fully responsible for marketing the loan program, as well as for originating and servicing the loans. Where banks have a major role, a state agency will set standards and program rules. In some states, building or heating and air conditioning contractors provide the main interface with customers.

The program administrators typically set the interest rates for state loans – either directly, by establishing the rate at which the agency itself loans funds, or indirectly, by using state funds to buy down the interest rate that a lending institution charges. The terms of mid-sized loans are commonly around five years, but can go up to 15 years. Many of these programs require loans to be secured by mechanisms such as a lien on the borrowers’ property; others create a fund to cover some percentage of the potential for defaults that might occur. In general, the need for loan security is inversely related to the stringency of credit-worthiness tests, so it may be possible to limit losses and the need for security through stricter credit requirements.ⁱⁱⁱ

This section summarizes six state residential loan programs. These programs were selected because

they offer perspectives and lessons from a variety of different states. Some programs have achieved higher loan volumes than others, but each provides lessons for other states to consider, regarding such issues as collateral requirements; the ways in which interest rates and loan terms are set; and the administration and marketing of programs.

Idaho

Administered and marketed by the state's energy office, Idaho's program is small when compared with loan programs in some other states. Since the program began in 2001, it has originated approximately 500 loans, with a total value of nearly \$2 million. Nevertheless, it is included in this discussion because it provides an example of a program run entirely by a state agency. The program offers loans of up to \$15,000 to customers in the residential sector, though the typical loan is around \$4,000. The interest rate, which has been mostly stable since the program began, is set at four percent over a five-year term, and the loan program is set up as a revolving fund, so approximately one-fifth of the loan funds are recycled back into the program each year.

The program provides these low-interest loans for a wide variety of purchases, including energy-efficient appliances and equipment such as water heaters and air conditioners; and a wide variety of projects,

including lighting, building management controls and duct- and air-sealing.^{iv} At one point in the program's history, the state offered loans for ENERGY STAR windows, and the program saw a surge in interest from borrowers. The program administrators stopped offering loans for windows because the number of applications was so great that it depleted funds available for other energy efficiency projects.^v

Staff has reported that the level of participation in this program has varied depending on the interest rates in the private market. When market interest rates have been low, consumers' interest in the Idaho program has slackened, and when market interest rates have been high, interest in the Idaho program has increased.^{vi}

In Idaho, loans are secured with liens placed on borrowers' property. According to Idaho staff, they experimented with unsecured loans in the early years of the program but saw unacceptable loan losses; as a result, all loans are now secured through a lien on property.

Table 2 presents the key data for the loans administered through the Idaho loan program. The state has not collected data on energy savings or emissions reductions that have resulted from the loan program.

Table 2: Idaho Residential Loan Volume and Value by Sector: 2001-2007

Sector	Loan Volume	Average Loan Size	Total Funds Lent
Residential	508	\$4,123	\$2,094,734

Source: Terry Hoebelheinrich, Idaho Energy Division/Idaho Office of Energy Resources, March 2008.

Kansas

The Kansas Housing Resources Corporation (KHRC) has operated a residential loan program called the Kansas Energy Efficiency Program (KEEP) since 2006. KEEP is profiled here for two reasons: first, because it is an example of an energy efficiency program operated by a housing finance agency; and second, because it made changes to its requirements in order to increase consumer interest. The purpose of KEEP is to finance energy efficiency improvements such as insulation, and efficient appliances, heating systems, windows and doors in residential buildings. Kansas funds its program with \$2 million in severance tax revenues imposed on oil and gas producers in the state.

The program operates by buying down the interest rate charged by participating banks. KHRC buys half of the loan at an interest rate of zero percent, and Sunflower Bank, the only participating bank, retains the other half at the market interest rate. Therefore, borrowers end up paying interest at half the market rate. Potential borrowers, usually with the help of a contractor, are required to fill out a program form which describes the item purchased (such as the type and efficiency of furnace to be installed), thereby certifying that it meets certain criteria. The borrower sends the form and a loan application to the bank, which then forwards both documents and its own documentation to KHRC. KHRC then issues a confirmation. Once the improvements are completed, the bank requests funds and KHRC reimburses the bank.^{vii}

There is no limit to how much participating banks can contribute to a given loan, but the state’s participation is capped at \$10,000 per loan. The total amount of the average loan is \$9,800; these loans are secured by a lien on the borrower’s property. And although at 24 months the program is still new and therefore without a long loan history, there have been no defaults or delinquencies on any loans.^{viii} The program does not keep records of energy savings or emissions reductions.^{ix} Table 3 summarizes loan volume and value since the program’s inception. The cost of administering the program – which consists of a part of one KHRC employee’s salary – is recovered in large part through interest earned on program funds, which are invested when they are not being lent out.

Originally the loan amount was set at a maximum state participation of \$7,500 per loan, and loans were limited to borrowers with incomes of less than the area-wide median income. When the early iterations of the Kansas program produced few loans (only 44 in the first 18 months) KHRC increased the maximum state participation to \$10,000 and the income limitation to 120 percent of area-wide median income. Within six months KHRC had doubled its loan volume. KHRC has since removed the income limitation altogether.

The KHRC markets the loan product at trade shows and libraries, through direct mail and to contractors. Sunflower Bank also distributes flyers and brochures about the program.

Table 3: Kansas Program Loan Volume and Value by Sector: 2006-2008

Sector	Loan Volume	Average Loan Size	Total Funds Lent
Residential	91	\$9,800	\$891,800

Source: Christine Reimler, Kansas Housing Resource Corporation, September 2008.

The appliances, equipment and systems must meet energy efficiency requirements that vary with each measure. For example, appliances generally must be ENERGY STAR-qualified; furnaces must be at least 92 AFUE; and central air conditioners must be at least SEER 14.

Nebraska^x

Nebraska’s program is similar to the Kansas program in structure, though it has been in place for much longer – since 1990 – and has issued far more loans. Nebraska’s program is one of the longest standing and highest volume energy efficiency loan programs in the country. It also offers an example of a program operating primarily through lending institutions and generating a significant loan volume. More than 23,000 loans have been issued in the residential sector since the program’s inception, representing more than 92 percent of the program’s total loan volume, and the program has issued more loans across all sectors than any other state.^{xi} The program is designed to finance projects in all four of the sectors for which energy efficiency loan programs are generally provided – residential, business, public and agricultural. Table 4 presents the details of the loans issued in the residential sector. Here, state funding leveraged lender capital, so the total funds available to lend far exceeded the state funds.

Like Kansas’ KHRC, Nebraska’s Energy Office runs its programs through participating lenders, and purchases half of the loan at an interest rate of zero percent in order to provide a lower blended rate. Unlike the Kansas program, however, the Nebraska program uses credit unions and thrifts as participating lenders.

The state offers loans for a wide variety of ENERGY STAR-certified appliances such as clothes washers, dishwashers, water heaters and lighting. It also provides loans for a variety of other energy efficiency measures such as insulation, energy-efficient doors, and duct sealing. As long as the measures appear on Nebraska’s list of pre-qualified measures, the state does not require an energy audit, and most loans fund the installation of these pre-qualified measures as well as their purchase. In some cases, the state will approve loans for measures that are not on the list, if the borrowers have performed an energy audit.^{xiii} The maximum state contribution to residential loans in this program is \$35,000 for single family homes and \$75,000 for multi-family buildings.

Of the 322 lenders that have qualified for the program, 250 have made one or more loans over the life of the program. Geographically, these loans have been evenly distributed throughout the state. Lenders decide whether or not the loans should be se-

Table 4: Nebraska Residential Loan Volume and Value (1990 - September 2007)

Sector	Loan Volume	Average Loan Size	Funds Lent by Energy Office	Funds Lent by Energy Office and Banks Combined
Residential	23,276	\$6,010	\$71,236,365	\$139,879,446

Source: Jack Oesterman, Nebraska Energy Office and Nebraska Energy Office Annual Report 2007, March 2008. (More information available at <http://www.neo.ne.gov/>)

cured or unsecured; therefore, Nebraska staff does not have data on how many loans are secured or unsecured. The type of security provided varies widely: in addition to liens on homes, borrowers have used vehicles, boats and even cows as security.^{xiv}

This program is marketed through contractors and participating lenders. The state does some cooperative marketing by producing brochures and flyers for contractors and lenders to distribute.

Since the program’s inception in 1990, total program-wide write-offs for all sectors have amounted to \$80,000 out of the \$88 million in state funds that have been lent out across all sectors.^{xv} The state has not performed an evaluation of the program in more than a decade, but has one under way as of mid-2008. The state does not keep records of energy savings or emissions savings.

This program has generated greater loan volume than the Kansas program. Nebraska staff speculates that this may be because of the following:

- The requirements for loan security and collateral are more flexible, while still giving the lenders recourse in the limited number of defaults that have occurred.

- The program’s marketing strategy makes use of the contact that contractors have with consumers.
- There is a clear focus on energy efficiency, rather than a dual focus on energy efficiency and low-income assistance.
- The program uses a large network of local banks as lenders and marketing partners for the program.

Nebraska staff noted that the authorizing legislation for the program had prohibited banks from out of state – including national banking institutions based in other states – from participating in the program. Despite the program’s successes, this prohibition has hindered its expansion, particularly as national banks have established more extensive branch networks in the state.^{xvi}

Oregon

Oregon’s Department of Energy runs all aspects of the state’s energy efficiency loan program. Oregon’s loan program is included in this discussion because it provides an example of a program that receives funding through a bond issue; it has a loan volume that is larger than that of most states; and it sets a minimum amount on its loans. Started in 1981, this loan program is one of the oldest state energy efficiency

Table 5: Oregon Energy Loan Program (2000 – 2007)

Sector	Loan Volume	Average Loan Size	Total Funds Lent
Residential	123 (16%)	\$15,468	1,902,563 (0.49%)
All Sectors	740 (100%)	\$486,861	\$382,651,911 (100%)

Source: *Progress Report 2007, Energy Loan Program, Oregon Department of Energy.*

loan programs in operation. Funding for the program comes from a bond issue, and the interest rate varies depending on the rates for these bonds. As of early 2008 the rate for residential borrowers was between six and 6.5 percent, depending on the loan size. The minimum size for all loans, including those to the residential sector, is \$15,000 and the loan term is 15 years.

Table 5 displays details of the program's residential loans since 2000.

The program provides loans to fund a wide variety of measures including water heaters, lighting, chillers, boilers, heat pumps, air conditioners, programmable thermostats, caulking/weather-stripping, duct/air sealing, insulation and windows.

Since the program's inception, only 16 percent of the total loan volume has gone to the residential sector; the rest has been loaned to business, public and agricultural borrowers.^{xvii} Only one loan closed in the residential sector in 2006, for \$20,000.^{xviii} This is probably due in large part to the high minimum loan amount; most residential energy efficiency loan needs (e.g., replacing a furnace, installing insulation) are well under \$15,000.^{xix} The larger residential loans that Oregon provides are generally used to fund longer-term projects, rather than the less-extensive emergency repair and replacement loans typically funded in other programs. This means that a quick and streamlined loan approval process is not as critical for this category of loans.

Although the program requires security on the loans, loan officers are given some discretion as to how the loans are set, depending on the credit history of the borrower. The program administrator recalled, in one case, having placed a lien on a fully owned second home as opposed to a primary residence.^{xx} The re-

quirement for collateral on these loans is not surprising, given the relatively large size of the loans. The Oregon program is unusual among state loan programs in that it charges fees to the borrower. These fees are set in statute. The application fee is 0.1 percent (up to \$2,500) of the amount requested. The underwriting fee is 0.5 percent, with a \$500 minimum and a \$5,000 maximum. Any amount of the underwriting fee greater than \$500 is credited to the one percent loan fee at closing. As a result of this fee structure, taking out small loans may not make sense. The Oregon program recovers its administrative costs through these loan fees as well as through the spread between the interest rate that it charges on its loans and the interest rate it pays on its bonds.

Oregon program staff noted that one of the challenges with the program has been the inflexibility of the fee rates: they are set in statute and are designed to recover at least a portion of the administrative costs. These fees have made the program less attractive to potential borrowers.

New York

New York State runs two energy efficiency loan programs for the residential sector through the New York State Energy Research and Development Authority (NYSERDA), both of which were launched in 2001. The programs are funded by the state public benefit fund, with loans averaging \$7,500. They are included in this discussion because they have generated significant loan volume and because they provide two different models for delivering loan funds to customers. One is a subsidized loan program offered through lending institutions, and the second is a low-interest loan program delivered through a third-party financing institution, Energy Finance Solutions (EFS). In general, the program delivered through EFS has been more streamlined than the bank program, and has

been more attractive to many customers and contractors who participate in the program.

These programs are marketed through a network of contractors who serve as the primary face of the program. With partial funding from NYSERDA, these contractors receive extensive training in energy efficiency through the Home Performance with the U.S. EPA ENERGY STAR program, which conducts whole-house energy audits and makes recommendations for improving home energy efficiency. The contractors can then offer their customers participation in one of the two financing programs.^{xxi}

In one program, contractors provide customers with a list of participating banks with which customers can work directly to finance energy efficiency improvements. The loans can be either secured or unsecured, depending on the banks' preference. NYSERDA buys down the interest rate for borrowers by four percentage points from the prevailing bank rate, paying the bank for the net present value of the difference in interest rates. In Con Edison territory (the New York City metropolitan region), NYSERDA has additional funds to buy down the rate by a total of 6.5 percentage points. As a result, interest rates for this program

may be lower than one percent in Con Edison territory and between two and five percent outside that service territory.^{xxii}

Through the second, more streamlined program, the contractors put customers in contact with a single program administrator, EFS, which evaluates the potential borrower's credit and decides whether or not to extend credit to the customer. NYSERDA buys down the interest rate on the unsecured loan from EFS, paying for the net present value of the difference in interest rates. Borrowers have a choice of a 5.99 percent rate for a 10-year term and a maximum loan amount of \$20,000; or a 4.99 percent rate for a five-year term and a maximum loan amount of \$10,000. According to program staff, contractors have expressed a preference for this program because it is more centralized and accessible for both the contractors and the borrowers. Table 6 shows that almost twice as many loans closed through the EFS program as closed through the participating banks program, despite the higher interest rates for these loans.^{xxiii} Loan default rates for the EFS program range from three to four percent of the total funds loaned. The bank loan program, which consists primarily of secured loans, has a zero percent default rate.

Table 6: New York Loan Program Activity: 2001 – Aug. 31, 2008

	Loan Volume	Total Funds Lent	NYSERDA Buydown Funds
Participating Bank Program	2,419	\$20,739,670	\$2,523,099
Energy Finance Solutions	4,782	\$35,518,652	\$5,693,041

Source: David Friello, NYSERDA, October 2008.

These two programs are among the few that track monetary savings resulting from energy efficiency measures: since 2001, they have served 6,629 households and saved an average of \$756 per household.^{xxiv} New York estimates that the energy savings from the program are approximately 775 kWh and 40 MMBtu per project per year. NYSERDA administers these programs with a ½ full time equivalent (FTE) project manager and a ½ FTE administrative assistant.

New York’s program has so far originated an average of 900 loans per year. The program staff attributes the program’s high loan volume to a few key factors: the network of contractors they use to deliver services; the training programs they have developed for these contractors; and the streamlined approval process for loans, particularly in the program operated through EFS.

Pennsylvania

Pennsylvania’s Keystone Home Energy Loan Program (HELP) is an energy efficiency loan program that was started in 2006 and is being funded over a three-year period with a total capitalization of \$20 million from the Pennsylvania Treasurer’s Office. This program provides loans for the purchase of ENERGY STAR or equivalent equipment, with a focus on heating equipment. It is run by AFC First, a third-party financing organization.^{xxv} Pennsylvania’s program is profiled in this discussion because it is an example of an energy

efficiency program capitalized by the state Treasurer and operated entirely through a third-party financial institution. The Pennsylvania program has also focused heavily on developing a highly streamlined program through which borrowers quickly find out whether or not they have been approved for financing.

Retail interest rates for loans issued by HELP have been set at 8.99 percent, based on a Fed Funds index, although the program is moving towards the less volatile LIBOR rate as an index.^{xxvi} The Treasury earns a 4.99 percent return on its funds at the current interest rate and the difference goes to AFC First. HELP accepts 65 percent of loan applicants; those who are not approved are rejected primarily because of credit ratings that are too low for the underwriting criteria of the program. In the first two years, only 10 loans have defaulted.

Typically, the Keystone HELP loans do not exceed \$10,000; they are unsecured and do not place a lien on property. The rationale behind the decision not to require security is two-fold.^{xxvii} First, the Pennsylvania Energy Development Authority provided a grant to seed 90 percent of a \$1,000,000 loan loss reserve fund, with additional funding from the state’s utilities. This loan loss reserve fund provides security for AFC First to help cover losses, and allows the lender to make an unsecured loan at a lower interest rate than it would otherwise be able to. Because it has access

Table 7: Pennsylvania’s Keystone Home Energy Loan Program

Sector	Loan Volume	Average Loan Size	Total Funds Loaned
Residential	2,965	\$6,316	\$18,728,541

Source: Peter Krajsa, President AFC First, March 2008.

to the loss reserve and because it keeps the default rate on its loans low by setting high credit-worthiness criteria, AFC First also guarantees principle and interest payments to the Pennsylvania Treasurer.

The second reason has to do with competition. AFC First, the Pennsylvania loan program administrator, sees as its primary competition the unsecured line of credit and credit cards offered by stores such as Lowe's, Sears and Home Depot. These are available for any purchase at the store, regardless of whether it meets tough energy efficiency standards. Acquired through an easy approval process, these financing products typically offer promotional rates over a six- to 12-month period but charge higher rates after the promotional period ends. An energy efficiency loan whose application demands significantly more work and documentation than these in-store loans would face an uphill climb in attracting borrowers.

Keystone HELP is meant to be a quick turn-around program that offers fast, streamlined loan approvals to borrowers. Although the program has had an interest rate buydown for low-income borrowers, Keystone HELP is not primarily an interest rate buydown program; instead it relies on credit supports, including a loss reserve and the AFC First guarantee to the state Treasurer to keep interest rates low, as well as low-cost 4.99 percent financing from the Treasurer.^{xxviii}

Like the New York program, the Pennsylvania program has produced substantial loan volume in a short time period. Table 7 provides information about the loan size and volume of this program.^{xxix}

Trained and certified contractors serve as the face of Keystone HELP, marketing the program, providing their customers with information about energy-efficient appliances, and then putting customers directly in contact with AFC First for the lower-rate financ-

ing offered as part of the program. The Pennsylvania program relies heavily on the ENERGY STAR label to determine product eligibility, and does not require an energy audit.

Because of a lack of initial funding, Keystone HELP does not track energy savings or emissions reductions, and as a result has no data on energy savings and only anecdotal evidence of its success, beyond loan amount and volume. The administrator does not have data on quality assurance for installations, or for the type of equipment being replaced.^{xxx}

Energy-Efficient Mortgages

Energy-efficient mortgages (EEMs) are available through lending institutions to homebuyers or to people refinancing their homes. State support for EEM programs has been rare, although several states are considering or have begun programs to subsidize them.

As currently structured, EEMs offer an opportunity to include in a mortgage the additional costs of certain energy efficiency measures as identified by a certified Home Energy Rating System (HERS) energy auditor. An EEM allows people to amortize the costs of energy efficiency measures over the length of time that they hold a mortgage, which in some cases may be a much longer term than they could get through other kinds of loans.

An EEM can be slightly larger than a conventional mortgage because it is allowed to include the costs of the energy efficiency measures. It is called a "stretch mortgage" and is made possible because it allows the ratio of borrowers' expenses to their income to be 38 percent rather than the conventional 36 percent, allowing them to qualify to purchase a more expensive home. An energy-efficient home results in a better

expense-to-income ratio because it has reduced energy bills – in other words, borrowers’ monthly energy expenditures fall as a result of the efficiency measures, which means that the ratio of their expense to income is lower than it would be in the absence of the energy efficiency measure.

Because interest on a mortgage loan is tax deductible, an EEM also allows for the interest on these home energy efficiency investments to be deducted from federally taxable income. In some cases, lenders may offer an EEM product at a lower interest rate than would be available for an equivalent mortgage, which reflects the lower credit risk posed by EEM borrowers.^{xxxi}

EEMs appeared to hold a great deal of promise as a new innovation in energy efficiency financing when lenders introduced them in the late 1980s and early 1990s. However, they have not seen widespread use and until very recently had not been offered through any state energy efficiency program for several years.

Section 105 of the Energy Policy Act of 1992 established the federal government as a provider of EEMs and introduced rules for their use. This Act set a limit on the cost of retrofit energy improvements that could be included in a mortgage at the greater of \$4,000 or five percent of the property value (not to exceed \$8,000). Currently the Department of Vet-

erans Affairs, the Department of Housing and Urban Development’s Federal Housing Administration, and the two quasi-governmental lenders, Fannie Mae and Freddie Mac, all offer EEMs with similar characteristics. Table 8 shows the number of energy-efficient Federal Housing Administration mortgages each year, which comprise a small portion of FHA’s annual loan originations. In 2007, EEMs represented about 0.007 percent of the approximately 15 million loans originated.

EEMs have gone unused for several reasons. First, audit protocols are generally rigid, and following them can be time consuming: an auditor may take three to six hours to complete the initial inspection, depending on the house. The findings are then plugged into a computer model that shows the energy and dollar savings accrued from potential energy efficiency measures identified in the audit. The auditor presents the results to the homeowner, who then installs the recommended measures. The auditor returns to the house to verify that the measures have been installed properly, and that they are producing the predicted energy savings. The entire home energy auditing process takes several days from the beginning to the end of the home energy improvement process. In times when mortgage loan financing was more readily available than it is now – as it was through much of the 1990s and 2000s – this audit requirement made

Table 8: FHA Energy Efficient Mortgage Volume by Calendar Year

Year	Loan Volume
2004	3,614
2005	430
2006	861
2007	1,100

Source: Charles Ludlum, *Federal Housing Administration, March 2008.*

EEMs significantly more complicated than obtaining a conventional mortgage.^{xxxii}

A second obstacle to EEMs is escrow requirements. Mortgage lenders that lend money for an EEM place the funds into escrow, to be released after the audit is complete. This adds an additional step for banks. Given the lack of significant interest in EEMs from borrowers, banks often view the escrow requirement as a burden, making EEMs less attractive.

A third obstacle involves the lack of incentives. Homeowners can qualify for a slightly larger mortgage by using an EEM; they also stand to see lower utility bills. Other than these benefits, they have little incentive to take the time to go through the application process for an EEM: few are offered with a lower-than-market interest rate, which could attract borrowers and compensate them for the additional time required to apply and qualify for an EEM.

Finally, the concept of “stretch” mortgages has not held much additional value to homeowners, especially in recent times, when mortgage loan financing has been easy to access. Until recently, home equity loans were often a simpler way to access capital that homeowners could use to finance energy efficiency improvements.

Efforts are now underway to revitalize the EEM product by addressing some of its initial shortcomings. Innovations include creating additional financial incentives, such as subsidized interest rates for energy-efficient home purchases or refinancing, and finding ways to increase the number of trained home energy auditors. For example, through the Energy Programs Consortium (a non-profit organization that works with state officials from energy offices, utility commissions and low income energy assistance providers), several states such as New York, Maine and Colorado are ex-

amining ways to take some funding traditionally used to subsidize small energy efficiency loans and use it to buy down the interest rate on EEMs.^{xxxiii} A \$2,000 subsidy on a \$200,000 loan buys down approximately 0.5 percentage points of loan interest. This state effort would be combined with new mortgage product offerings from mortgage lenders.

The Energy Programs Consortium has partnered with the U.S. EPA to develop a pilot ENERGY STAR mortgage product. Unlike the traditional government-provided EEMs from Fannie Mae and others, this mortgage product is not tied to any particular secondary mortgage market product requirements. Instead, it requires only that the mortgage be issued for the purchase or refinance of a new ENERGY STAR certified home, or for a home that is being retrofitted to reduce energy consumption by at least 20 percent, under the U.S. Environmental Protection Agency’s (EPA) Home Performance with ENERGY STAR Program. Therefore, it is not an EEM by the Fannie Mae definition, but rather a mortgage for a qualifying energy-efficient home. In order to qualify as an ENERGY STAR mortgage, the loan product must provide a true consumer benefit by offering a discounted mortgage rate, closing cost assistance, and other incentives that compensate borrowers for the added burden of applying for an EEM.^{xxxiv}

In an effort led by the Oregon-based non-profit Earth Advantage in coordination with the Energy Trust of Oregon, Countrywide Home Loans announced in March 2008 that it would offer a 0.125 percentage point interest rate discount for mortgages that meet certain energy efficiency standards.^{xxxv} The discount would be available for buyers of qualifying homes in Alaska, Colorado, Idaho, Iowa, Minnesota, Montana, Nebraska, North Dakota, Oregon, South Dakota, Utah, Washington and Wyoming. New homes built to several third-party standards – Earth Advantage Homes,

ENERGY STAR Homes, and the U.S. Green Building Council’s Leadership in Energy and Environmental Design (LEED) for Homes Silver – also qualify.^{xxxvi}

In the early 1990s Nebraska offered an EEM product that provided a one percent interest rate buydown for purchasers of energy efficient homes (which were defined as homes that exceeded Nebraska’s equivalent of ENERGY STAR homes). The state found that this buydown attracted a great deal of interest; the program was terminated because it became too costly.^{xxxvii}

Finally, New York State recently announced a new EEM product, a joint effort of NYSERDA and the state’s housing finance agency, the State of New York Mortgage Authority (SONYMA). Through this product, New Yorkers who borrow money to purchase an ENERGY STAR labeled home through SONYMA will receive a 0.5 percentage point discount on their mortgage rate and assistance with their mortgage closing costs.^{xxxviii}

The use of interest rate discounts to incentivize EEMs will not be attractive to all people in all circumstances. For example, people who do not expect to stay in their house for many years might prefer an immediate discount of \$2,000 off of their closing costs,

rather than a lower interest rate (through which their monthly payments would be lower) that is only effective for as long as they hold the mortgage. To accommodate homeowners who don’t plan to own their houses indefinitely, Countrywide offers a 0.5 percentage point discount off of closing costs or other fees to borrowers in Colorado for new homes that meet the environmental standards of the Built Green program; the value of this discount can also be applied to buy down an interest rate.^{xxxix}

Business Energy Efficiency Loan Programs

Currently, 14 states offer loans to businesses through their energy efficiency loan programs. Many of the business loan programs are structured and administered in the same way as the residential loan programs, with similar interest rates and security requirements. The sizes and terms of these loans, however, are frequently larger and longer, due to the bigger purchasing requirements of businesses.

These loan programs typically serve smaller businesses; like the residential loan programs, many of them focus on providing crisis loans that require a streamlined and quick approval process to finance the replacement of a broken appliance. Business loan programs also provide financing for non-crisis pur-

Table 9: Nebraska Business Energy Efficiency Loan Program

Sector	Loan Volume	Average Loan Size	Funds Lent by Energy Office	Funds Lent by Energy Office and Banks Combined
Business/Non-Profit	980	\$16,447	\$8,404,597	\$16,117,580
EPA ENERGY STAR Partners	7	\$119,642	\$418,747	\$837,493

Source: Jack Oesterman, Nebraska Energy Office, September 2008.

chases, such as planned facility remodeling or end-of-life equipment replacement, but these tend to comprise a smaller portion of the loans offered by these programs.

The remainder of this section provides information on state experiences with business loan programs, focusing on states that have generated large loan volumes. This part also includes discussion of a program that has had challenges in generating significant loan volumes.

Nebraska

Nebraska’s business energy efficiency loan program is structured almost identically to its residential loan program, with the notable exception that loans are capped at \$100,000 as a result of the larger capital needs of many borrowers in this sector. If a borrower signs up with the U.S. EPA to be an EPA ENERGY STAR partner, the loan can be as large as \$150,000.^{xi} There is no minimum loan size specified in the program. It is profiled here because, like Nebraska’s residential loan program, it has generated high loan volume through partnerships between the state energy offices and lending institutions.

The average loan size is around \$16,500 for most businesses and non-profits (Nebraska runs its busi-

ness/non-profit sector as a single unified program) and is close to \$120,000 for ENERGY STAR partners, which are typically hospitals and schools. The typical measures installed are the same as in the residential sector – insulation, ENERGY STAR windows, HVAC systems – but on a larger scale. The program does not typically require audits, but instead relies on a list of prescribed measures that qualify for the program.

As with the residential program, participating banks originate loans and the energy office provides half of the loan capital. Contractors, banks and the state agency all market the program through their own networks.^{xii} Table 9 provides further detail on this program.

Oregon

Oregon’s business loan program is funded, administered and marketed in a similar way to the residential program. It is profiled in this section because it has generated significant loan volumes and is capitalized with a bond issuance. Most loans offered through this program are for insulation and occasionally cover ENERGY STAR windows. The program also finances a small number of efficient heating systems. Oregon’s

Table 10: Oregon Energy Loan Program Loans 1980 – 2006

Sector	Loan Volume	Average Loan Size	Total Funds Lent	Business Funds Lent as Share of All Sectors	Business Loan Volume as Share of All Sectors
Business	288	\$467,713	\$134,701,440	39.02%	40.62%

Source: State Residential Energy Efficiency Loan Programs, Matthew H. Brown, for the Energy Programs Consortium, September 2007, www.energyprograms.org. Based on personal communication with Kathy Estes, Oregon Department of Energy, February 2008.

loan program also funds renewable energy projects, although according to loan program staff the majority of the funding goes to energy efficiency.^{xiii}

The program is designed so that energy savings will cover a portion of the repayment, although it does not have strict guidelines that dictate precisely what portion should be covered. So far, the program has seen only one default for all sectors, producing a default rate of around 0.3 percent.

The program focuses heavily on a prequalification process, working with potential borrowers before they apply in order to make sure their project fits with the loan program’s goals, is operationally and financially viable and is a low credit risk for the state.^{xiiii}

Among all of Oregon’s programs, the business loan program is the largest: the business sector has received around 40 percent of both loan volume and loan amount over the lifetime of the programs. In 2006, 25 of the 29 loans that closed were business loans, representing 76 percent of the total value of all loans closed that year. Averaging \$467,713, these loans are large when compared to the business energy efficiency loans provided in other states. Table 10 shows the volume and total amount of the business loans originated since the program’s inception in 1980.

Tennessee

Tennessee’s business energy efficiency loan program is profiled here because it is an example of a long-standing program whose loan volume has fallen short of its administrators’ expectations in recent years.

Tennessee’s business program started operating in 1989 and is available to small businesses with fewer than 300 employees or less than \$3.5 million in gross sales. This program is capitalized by Petroleum Violation Escrow (PVE) funds; it received four infusions of PVE funds in the late 1980s and early 1990s, for a total of \$14 million of capital to lend. The state Department of Economic and Community Development (ECD) has the authority to originate and service loans, and has full control over the program – financing, loan servicing, marketing and program design.

Tennessee’s program requires that small business loan applicants undergo an energy audit in order to determine their energy efficiency needs. The University of Memphis performs these energy audits through a contract originally funded by the U.S. Department of Energy’s State Energy Program, and now supported through Petroleum Violation Escrow funds. After the audit determines the specific needs of the small business, the Tennessee ECD loans the needed funds at a three percent interest rate. This low rate is avail-

Table 11: Tennessee Business Program Loan Activity: 1989 –2008

	Loan Volume	Value of Loans
Loan Applications	420	\$21.5 million
Loans Approved	368	\$14.6 million
Loans Made	274	\$11.7 million

Source: Clinton Berry, Tennessee Department of Economic and Community Development, Energy Division, November 2008.

able statewide, while designated geographic areas of the state (based largely on economic development criteria) can also qualify for a zero percent interest rate. Over time almost all counties in the state have received this designation, and as a result most of the new loans are at the zero percent rate. It is worth noting that this zero percent rate is very unusual among state loan programs.^{xliv}

To be approved, the projects must have a simple payback period of 10 years or less or a positive net present value based on a 15- to 30-year project life, depending on the type of system. HVAC systems, for instance, are calculated with a 15-year life. Some renewable energy projects are also funded under this program. An eligibility calculation based on the net present value is useful for allowing bigger projects such as large-scale HVAC and renewable PV systems to qualify for the loan. The program pays for the full cost of measures that qualify for loans.

All of the loans have a term of seven years. Originally this seven-year term was a maximum, but the program administrators elected to extend the seven-year term to all loans in order to reduce business owners' monthly payments and bring the payments closer to the level of monthly energy savings.

The program requires that the borrower put up some security when the loan is made, but the security qualifications are flexible. In the past, the program has accepted as security a personal guarantee from the business owner; a Certificate of Deposit; deeds of trust on buildings and undeveloped land; and the energy efficiency equipment itself, in cases when it can be moved and disassembled. Since 1989, the program has had only one default that forced it to collect on that collateral, and has written off a total of approximately \$220,000.^{xlv}

The state markets the program through direct mailings to businesses and through the Chamber of Commerce.

Table 11 shows loan applications, approvals and loans made. Tennessee staff estimate that over \$21 million in energy savings has resulted from the \$11.7 million in loans.

Initially, the program saw a high demand for loans, but the program has never grown as large as its staff would like; currently, 51 loans, totaling slightly less than \$2.5 million out of the available \$14 million in funding, are outstanding. With the recent increase in energy prices, interest in the program has grown, ac-

Table 12: Tennessee Business Energy Program Loan Originations

FY Year	Loans Originated	Average Loan Size
2003	2	\$56,724
2004	4	\$28,407
2005	8	\$34,661
2006	10	\$72,399
2007	12	\$89,387

Source: Clinton Berry, Tennessee Department of Economic and Community Development, Energy Division, November 2008.

According to program staff, Table 12 shows loan volume by year since 2003.

The loan sizes have increased in part because photovoltaic systems are now included as eligible projects. In addition, the state has seen an increase in the size of loan requests and therefore raised the loan limit to \$300,000 from \$100,000 as of 2006.

The Tennessee program staff noted two events that originally appeared to have little to do with energy but that have triggered temporary jumps in participation in the loan program throughout its history. The first event was a new U.S. EPA requirement that dry cleaners upgrade their equipment in order to reduce emissions of perchloroethylene. Since the new dry cleaning equipment was also more energy-efficient than the installed equipment, these dry cleaners found that they could qualify for the loan program.

The second increase in loans resulted from a U.S. EPA requirement that prohibited sawmills from simply throwing away their sawdust. As a result, many mills found that they could burn wood waste instead of natural gas in retrofitted or new boilers – and that the increased efficiency of these new boilers qualified them for the energy efficiency loan program.

This result, although good for generating loan volume in the program, raises questions about how much the loan program stimulated investments in energy efficiency that would have happened even without the loan program – a question of potential free-ridership on the program. Aside from these relatively isolated events that spiked program participation, staff noted that the program had not attracted the level of interest that they expected, and that in recent years loan inquiries were actually declining.^{xlvi}

Perplexed by the relative lack of interest in the loan program, the state contracted with Tennessee Tech University in 2008 to perform a study of the loan program to examine the ways in which it could expand its reach and appeal. Studies on the effectiveness of loan programs are rare, and this one provides useful information about the audience for business energy efficiency loan programs. Among its conclusions:^{xlvii}

- The decline in inquiries in the late 1990s coincided with the general decline in interest rates during the study period, suggesting that financing for such projects need not be subsidized by the public sector when low-cost financing is available from the private market.
- Participation seems to be higher for those companies that can get the largest energy and dollar savings from small investments. According to the report, the energy loan program might increase its effectiveness by focusing on only the sectors that realize the greatest returns from the program, rather than employing a blanket marketing strategy. The report, however, does not analyze the greater potential for free-ridership within this sector – those who realize the greatest energy savings from investment in energy efficiency are the most likely to make these investments even in the absence of the loan program.
- Older, larger firms report higher levels of expertise in energy-related issues and report higher levels of active monitoring of energy use. In general, experienced firms may have found ways to reduce their cost structure through energy savings. Future strategies might focus on less experienced firms that may not have the personnel resources to evaluate the potential for energy efficiency in their facilities.

Program staff noted that in addition to the findings of the Tennessee Tech study:

- One element of the program that appeared to work well was the flexibility in the kinds of collateral that could be used. The program staff noted that a similar program had been established in North Carolina; however, the program had required all applicants to secure a letter of credit as collateral. This program attracted even fewer borrowers than the Tennessee program, and the rigidity of the collateral requirements may have contributed to the lower level of participation. A letter of credit can be difficult for some borrowers to get, and adds a cost to the transaction.
- Interest rate flexibility may be key as well. Program staff noted that interest in the program has seemed to vary in part with changing market interest rates.
- A significant proportion of the program's loans are crisis loans, needed to replace equipment that has already failed. Even after receiving an audit that details how they can save money with energy efficiency improvements, many businesses do not make the improvement until equipment actually fails.

Public Sector Loan Programs

Currently operating in 18 states, energy efficiency loan programs offering loans to state agencies, school districts, universities and local governments differ in many ways from those focusing on other sectors.

First, loans to the public sector tend to be far larger than others – often over \$100,000 – and, because of this, the lending process is generally more complex than the process for typical loans in the business and residential sectors. The process almost always requires an energy audit and a more extensive review of the financing agreement than that of smaller loans in the other sectors. Loan terms tend to be longer as well, commonly reaching 15 years.

Moreover, many states design the loans to this sector so that energy savings pay back the full amount of the loan, or base the amount of the loan on estimated annual energy savings. This is important because, often, state laws prohibit public entities from entering into multi-year financing agreements. When the loans are set so that energy savings can pay them back, these loans are not classified as multi-year debt, which allows the entities in the public sector to participate in these programs.

Another difference is the fact that these loans are administered from one level of government to another. As a result, requirements for collateral on loans are rare and the loan programs are almost entirely marketed by state agency staff. Private contractors perform administration services, conduct audits, and install the energy efficiency measures or equipment purchased through these programs; however, they are not involved in the program marketing in the way that they are for programs that loan to the private sector.

One advantage of these programs is that they can be funded by the state tax-exempt bonding authority because the proceeds are used entirely for a government purpose. As a result, financing costs for these programs are lower than those for private sector loans.

Among the public sector energy efficiency loans, those that are offered to state agencies are the easiest to administer because both the lender and the borrower are at the state level of government. These loans fall under a single administrative structure and do not require a transfer of funds outside the state government.

The remainder of this section surveys specific state experiences with loan programs for state and local

government functions. These programs are included in this review because they offer a range of examples of how states may fund and administer their energy efficiency loan programs to the public sector. Each experience offers some lesson from which other states may benefit as they look to revise existing public facility loan programs or establish new ones.

Alabama

Created 10 years ago, Alabama’s public sector energy efficiency loan program is operated through the state’s energy office, though a private contractor performs loan administration services such as loan servicing. The program is included in this discussion because it provides an example of a program that was not meeting the expectations of its staff for total loan volume, but that has significantly increased its loan volume as a result of a number of changes described below.

The Alabama program offers zero percent interest loans to local governments and K-12 school districts for a wide variety of energy efficiency purchases. In order to qualify for loans from this program, the measures must include estimated energy savings that can repay the full loan amount within 10 years. This program was created to serve rural areas and only

recently expanded its scope to cover urban areas as well.

PVE funds provided just under \$3 million in capital to fund the program, which is self-sustaining. Unlike capital from bond funds, the PVE funds provided Alabama with a source of funding that did not need to be paid back, enabling the state to offer zero percent interest loans. The program covers its administrative costs through a management fee equal to three percent of the loan amount. Power South, an electricity cooperative in the state, processes and services the loans.

Despite the zero percent interest rate and rising energy prices the Alabama program has attracted little interest in recent years. According to program staff, hardly any new loans have been issued in the past four years; the currently outstanding loans will mature over the next year. No data is available for the past performance of this program.

Staff at Alabama’s energy office made a number of changes in 2008 that significantly increased interest in the program. The state expanded the scope of the program to include public facilities in urban as well as in rural areas. Moreover, the loan caps were increased from \$150,000 to \$350,000 per school cam-

Table 13: Typical Loan Terms for Various Measures

Measure	Typical Term (years)
Photovoltaics (if combined with energy efficiency measures with short payback periods)	15
Energy Efficient Traffic Lights	5-7
HVAC	Up to 15

Source: InterEnergy Solutions, March 2008, based on personal communications with California Energy Commission staff.

pus and to \$500,000 per district. The state increased loan terms from seven to 10 years, which is now more in line with those offered in other states. The staff also increased its marketing efforts by reaching out to superintendents and energy service companies. As a result of these changes, the staff expect to loan out the full \$3 million over the next several months.^{xlviii}

California

The California Energy Commission (CEC) operates an energy efficiency loan program for public schools and colleges, city governments, county governments, special districts, public hospitals and public care institutions in the state. California’s program is included in this discussion because it is one of the oldest and largest state-run loan programs, and has used a unique method based on a multiplier of projected energy savings to determine the loan amount. Begun in the late 1970s, the program provides loans for a variety of energy efficiency purchases at a below-market interest rate; it is currently set at 3.95 percent.

Funding for this program comes from a mix of state, federal and bond funds.^{xlix} The seed money from state and federal funds totaled \$85 million, while bond funds – issued in 2003 and 2005 – amounted to more than \$66 million.¹ The maximum term for these loans is 15 years and a typical term is 10 years. The loan amount is based on energy savings. An energy audit projects total annual energy and monetary savings,

and CEC multiplies those monetary savings by 10 to come up with the full loan amount. The loans do not necessarily cover the full cost of the purchase, though according to CEC staff, loans for lighting and HVAC upgrades often do. CEC also encourages borrowers to use rebates from utilities or other sources to reduce their capital costs.

This program provides loans on a reimbursement basis, a condition that has proven to be a barrier for some borrowers. Borrowers must first come up with their own capital for contractor payment and then apply for reimbursement after spending that money. This element of the program is seen as necessary to keep borrowers from arbitraging government money (i.e., by investing up-front funds at a higher interest rate than they are paying to borrow those funds).

A partial list of the purchases financed includes lighting, motors and variable frequency drives, insulation, HVAC systems, automated energy management systems, streetlights and traffic signals. The program finances some renewable energy generation measures as well, but the overall total loan amount is still determined by multiplying annual savings by a factor of 10. Table 13 lays out the typical terms for several of these measures.

California operates two energy efficiency audit programs that complement the loan program: Energy Partnership Program and the Bright Schools Program.

Table 14: CEC Loan Program Loan Amounts and Estimated Energy Savings

Total Funds Lent	Estimated Value of Energy Savings (Annual)	Estimated Electricity Savings (Annual)	Estimated Natural Gas Savings (Annual)
\$205 million	\$44 million	311 million kWh	6 million therms

Source: Jim Holland, California Energy Commission, November 2008.

The Energy Partnership Program provides energy audits, technical studies and other assistance to help local governments, colleges, hospitals, special districts and public care facilities identify energy saving measures.ⁱⁱ The program started in 1987 and provides its services – up to a \$20,000 per project cost – at no cost to clients. The Bright Schools Program is similar to the Energy Partnership Program but it provides assistance to K-12 schools.ⁱⁱⁱ This program started in 1987 and has helped 343 school districts and private schools.

In order to estimate energy savings, California’s loan program requires that borrowers conduct an audit with results that the CEC can verify prior to each project. Total estimated savings from loans in this program are shown in Table 14.

Loan amounts vary widely – from as little as \$10,000 to as high as \$3,000,000. There is no minimum amount, although the program would probably discourage applicants from asking for a loan of less than \$10,000 since the paperwork for both the borrower and the lender would be a burden for such a small loan. Single loans are limited to a maximum of \$3 million so that any one loan does not comprise too large a proportion of the total loan portfolio. This is important because otherwise the bonds underlying these loans would be given a lower rating. Since 1978, over 700 loans have been made through the

California program, totaling over \$200 million. This includes agencies that have received multiple loans at different times.ⁱⁱⁱ

Although the state does not conduct regular measurement and verification studies after projects have been completed, it produced one such study in 2004 that, according to program staff, indicated that the actual energy savings were within five to 10 percent of the projected savings.

California program staff shared several observations about programs that loan to state agencies. According to staff, the success of the California program in attracting borrowers is in part due to the relatively easy application process. That being said, program staff also reports that application requirements are strict enough to garner high-quality projects and minimal default levels. The staff believes that the feasibility study is an important component of the program not only because it helps to determine whether a project is eligible for funding, but because it helps borrowers understand the length of time involved in earning a payback on their investment.^{iv}

Missouri

Missouri began its Energy Revolving Fund for the public sector in 1989 after examining similar programs in other states, including Nebraska. It is included in this

Table 15: Missouri Energy Savings and Emissions Reductions

Total funds invested through loans	\$78 million
Total energy savings since inception ⁱ	\$83 million
CO ₂ reductions/yr	25 million lbs/yr
NO _x reductions/yr	100,000 lbs/yr

Source: Bernard Thompson, Missouri Energy Office, March 2008.

analysis because it is one of the larger energy loan programs in the country to be funded in large part through the proceeds of a tax-free bond issue.

The program is run by the Missouri Energy Center, which is part of the Missouri Department of Natural Resources. It began with a capitalization of \$10 million in the form of PVE funds. Subsequent bond sales contributed \$40 million more, and additional PVE funds have capitalized the program further. The program generally provides loans either for the full amount of the energy efficiency improvement, or for 16 times the improvement’s estimated annual energy savings, whichever is less. As a result, for projects with a payback of less than 16 years, such as a typical lighting project, the energy savings pay for the full cost of the loan, with money left over. For other projects, such as a large HVAC project, the borrower may need to come up with additional cash to make up for the

difference between the maximum loan amount and the full project cost. The maximum loan term is 16 years, but is tied to the estimated payback period for a given measure. According to state law, because the loans are designed to be repaid entirely with energy savings, the borrowers do not need to classify these loans as debt.

The Missouri program is entirely self-sustaining. A portion of the loan repayments – both interest and principle – is cycled back into the fund to capitalize future lending, while other returns go toward paying off the bonds that initially capitalized the fund. Moreover, the costs of administering the program are recouped by interest on some of the PVE funds, which have been set aside in a separate account for investment, rather than loaned out. This self-supporting feature distinguishes the program from many other state loan programs, which pay for

Table 16: Sample Missouri Energy Efficiency Projects

Loan Recipient	Loan Size	Annual Savings	Project
Adair County R-11	\$31,500	\$2,771	lighting/window replacement
Stewartville schools	\$136,500	\$11,955	lighting, new cooling units and heating units
Clarkton schools	\$151,000	\$13,296	lighting/window replacement, HVAC/insulation
Fair Grove schools	\$555,000	\$48,901	lighting/insulation
Marionville schools	\$36,000	\$3,162	football field lights
Mehlville school district	\$147,000	\$12,958	new boiler

Source: Missouri Energy Center, www.dnr.mo.gov/energy/financial/loan.htm, accessed October 2008.

administrative costs through general funds or other sources.^{lv}

The bulk of the loans fund the purchase of HVAC and lighting measures, although some renewable energy installations have also been funded.

The state has experienced no loan defaults since the program's inception.^{lvi} The program interest rate is set at 0.5 percentage points below the rate of the 20-Bond Index, which is published by The Bond Buyer and reflects an average of 20 municipal general obligation bonds with a rating of approximately Aa2. As of the spring of 2008, interest rates for the Missouri Revolving Loan Fund were set at 4.125 percent.^{lvii}

The average loan is for \$179,000, while the largest loan that the program has provided is for \$1.9 million – this for a multi-building project on a college campus. The smallest loan the program has ever issued was for \$16,000 – well above the minimum loan size of \$2,500, which is set in statute. The program has issued 440 loans since its inception, for a total value of \$78 million. Table 15 shows energy savings and emissions reductions achieved since the program's inception.^{lviii}

Table 16 presents several projects funded in the spring of 2008 by the Missouri Revolving Loan Fund, along with the projects' total investments and annual savings.

According to staff, many schools that have replaced their HVAC systems have had an additional motive for doing so: many school HVAC systems are dated, having been installed in the 1950s or 1960s. This has made it nearly impossible to find replacement parts when the systems need repair, so total system replacement is an attractive option. In effect, energy savings is not the only impetus for replacing these systems. Nevertheless, the loan program allows the school district to install a more efficient replacement system than they otherwise would have.^{lix}

Montana

Montana's state agency loan program has been in operation since 1989. This program is included in this discussion because it provides an example of a program that has used both bond funding and state appropriations to capitalize its loan fund. This is due to a requirement that the energy office review all new construction designs in order to make energy efficiency recommendations, which can be financed through this loan program.

Until 2007 the state funded its loan program through 15-year general obligation bonds, so the interest rate and rating of the bonds relied on the state's ability to repay the bonds through tax revenue, not on the energy savings that result from them. The state issued a total of \$14.75 million in general obligation bonds

Table 17: Typical Loan Term/Payback Period by Measure

Measure	Typical Term/Payback Period
lighting	7-8 years
HVAC	8-12 years
controls	9-12 years
insulation	9-12 years

Source: Georgia Brensdal, Montana Department of Environmental Quality, March 2008.

during this period. This arrangement led to better interest rates than might have been available had the interest and principle payments relied just on energy savings. Interest rates fluctuate with the rate of the bonds issued, and have ranged from three to four percent. The legislature must approve the issuance of bonds, and it has not done so since 2006.

In 2007, for the first time the legislature provided \$3 million through a general fund appropriation, with a requirement that those funds be paid back into

an account. No interest rate was specified, and the state has not yet determined what interest rate it will charge when it lends these funds.^{ix}

Until 2008, the bond funds covered all costs for the program, including program administration and the cost of energy audits that agencies must perform. Administrative costs vary from year to year, but range from six to 15 percent of the total value of loans issued. Administrative costs include the fixed cost of bond issuance (hiring of bond counsel, etc.), a portion

Table 18: Examples of Montana Energy Analyses Completed and Projects Authorized between July 1, 2006 and June 30, 2008

Agency	Building	Funding Authorized	Annual Energy Cost Savings
Administration	1100 North Last Chance Gulch, Helena	\$85,000	\$20,000
Board of Public Education	Aspen Hall classroom, Great Falls	\$28,000	\$4,000
Board of Public Education	Bitterroot Hall, Great Falls	\$ 11,000	\$1,000
Corrections	Montana State Prison, high side kitchen, Deer Lodge	\$151,000	\$22,000
Corrections	Montana State Prison, dairy dorm expansion, Deer Lodge	\$120,000	\$12,145
Justice	Law Enforcement Academy Aspen, Maple & Spruce Buildings, Helena	\$143,000	\$23,000
Montana State University, Billings	auxiliary buildings, boilers, Billings	\$424,500	\$42,000
Montana State University, Billings	McMullan Hall, Billings	\$334,160	\$23,000
Montana State University, Great Falls	College of Technology	\$880,000	\$95,000

Source: Montana Department of Environmental Quality, "State Buildings Energy Conservation Program Report to the Governor." September 1, 2008.

of the program administrator’s time at the Montana Department of Environmental Quality and the costs of any engineering studies that may be required to assess specific project needs. The cost of those engineering studies varies widely; a lighting retrofit is not complex, while a more comprehensive HVAC system replacement requires detailed study. The 2007 state appropriation from general funds specified that the full amount of those funds should be loaned out, and did not include an allocation for administrative costs. As a result, the state is determining how it will recover those administrative costs from its borrowers – either through an upfront fee or through the interest rate it charges.^{lxi}

This loan program requires that all loans be paid back from the energy savings realized on the project within a 15-year term. The program also asks that borrowers seek as much in rebate funds as possible from utilities or other sources. As a result, the total amount that the program lends for specific projects can be less than the total cost of the projects: some projects do not get any rebates, while some get rebates amounting to as much as 40 percent of the total project costs. Typical terms for loans are approximately 10 years, but this depends on factors such as the measures installed and the age and condition of the equipment being replaced. The program

funds purchases including efficient lighting, HVAC, heating and ventilation controls and insulation. Table 17 describes typical loan terms and payback periods, and Table 18 shows a partial list of projects, along with funding and annual energy savings.

In Montana, the state energy office must review all new state building projects before they are approved. The state energy office makes non-binding recommendations on energy efficiency improvements, which, if they are adopted, the state finances through its loan program. This has helped integrate a financing mechanism into the capital improvement process for constructing new facilities.^{lxii}

Texas

The Texas Energy Office initiated the LoanSTAR Program in 1988. The program is included in this analysis because it was among the first loan programs of its kind and has achieved high energy savings.

As of November 2007, this program had funded 191 loans totaling over \$240 million dollars, achieving energy savings of over \$212 million dollars.^{lxiii} The funding source for this program is Petroleum Violation Escrow funds from the federal government. LoanSTAR is unique in a number of ways. The size of

Table 19: LoanSTAR Program Total Loan Amount, Savings and Average Payback Since 1988

Loan Amount	Estimated Total Energy Savings	Average Payback Period (years)
\$241,311,510	\$212,000,000	5.6

Source: www.seco.cpa.state.tx.us/lis_guideline.htm, Texas State Energy Conservation Office, accessed November 2008.

the program – \$98.6 million – makes it the largest state-run building energy conservation program in the United States. The loans are targeted for a wide variety of HVAC and lighting efficiency measures in public buildings, including state agencies, school districts, higher education, local governments and hospitals. The loan interest rate is three percent. The loans can cover incremental costs for new construction, if the construction exceeds the applicable building code; they can also cover the full cost of building retrofits. Almost all loan funds have gone to support the full costs of retrofits. In order to qualify, projects must have a 10-year simple payback and be no greater than \$5 million. In fact, most projects have a payback of approximately six years after accounting for utility or other rebates which typically cover between 10 and 15 percent of project costs.^{lxiv}

Administrative costs for the program consist of slightly less than one full-time equivalent (FTE) to administer the program and consulting engineers to perform building assessments that recommend energy efficiency measures in buildings. These administration costs were \$394,000 in the 2008 fiscal year. Interest paid on the loans recovers these administrative costs.^{lxv}

The initial loans (1989-1994) were made for a period of four years, with program paybacks averaging 3.4 years. There have been several changes in the LoanSTAR Program since inception. Initially, loans had to pay back within four years and all major projects had to be metered and monitored for savings verification. In 1995 the loan period was lengthened to eight years and metering and monitoring became an option for the loan recipient, with the cost allowed to be rolled into the loan. In 2001 the payback period was extended to the current 10-year maximum loan term. Partly as a result of these changes, the LoanSTAR Program saw increased interest; in 2007 it had expended all available funds for new loans and had requests of

over \$20 million waiting for funding. Payback for typical projects is now approximately 5.5 years.^{lxvi}

The LoanSTAR Program has achieved significant loan volume and has loaned a substantial amount of money. Moreover, according to the State Energy Conservation Office's website, LoanSTAR-funded projects have prevented the release of 7,073 tons of NO_x; 2.1 million tons of CO₂; and 4,788 tons of SO₂. With the cumulative energy savings achieved to date, plus estimated savings from new loans, the LoanSTAR Program is expected to save over \$250 million in energy costs over the next 20 years.^{lxvii}

Ideal Applications for Loan Programs

Government lending as a funding mechanism for energy efficiency is favorable in many cases, but less appropriate in others. State loan programs are especially suited for the situations in which:

The program is funded by a capital source (such as bonds or treasury investments) requiring a financial return. Unlike ratepayer funds and other sources of program funding, bonds and investments must be paid back; providing loans, as opposed to rebates, makes this possible.

The target borrowers have the ability to take on new debt. Many low-income households and some government entities do not qualify to borrow money and will be unable to take advantage of loan programs.

State governments want to offer long-term assistance programs that recycle funds to reach more people. Loan programs are especially useful when the funds available for these programs are not extensive.

Borrowers need to refinance out of a subprime mortgage. In some cases, a new energy-efficient mortgage that takes into account a higher income-to-expense

ratio (resulting from lower monthly energy bills) may, in theory, enable borrowers with sub-prime mortgages to finance out of them.

Borrowers need to use energy savings to meet principle and interest payments. Many public sector loan programs are structured such that the loan term and interest rate allows the agency to pay back the loan entirely from energy savings.

Complementary and Alternative Policies for Loan Programs

Rebates and grants can complement loan programs to reduce the size of the loan; a loan can finance what a rebate does not pay for. In addition to working well in combination with loans, rebates and grants may also be viable alternatives to loans. In particular, grants may be appropriate for low-income people who do not have the financial ability to take on debt because of poor credit scores or high debt levels.

Energy audit, measurement and verification programs can complement energy efficiency lending programs – though for programs that finance small to mid-sized purchases, energy audits can be prohibitively costly. Also, audits and measurement and verification programs might be unnecessary for energy efficiency measures for which energy savings are predictable.

Policies to create funding sources such as ratepayer funds or other flexible funding mechanisms could be used to complement loan programs. Pennsylvania's Keystone HELP, for example, used grant funds to create a loan loss reserve. These funding sources can be used to provide loan loss reserves and other credit supports, to pay administrative costs, or to buy down the interest rate on loans to low-income borrowers.

Observations: Factors that Influence the Effectiveness of Loan Programs

Loan program application, approval, auditing and other procedures must be targeted to specific markets.

Low levels of participation in a state energy efficiency loan program often occur because the program is not actively marketed; is cumbersome to access; provides little benefit to borrowers; or has requirements that make potential borrowers reluctant to use them. Loan programs must be designed to meet the needs of borrowers in different situations; a borrower taking out a crisis loan to replace a broken furnace in January needs a fast loan application and approval process. A borrower contemplating a major home renovation project that incorporates energy efficiency may benefit more from a detailed energy audit that identifies the most cost-effective energy efficiency measures available to him; he may not require an expedited loan approval process. Most larger loans, such as those to state agencies, school districts or larger businesses, fall under this category as well. A program that knows its target market can structure its loan requirements accordingly.

Loan programs in the residential and business sectors will be more far-reaching if they can accommodate crisis loans.

Tennessee has found that many of its loans to the small business sector are crisis loans to replace broken equipment, while Pennsylvania's program has found this to be true of its residential lending program. It is important for these crisis loan programs to offer a streamlined loan approval process, which usually would mean forgoing a full energy audit. The Pennsylvania Keystone HELP is a good example of this type of program.

Loan programs in the residential and business sectors will be more far-reaching if they are able to lend for long-term projects.

Loan programs in the residential and small business sectors can be set up to accommodate longer term projects in addition to crisis loans. The EPA Home Performance with ENERGY STAR program, which lays out a whole-house approach to energy efficiency measures in homes, can be integrated into an energy efficiency loan program. The New York State NYSERDA loan programs are good examples of programs that take this approach.

Existing energy-efficient product labeling programs can be used to set eligibility requirements.

Many loan programs rely on existing energy-efficient product labeling programs – most notably the ENERGY STAR label – to establish product eligibility, which greatly simplifies the program design. A few states, such as Kansas, set their own eligibility requirements as well as using ENERGY STAR standards.

Most residential lending programs can operate effectively with a loan maximum of \$15,000-\$20,000.

Most state energy efficiency residential lending programs find that the majority of the loans they close range from \$5,000 to \$10,000. New York's loan program, for example, offers loans for up to \$20,000 but its average loan amount is around \$7,500. Although making many small loans will likely result in higher administrative costs, states such as New York and Pennsylvania have found ways to reduce these costs with a streamlined process appropriate to small loans. Pennsylvania uses prescribed measures to determine whether a consumer qualifies for a loan, and both Pennsylvania and New York provide a streamlined loan application process.

States should be cautious in setting a high minimum for residential loans.

Oregon's energy loan program is unique among state energy efficiency loan programs in that the minimum size for a residential loan is \$15,000. This can help to ensure a low ratio of administrative costs to loan amount, but it can also limit program participation. As Oregon staff point out, there has been little interest in the residential component of the state's program because most residential energy efficiency improvements do not cost enough to qualify for a loan of this size.

Participation in loan programs fluctuates depending on the difference between market interest rates and program interest rates.

State-run loan programs are more attractive when the program interest rate is significantly lower than the market interest rate. The fluctuation in the level of participation in state loan programs may indicate that program administrators should have the ability to adjust interest rates to suit market conditions.

Requiring security could add complexity to the program.

The process of setting a lien on property or taking other security adds time and expense to a transaction. Unsecured loans are riskier than secured loans, however, and may require stricter underwriting criteria than would otherwise be required. Loan loss reserves that cover projected loan defaults (given certain underwriting criteria) can also serve as credit enhancements for an unsecured loan portfolio. Pennsylvania is an example of a state that has created such a loan loss reserve for its Keystone HELP program.

Government loans that are paid back through energy savings alone may not be counted as debt.

Public sector loan programs in Oregon, Missouri, California and other states set up loans so that projected energy savings pay for all principle and interest. In these states such loans do not count as multi-year debt on the school districts' accounts, so they are permitted to take on the loans even if they, like many school districts, are prohibited from entering into multi-year debt and financing agreements without going through special procedures such as a vote of the people.

Reviewing state capital improvement projects early in the planning process provides an ideal opportunity for state agencies to consider energy efficiency upgrades and the incorporation of energy efficiency financing. When energy agencies review plans for new state buildings soon after the planning process has begun, they have the opportunity to recommend energy-saving measures and provide easy access to capital via the state loan program. Montana's energy efficiency loan program for state agencies takes this approach.

Very few of the energy efficiency loan programs have had a detailed programmatic evaluation that identi-

fies successes and areas in need of improvement. Many states do not appear to have a sense of what interest rate or terms are really necessary to attract investment in energy efficiency, and may ask, for example, whether a zero percent loan is truly necessary, or whether a four percent loan in existing market conditions will attract borrowers to the program and result in additional energy savings.

In addition, few states have a good sense of the overall effectiveness of the loan programs at market transformation or energy savings, though many do track loan size and loan volume. Performing a detailed evaluation will give state loan programs a sense of how effective they are, while providing a valuable source of information for other states who wish to launch energy efficiency loan programs or modify their existing programs. A program evaluation can also provide some analysis of free-ridership – essentially answering the question of whether actions that reduce energy consumption would have happened without the program anyway.

States to Watch

New York State has developed residential energy efficiency loan programs with significant loan volume, energy audits, follow-up measurement and verification programs and a streamlined loan approval process.

Pennsylvania has developed an energy efficiency loan program that has reached significant loan volume, and has a fast and streamlined loan approval process.

California has developed a loan program for state agencies and local governments that has reached a significant proportion of its local government entities.

Texas has developed an energy efficiency loan program for state agencies that has produced a significant number of loans, while also documenting energy and emissions savings.

Nebraska has developed a multi-sector loan program that has achieved high loan volumes and high energy savings through partnerships with Nebraska banks.

Additional Resources

The Alliance to Save Energy Web site features a state policy bulletin, published regularly, that tracks the status of state legislation pertaining to energy efficiency. This is available at http://www.ase.org/section/_audience/policy/statebulletin.

The Alliance to Save Energy profiled both state and international loan programs in “Funds for Energy Efficiency Projects” in 2002. This resource is available at http://www.ase.org/uploaded_files/intl_eefunds_april23.pdf. The North Carolina Solar Center and the Interstate Renewable Energy Council run the DSIRE database, which compiles state energy efficiency and renewable energy incentives and regulatory policies. This is available at www.dsireusa.org.

The American Council for an Energy Efficiency Economy (ACEEE) provides an online database of energy efficiency policies in states, searchable by state or by policy. This is available at <http://aceee.org/energy/state/index.htm>. ACEEE also has published a study of state public benefit funds entitled Five Years In: An Examination of the First Half-Decade of Public Benefits Energy Efficiency Policies. This is available at <http://www.aceee.org/pubs/u041.htm>.

Endnotes

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- iii. Terry Hoebelheinrich, Idaho Department of Water Resources, March 2008.
- iv. For further information on the Idaho loan program see <http://www.energy.idaho.gov/loans>.
- v. Terry Hoebelheinrich, Idaho Department of Water Resources, March 2008.
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- x. Note that this program addresses more than residential sector loans, but is included in this section because of the large share of such loans provided to the residential sector.
- xi. Jack Oesterman, Nebraska Energy Office, March 2008.
- xii. This state funding leveraged lender capital, so the total funds available to lend far exceed the state funds.
- xiii. Ibid. Industry, local government and the schools and hospitals sector typically perform an energy audit in order to identify qualifying measures. All projects must show a maximum 15-year simple payback in order to qualify for financing.
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- xv. Ibid.
- xvi. Ibid.
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- xxi. David Friello, NYSERDA, October 2008.
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- xxv. <http://www.keystonehelp.com/>, April 2008.
- xxvi. Keith Welks, Deputy Treasurer, State of Pennsylvania, March, 2008.
- xxvii. Peter Krajsa, President, AFC First, March 2008.
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- xxix. Peter Krajsa, President AFC First, March 2008.
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- xxxii. Ibid.
- xxxiii. The Energy Programs Consortium has funding from the Ford Foundation, U.S. EPA, U.S. DOE, the Surdna Foundation and others to develop and implement an energy-efficient mortgage product. More information is available at www.energyprograms.org.

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- xxxv. Multi-Housing News, http://www.multihousingnews.com/multihousing/content_display/industry-news/e3i71ba0ba389e5e5be5d174f2748e100c2, accessed September 2008.
- xxxvi. <http://www.earthadvantage.com/news/item/?key=35>.
- xxxvii. Jack Oesterman, Nebraska Energy Office, September 2008.
- xxxviii. "SONYMA offers closing cost assistance and low cost mortgages to buyers of new energy-efficient homes," http://www.nyserda.org/Press_Releases/2008/PressReleas20080804.asp, September 2008.
- xxxix. The value of a ½ point discount is \$500 per \$100,000 borrowed. Program information is available at www.built-green.org/media/other/Countrywide_Built_Green_Flyer.pdf.
- xl. For more information on the U.S. EPA ENERGY STAR Partner program see http://www.energystar.gov/index.cfm?c=partners.pt_index.
- xli. Jack Oesterman, Nebraska Energy Office, January, 2008.
- xlii. Kathy Estes, Oregon Department of Energy, February 2008.
- xliii. Ibid.
- xliv. Tennessee originally set its interest rate at five percent, but when market rates declined in the 1990s, the program lowered its rates to three percent.
- xlv. Clinton Berry, Tennessee ECO, March 2008.
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- xlviii. Data and information provided by current and former Alabama program staff Larry Knox and Karen Clifton, March 2008.
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- lv. Bernard Thompson, Missouri Energy Office, March 2008.
- lvi. Ibid.
- lvii. 2008 Energy Loans Awarded, www.dnr.mo.gov/energy/financial/loan.htm, October 2008.
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About the Alliance to Save Energy

The Alliance to Save Energy is a coalition of prominent business, government, environmental and consumer leaders who promote the efficient and clean use of energy worldwide to benefit consumers, the environment, the economy and national security. The Alliance advances energy efficiency policies, conducts research on various energy-related topics, and increases awareness and knowledge about the many ways that energy consumption can be reduced in the United States and throughout the world. For more information about the Alliance and its activities, please visit www.ase.org.

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Author: Matthew Brown

Matthew Brown is President of InterEnergy Solutions, a consulting firm that focuses on clean energy policy and finance. He provides a combination of (1) analytical and project management services on clean energy for state, federal and local government clients and (2) financial design for clean energy programs for private and public sector clients. He has performed work for a variety of domestic and international clients, including the U.S. Agency for International Development, for which he assisted in the development of clean energy policy in Liberia; SEEDCo, a community development financial institution seeking to build new energy efficiency lending programs in Colorado; and state governments and national associations seeking assistance in the clean energy arena. Prior to founding InterEnergy Solutions, Mr. Brown was the Energy Program Director for the National Conference of State Legislatures (NCSL), where he managed programs that advised high-level state officials on energy regulation, energy policy, energy efficiency, renewable energy, energy/air issues and energy security. He has advised state legislatures, provided expert testimony in over 35 states and for the Federal Energy Regulatory Commission on energy policy and regulation, and written extensively on the subject. Mr. Brown also served as the Director of Special Projects for the New York City Department of Telecommunications and Energy, where he was responsible for establishing several public-private partnerships to build alternative fuel vehicle infrastructure and for intervention with the State's Public Service Commission on renewable energy issues. Prior to this he worked with the accounting and consulting firm of KPMG Peat Marwick. Mr. Brown holds an MBA from New York University and a BA from Brown University.