Sustainable Energy Trust – Energy Efficiency and Water Conservation

Washington State Housing Finance Commission

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Section 1.0 Introduction

The Washington State Housing Finance Commission (Commission) commissioned David Paul Rosen & Associates (DRA) to conduct analyses of renewable energy and energy efficiency systems and programs that can be financed by the Commission's Sustainable Energy Trust (SET). In previous phases of this study, DRA analyzed solar PV systems as applied to single family and multifamily residential use, non-profit or government-owned school use and agricultural use, as well as wind energy generation systems and anaerobic biodigester systems. This report focuses on the issues surrounding measuring, promoting, achieving and financing energy efficiency and water conservation improvements in the built environment.

More than 30 percent of Washington's greenhouse gas (GHG) emissions currently result from energy use in buildings. Reducing buildings' energy use therefore not only addresses the State's contribution to global warming, but also represents the most efficient and cost-effective way of meeting rising energy demands in the State. The Legislature acknowledged this reality and took important steps towards reducing energy use in buildings by passing SB 5854, the "Efficiency First" bill, in April 2009.

SB 5854 makes Washington the first state in the country to meet the AIA's Architecture 2030 Challenge for progress towards ensuring buildings are net-zero energy consumers by 2030. The law requires the State Building Code Council to adopt energy codes for residential and nonresidential buildings that, from 2013 to 2031, incrementally move towards achieving a 70 percent reduction in annual net energy consumption over the 2006 established baseline.

This bill also requires utility companies to maintain energy consumption records for all nonresidential and public agency buildings to which they provide service. Building owners will also be required to disclose buildings' energy use scores to prospective buyers, beginning in 2011 for buildings over 50,000 square feet and in 2012 and thereafter for those over 10,000 square feet. In addition, the State Department of Commerce (Commerce) is directed to develop an energy performance scoring system for residential buildings that will be disclosed when the units are sold. Public agency buildings are now required to monitor and report their energy use and those that are underperforming will be required to undergo energy audits and make energy efficiency improvements. In addition, to the extent funding is appropriated to do so, Commerce is directed to develop and implement a strategic plan to enhance energy efficiency in homes, buildings, districts and neighborhoods.

Achieving energy efficiency improvements in Washington's built environment is therefore a statewide priority as well as a necessary step towards reducing the State's carbon footprint and energy dependence. There is potential for an important role for the Commission in providing financing for energy efficiency retrofits of existing buildings and assisting in creating a statewide energy efficiency retrofit program. This report provides summaries of several areas surrounding the issue of energy efficiency, including the following:

- A literature review of the available research on energy efficiency retrofits of commercial and residential buildings, the costs, benefits and payback projections of these retrofits, and the barriers to implementing energy efficiency measures.
- A summary of the funding programs available to Washington from the Department of Energy (DOE) for energy efficiency programs, including the programs' total appropriated funds, status of allocations and spending and current funds available.
- A summary of the process and policy concerns and implications for creating an energy efficiency retrofit program.

Section 2.0 Energy Efficiency Literature Review

DRA conducted a review of available literature and research regarding the costs and benefits of energy efficiency measures for various building types. While specific energy efficiency measures and their associated costs and benefits vary greatly from building to building, many studies have attempted to quantify the average cost of performing energy efficiency retrofits and the expected payback in energy savings that an average retrofit can achieve. Below we offer an overview of the available research and findings on this subject.

McKinsey & Company (McKinsey) conducted an investigation in 2009 of the opportunities for greater energy efficiency achievements in the non-transportation uses of energy in the US economy. In *Unlocking Energy Efficiency in the U.S. Economy* (Granade, 2009), McKinsey analyzes the costs and benefits of over 600 energy efficiency measures applied to various building types. The report finds that, if all of the energy efficiency measures identified in the study as being Net Present Value (NPV) positive were to be executed at scale, the resulting gross energy savings would be worth over $1.2 trillion, far more than the $520 billion needed through 2020 for upfront investment in implementing the measures. The McKinsey study defines NPV-positive measures as those in which the energy, operations and maintenance cost savings over the useful life of the measure, net of equipment and installation costs, are positive. The report found that even the most expensive of the measures are NPV-positive over the measures' lifetimes and are the cheapest ways to provide for future energy demand.

Assuming all NPV-positive measures are implemented at scale, energy savings in the residential sector would account for 35 percent of the end use efficiency potential, savings in the industrial sector would account for 40 percent and savings in the commercial sector 25 percent. Even though energy consumption per unit of floor space has decreased significantly in each of these sectors since 1980 (11 percent in residential, 41 percent in industrial and 21 percent in commercial), clearly substantial opportunity remains in each sector to reduce energy consumption by employing cost-effective measures.

Despite the significant potential, however, McKinsey identifies several barriers that have impeded the implementation of energy efficiency measures, falling into the following three categories: structural, behavioral and availability barriers. We will discuss these barriers at more length below.

DRA's literature review illustrates the breadth and depth of the energy efficiency research available. While much research has focused on energy efficiency in the built environment, few studies beyond those conducted by McKinsey examine the issue across building sectors. Much of the available research focuses in depth on one building sector only, or on the costs and benefits of specific energy efficiency measures. Another large group of studies focuses on quantifying the costs and benefits of complying with certain green building standards in newly constructed buildings. While complying with these standards does not in all cases equate with achieving energy efficiency, many of these studies use a green building standard, such as LEED or Energy Star certification, as a proxy for energy efficiency. This is likely due to the lack of data available on the energy efficiency measures employed in existing buildings that are not certified by a green building program. While equating LEED or Energy Star certification with energy efficiency can be misleading, it is the closest measure available in the current research. Below we outline the findings of a sampling of these studies, focusing on those studies that examine energy efficiency in commercial and residential buildings.

2.1 Commercial Buildings

Several studies compare the construction costs, rental rates, absorption rates and sales prices of new commercial office buildings that comply with LEED or Energy Star standards with those of buildings that do not. As of June 2009, there were 7,338 Energy Star certified buildings, including 2,943 office buildings, and 2,706 LEED certified buildings, including 1,151 office buildings (Eichholtz, 2009).

2.1.1 Energy Efficiency Costs

All of the research DRA reviewed finds no or marginal project costs associated with those new buildings complying with a green building standard. Miller, Spivey and Florance's (2008) survey of owners of buildings meeting minimum LEED certification finds average project costs to be about 3 percent higher than those without LEED certification. Kats (2007) found that commercial and school buildings achieving LEED certification cost only 0.6 percent more than those that do not. Those achieving LEED Silver designation had a 1.9 percent higher cost, LEED Gold buildings had a 2.2 percent higher cost and LEED Platinum a

6.8 percent higher cost (Kats, 2007). Fuerst and McAllister (2009) reviewed several studies that quantify the additional project cost associated with achieving green certification and found an average cost increase of 2 percent. They note, however, that some studies attempting to verify this figure found no increase in cost associated with achieving green certifications.

Davis Langdon, a construction cost consulting company with a database containing project budgets for over 600 buildings in 19 states has conducted cost comparisons of libraries, classrooms, community centers, ambulatory care facilities and laboratory buildings achieving LEED certification with those that did not. They found, first in 2004 and again in 2007, that within each category of building analyzed, the costs for the LEED-certified buildings are scattered randomly throughout the cost ranges of all buildings. The authors conclude that there is no statistically significant difference between the construction costs of LEED and non-LEED buildings of the types studied (Matthiessen and Morris, 2007 and 2004).

Morris (2007) reviews existing studies and cites an average of 1 to 2 percent cost increase associated with LEED Silver, or with achieving what he deems is a "moderate level of sustainability." He notes, however, that often in these studies over half of the projects surveyed report no additional costs associated with achieving LEED certification.

Additionally, Miller (2008) points out that marginal costs for achieving sustainability in buildings can be zero when green building measures and standards are mandated through policy such as building codes. Given the high standards regarding sustainability in Washington's building code update, effective in 2010, this may be true for new and rehabilitated buildings in the State.

Davis Langdon's conclusion, then, is supported by subsequent studies: due to the variety of commercial buildings, there is regularly a wide construction cost variation between buildings, leading to high and low cost LEED buildings and high and low cost non-LEED buildings. It is therefore difficult to generalize regarding the costs of "going green" from such disparate data.

As discussed above, achieving LEED certification in new construction commercial buildings does not translate directly into achieving a given level of energy efficiency, as LEED certification is based on accumulating points in a number of categories including, but not limited to energy efficiency. Energy Star certification is more closely aligned with energy efficiency, but again, points can be accumulated in a variety of ways beyond energy efficiency. However, due to a lack of studies of building energy efficiency apart from green certification programs, we are left to assume that the costs and benefits of energy efficiency measures will be similar to those undertaken to achieve green certification. In fact, even those measures undertaken to accumulate LEED or Energy Star points that are not directly related to earning energy efficiency points, such as building orientation or window shading, can lead to reductions in the building's energy consumption and use.

2.1.2 Energy Efficiency Benefits

Miller (2008) states that the national average operating costs for energy in an Energy Star commercial building in 2006 was $1.27 per square foot compared to $1.81 for a non-Energy Star building. This can represent significant savings, given that energy costs represent 30 percent of operating costs in a typical office building (Eichholtz, 2009). However, energy costs in Washington's buildings are likely lower than the national average, given the State's high supply of hydropower and the resulting low overall electricity rates.

These operating cost savings, along with less tangible benefits such as increased productivity (Kats, 2007) and improved corporate image, lead to a "green effect on price" enjoyed by green certified office buildings (Center for Neighborhood Technology, 2009). Miller (2008) finds higher occupancy rates, higher rental rates, higher sales prices and lower cap rates in Energy Star and LEED certified office buildings when compared to comparable non-certified buildings. When controlling for age, location and time of sale, he finds a 10 percent higher sales price, on average, for LEED certified buildings and a 5.76 percent higher price for Energy Star buildings sold between 2000 and 2007.

Fuerst and McAllister (2009) control for a building's microlocation within its metropolitan area and factor in vacancy rates to find a statistically significant rent premium of 10 percent for Energy Star and 9 percent for LEED certified office buildings. It is interesting to note that, prior to factoring in vacancy rates, the LEED certified buildings showed no rent premium, thus suggesting that the higher occupancy rates in LEED buildings as compared to non-LEED buildings are substantial. Fuerst and McAllister cite similar effects on sales prices of green certified and non-green certified buildings. Eichholtz, Kok and Quigley (2009) find a 3 percent average increase in rent per square foot for green certified buildings, resulting in a 6 percent higher effective rate when vacancy is considered and a 16 percent higher sales price. To illustrate the effect these higher rent rates can have on the buildings' values, the authors state that, at the prevailing cap rate at the time of 6 percent, the increased rents in green office buildings would translate into a

$5.5 million higher value for green buildings than for non-green buildings located nearby (Eichholtz, 2009).

As of second quarter 2007, the Seattle/Puget Sound area was ranked eighth in all metro areas for percentage of green buildings, with 16 buildings representing over 7 million square feet and 3.9 percent of the region's total buildings. Washington was also ranked eighth among states.

2.2 Residential Buildings

While many have studied the costs and benefits of green certification programs for commercial buildings, fewer such studies have been performed for residential buildings. This is partly due to the more fragmented nature of the green certification programs available for residential buildings. LEED, which began with a certification program for newly constructed commercial buildings in 1993, only adopted its LEED for Homes certification standards in 2008. These standards apply to single family homes and low rise multifamily buildings. Standards for mid-rise multifamily are currently in development. Studies on the cost-effectiveness of the LEED for Homes certification program are therefore premature at this point. Energy Star has standards for multifamily and single family housing. Other green building standards are also in use for residential buildings, such as: the National Association of Home Builders' Model Green Home Building Guidelines, Enterprise Community Partners' Green Communities standards for affordable multifamily housing, and various local green building standards for residential buildings such as King and Snohomish Counties' Built Green program.

Because of the variety of green certification programs in use for residential buildings, and the different sustainability standards that apply to single family, multifamily and affordable multifamily, it is difficult to generalize regarding the costs and benefits of sustainability measures for homes by comparing those homes with green certifications to those without. Most of the studies examined in DRA's literature review focus on the costs and benefits of meeting green building standards in affordable housing. These studies aim to make the case for increasing the prevalence of green certifications in the country's affordable housing stock.

More often than in studies focusing on commercial buildings, those studies on the costs and benefits of green building for affordable housing tend to focus on rehabilitation and energy efficiency retrofits rather than new construction projects. One estimate states that 61 percent of the housing units that will exist in 2030 had already been built in 2008 (Abromowitz, 2008). Thus, the most significant gains to be made in energy efficiency in the residential sector lie in existing homes.

Enterprise Community Partners estimates that a rehabilitation of existing multifamily units can increase energy efficiency by 25 to 40 percent for an energy efficiency retrofit cost of $2,500 per unit, which can be recouped through energy savings in 5 to 10 years (Enterprise, 2008). Lawrence Berkeley National Laboratory studied 25,000 multifamily units that had undergone energy efficiency retrofits and found that the resulting energy savings ranged from 10 to 22 percent reduction in energy use, with a median of 15 percent, and an average payback of 6 years. According to a Government Accountability Office study of green affordable housing in 2008, the government can increase energy efficiency in affordable housing by 25 to 40 percent for a cost of $2,500 to $5,000 per unit (GAO, 2008). Abromowitz (2008) details the extent of the energy efficiency improvements represented in this cost range. For approximately $2,500 per unit and a payback period of 5 to 10 years, the retrofit can upgrade the unit's boiler, ceiling insulation, caulking, sealing and storm windows. For a cost of approximately $5,000 and a payback period from 8 to 10 years, the retrofit can also install high efficiency equipment and systems, replace windows and install new insulation.

Enterprise also asserts that a single family home energy efficiency retrofit can increase energy efficiency by 25 to 50 percent for a cost of $3,000, which can be recouped in 5 to 10 years (Williams, 2008). The DOE estimates that an Energy Star certified home delivers $200 to $400 per year in energy savings (Abromowitz, 2008). The Center for Neighborhood Technology (2009) estimates that a whole house retrofit costs from $5,000 to $7,000 and can achieve a 30 percent reduction in energy consumption.

Enterprise (Bourland, 2009) also completed an assessment of the costs and benefits to affordable housing projects, both single and multifamily, of complying with Enterprise's Green Communities standards. They compared the costs of complying with the Green Communities standards in those cases where these standards were more restrictive than the local building code. Many of the projects surveyed, including six in Washington and Oregon, reported no additional cost due to the States' relatively stringent building codes. Washington currently requires all tax credit properties to comply with Enterprise's Green Communities standards.

Enterprise's study (Bourland, 2009) found that complying with the standards costs an average of $4,524 per unit and achieves a lifetime utility cost savings of $4,851. The measures therefore more than pay for themselves over their lifetimes. When the costs and benefits are disaggregated by type of measure, it is clear that the energy and water efficiency measures are cost-effective. These measures cost an average of $1,917 per unit and result in a lifetime savings of $4,851. All other measures included in the standards, such as building orientation and waste reduction, add some additional cost but do not have measurable lifetime cost savings.

Enterprise also compared the cost and benefit data among different categories of occupancy and different project types. They found similar compliance costs across all occupancy types but different payback periods due to different patterns of energy use in owner and renter units. They also found that, among project types, those that were moderate rehabilitation projects had the lowest cost of compliance and the highest return on investment, with the lifetime savings amounting to twice the projects' costs. Substantial rehabilitation projects had the highest costs and the highest lifetime savings. Predicted savings for new construction projects were 23 percent lower than the average of all projects, likely due to the fact that new projects would be meeting higher energy efficiency standards regardless of compliance with the Green Communities standards.

Enterprise's study (Bourland, 2009) also details the costs and benefits of complying with the Green Communities standards for water efficiency. The average cost of the water efficiency measures was found to be $80 per unit, with a lifetime savings of $352 to $935 per home. While many projects reported no additional cost for complying with water efficiency measures, those that did reported an average cost of $0.16 per square foot for water conserving appliances and fixtures, $0.36 per square foot for efficient irrigation systems and $0.22 per square foot for landscaping. The water conserving appliances and fixtures cost an average of $128 per unit and result in a 41 percent savings in water use, for a 2-year simple payback. Water conservation measures, then, require low upfront costs and reap substantial water savings.

Davis Langdon (2009) conducted an analysis and comparison of new construction costs for green and standard affordable housing projects in Seattle and Portland in 2009. Their study compared the costs of green rated projects, those complying with LEED or Built Green, to non-green projects. In Seattle, all affordable housing projects receiving funding from the City must meet the SeaGreen Affordable Housing guidelines which are greener than most building standards in the country. However, similar to their previous findings regarding commercial buildings, they find no statistically significant difference in project costs between green and standard affordable housing projects. The costs of the new construction green projects were scattered randomly throughout the range of costs of all of the projects, illustrating that there are high and low cost green buildings as there are high and low cost non-green buildings (Davis Langdon, 2009).

2.3 Barriers to Energy Efficiency

Several studies and reports attempt to explain why energy efficiency measures that pay for themselves through energy cost savings are not more widely implemented by building and homeowners. As stated above, McKinsey & Company (2009) describes the barriers to more widespread adoption as falling into three categories: structural, behavioral and availability. Structural barriers prevent energy end users from taking advantage of attractive measures. This includes the "split incentive" problem in tenant occupied buildings, in which the building owner must pay the upfront capital costs of energy efficiency measures that benefit the building's tenants. Behavioral barriers are those in which a lack of awareness or information blocks a measure's adoption. This is a significant barrier in that many building and homeowners do not know the cost-effectiveness and payback potential of energy efficiency measures that may seem costly to install. Availability barriers are those in which end users are interested and willing to pursue a measure but cannot access it, such as a building owner facing a lack of available financing for an energy efficiency retrofit.

Some of these barriers are overcome for commercial building owners by Energy Service Companies (ESCos) that contract with building owners to conduct and pay for energy efficiency retrofits and are paid back with the energy savings achieved. In these situations, ESCos guarantee the energy savings up front, perform the upgrade, pay the upfront costs and monitor the building after the retrofit is complete. Unfortunately, ESCos rarely undertake contracts for less than $1 million, leaving small- and medium-sized commercial buildings and residential buildings unable to take advantage of their services. In addition, if the energy savings achieved do not surpass those projected by the ESCo at the outset of the project, there could be no savings that accrue to the building owner, thus providing no incentive for undertaking such an endeavor (Abromowitz, 2008). There is a potential role for the Commission in addressing this barrier by creating a program by which small retrofit projects are aggregated and taken on by ESCos or other financing mechanisms, similar to the program currently being explored by the Commission and MacDonald Miller ESCo.

The split incentive barrier can be addressed with "green leases," in which tenants agree to pay higher rents in exchange for a landlord's investment in energy efficiency improvements that are projected to reduce utility costs. While many advocate using green leases to incent building owners to invest in energy efficiency retrofits, there is so far little evidence of their use or success at doing so.

Single family homeowners face a slightly different set of barriers to achieving energy efficiency: a lack of information regarding energy efficiency costs and savings; lack of available financing; high transaction costs; uncertainty regarding energy savings that will be achieved; and inability to find and/or choose a competent and qualified contractor.

Financial institutions are hesitant to make loans to building and homeowners for these retrofits due to: uncertainty about energy savings that can be achieved; difficulty in guaranteeing the work performed; difficulty in securitizing, underwriting and providing collateral for the loans; the fragmented nature and high transaction costs of providing small loans to many borrowers in different locations; and difficulty in guaranteeing that the loan will be paid back in the event the property is sold. There is also a lack of standard methods for conducting energy audits and retrofit evaluations, resulting in inconsistent findings and retrofit quality. Additionally, there are no standards in place for accounting for energy efficiency improvements in property appraisals, leading to property values not accounting for the benefits of these improvements and hesitancy by financial institutions to underwrite loans that are not associated with a specific value. Lastly, the terms of the loans financial institutions offer energy efficiency retrofits are often shorter than the term required for the energy efficiency measures to realize sufficient savings to pay off the loans.

Even when an energy efficiency loan program exists, the lack of awareness on the part of homeowners and building owners combined with the split incentive issue for tenant-occupied buildings, cause these programs to be underutilized. Fuller (2009) states that there were over 150 loan programs for energy efficiency retrofits of homes in the country in 2007. Most of these programs reached only 0.1 percent of their potential customers during that year.

Several alternative financing programs and products have been developed to address these barriers, including: on-bill financing, tariff installed programs, clean energy municipal financing of Property Assessed Clean Energy (PACE) programs, energy efficiency refinancing of existing mortgages and energy improvement mortgages for new homebuyers. In addition, some are working to expand the use of green leases for tenant-occupied buildings in which tenants agree to an increase in rent to help pay for energy efficiency improvements paid for by the landlord that will result in their reduced utility bills (Fuller, 2009).

Some are addressing these barriers by developing building scoring systems that rate buildings based on their energy efficiency in operations and maintenance (Prill, Kunkle and Novosel, 2009). Such systems can reduce the information barriers and potentially lead to higher rents and sales prices for green buildings, as renters and buyers will have standardized information on the operations cost savings associated with the building's energy efficiency. As described above, Washington's SB 5854, passed in April 2009, requires the creation of an energy efficiency scoring system for residential buildings and the reporting of energy usage for commercial and public agency buildings. This will effectively create a mechanism by which potential building buyers and tenants can rate buildings based on their energy use and adjust their prices and rents accordingly, which could serve to further incentivize energy efficiency improvements and potentially generate creation of new related financial programs.

Affordable rental housing faces unique barriers and opportunities in carrying out energy efficiency retrofits. Often, HUD-financed public housing projects cannot raise rents above specified levels and therefore cannot recoup the costs of the energy efficiency retrofit. In addition, there are often waiting lists for units that become available, thus preventing the project from enjoying the benefit of the faster absorption rates that green market rate rental projects report. In addition, HUD-financed public housing regulations such as those that prohibit third party investors, prohibit increased cash flow to accrue to the project owner and prohibit increased debt on the project, serve as barriers to investing in energy efficiency measures in these buildings (Davis Langdon, 2009).

On the other hand, affordable housing projects financed with Low Income Housing Tax Credits (LIHTC) can increase tenant-paid rent as utility allowances are reduced. With agreement from the Commission's tax credit compliance unit, LIHTC projects can calculate building-specific utility allowances and therefore increase their cash flow by reducing energy costs for tenants. This may increase the permanent mortgage for the property or increase its cash flow and residual receipts to the property's owners, thus providing incentive for undertaking these retrofits.

Section 3.0 Department of Energy Funding Status

The DOE provides funding for energy efficiency programs through several funding programs. DOE's available funding for energy efficiency has been increased and enhanced by appropriations and programs created through the American Recovery and Reinvestment Act (ARRA) of 2009. Below we summarize the status of DOE energy efficiency funding available for Washington.

Through ARRA, Washington State was awarded a total of 3,366 grants amounting to $3.15 billion in available funding. DOE is providing $2.15 billion of that funding (108 awards), of which $0.20 billion has been reported as received by awardees.

The total award for weatherization in April 2009 from DOE to Washington's Department of Commerce was $59.5 million. Of this allocation, Commerce allocated $46.3 million to 27 organizations to implement energy efficiency improvements to dwellings occupied by low income persons. As of January 2010, this project is listed by Recovery.gov as less than 50 percent complete with awardees reporting only $1.3 million in expenditures thus far. Information on the number of homes benefiting from weatherization funds is unknown at this time.

The total award from DOE for Energy Efficiency and Conservation Block Grants (EECBG) to the State of Washington is $10.64 million with $6.4 million to be used in competitive grants for small cities and counties. The State's EECBG Strategy also provides for $770,000 in Energy Efficiency in Transportation Planning grants and $750,000 in grants for Resource Conservation Managers to which all cities and counties may apply. Applications for the $6.4 million in competitive grants were due September 30, 2009. Applications for the Energy Efficiency in Transportation Planning grants were due October 26, 2009. The Resource Conservation Managers grants are on a first come, first served basis with the application period closing on January 15, 2010. Current expenditure amounts listed on Recovery.gov show $211,601 in expenditures under Washington's EECBG program.

Additionally, the State Energy Program (SEP) was allocated $60.9 million by DOE for energy efficiency and renewable energy projects. The State Legislature allocated $38.5 million of these funds to Commerce to administer the Energy Efficiency and Renewable Energy Loan and Grant Program. Commerce set aside $20 million for the first round of funding under this program, and received over 100 applications with requests totaling approximately $200 million. Nineteen projects were chosen to receive awards totaling $20 million on October 5, 2009. These projects included grants for a biomass cogeneration plant, food and yard waste anaerobic digestion, hydropower, wind power, use of nanomaterials to capture CO_2 gas, energy efficiency upgrades, gasification, and others. It appears that the projects do not focus specifically on energy efficiency with the exception of two projects that address energy efficiency in municipal buildings, and one project providing energy efficiency upgrades to a commercial building. Applications are currently being accepted for the second round of SEP funding, awardees of which will be under contract by June 2010 and funds will be expended by December 2010.

According to the State's application to DOE for SEP funding, the remaining SEP allocation will be used for the following programs:

- Community-Wide Urban Residential and Commercial Energy Efficiency Program: $14.5 million to be used for the development and deployment of at least three large neighborhood-based building energy efficiency projects, to be administered by the Washington State University (WSU) Energy Extension Program.

- The Farm Energy Assessments Program: $500,000 to be directed towards developing energy tools and training assistance to increase energy efficiency in the agricultural sector, to be developed by WSU Energy and others.

- The Energy Efficiency Credit Enhancement Program: $5 million to be directed towards credit enhancement mechanisms such as loan loss reserves and loan guarantees by financial institutions for use in leveraging funding for energy efficiency projects.

Expenditures under Washington's SEP are currently reported to be $431,763 by Recovery.gov.

Energy and technology funding through all competitive grants and loans and federal direct expenditures currently awarded to the State of Washington breaks down as follows:

Energy Research	$20,000,000
Facility Maintenance/Improvement	$2,332,000
Hydrologic Model	$645,542
Laser Research	$599,562
Photovoltaics	$8,594,818
Scientific Instrumentation	$679,161
Weatherization Assistance	$46,280,820
Biomass Fuels	$1,022,000
Bonneville Navigation Controls	$1,710,880
Computer System Design	$66,863
Dam Repair	$463,953
Energy Conservation	$339,831
Energy Design Services	$156,068
EECBG Formula	$18,173,360

Reporting of ARRA funding is conducted quarterly with the last reporting period ending September 30, 2009 though data is updated as made available. The expenditures cited here, therefore, are primarily through September 30, 2009.


Section 4.0 Designing an Energy Efficiency Retrofit Program

As detailed above, there are many barriers to increasing the numbers of building owners who invest in energy efficiency retrofits. Assuming the information barriers are overcome, and building owners recognize the benefits of making such an investment, attaining financing for the retrofit can be difficult as lenders face unique obstacles and challenges to providing financing for such retrofits. A statewide energy efficiency retrofit program can help reduce these barriers by providing information, approving contractors, attaining financing partners, establishing payback mechanisms, reducing transaction costs and establishing appraisal, audit, underwriting and construction standards. Below we detail the main process and policy issues surrounding the design of a coordinated energy efficiency retrofit program.

4.1 Information and Marketing

In order for an energy efficiency retrofit program to be successful, building owners must want to participate. A lack of information regarding the potential benefits of energy efficiency retrofits and who to contact to perform a retrofit, as well as a lack of understanding regarding the financial implications of energy efficiency measures all pose barriers to participation in a retrofit program. Overcoming these barriers requires outreach efforts to educate building owners about the potential benefits of energy efficiency improvements. However, many studies note that simply providing information to homeowners is not enough to get their participation. In fact, if lack of information were the only barrier, government incentives would not be necessary (Fuller, 2009).

Some programs have had success increasing participation by engaging in community wide, door-to-door outreach through a trusted local organization. This suggests that, along with providing information, the way information is provided is important for gaining the confidence of potential program users (Fuller, 2009).

There is also potential in using marketing campaigns to increase awareness about such programs.

Washington's average electricity rates are substantially lower than those in the rest of the country. While Washington's statewide average electricity rate in 2009 was $0.068 per kWh, California's was approximately $0.14 per kWh and the national average was $0.10 per kWh. Washington, therefore, with its relatively low electricity rates, faces unique barriers in convincing building owners that energy efficiency retrofits are worth the initial cost and effort. However, SB 5854's requirement that building owners report energy usage to potential buyers and that residential buildings are scored on an energy efficiency criteria may help overcome this obstacle.

4.2 Supply Chain Development and Certification

In order for a large-scale retrofit program to be successful, there must be adequate supply of qualified contractors available to perform the audits and retrofits. In some areas, this may require building the capacity of existing suppliers and providing them with training and workforce development. In others, recruiting and training new suppliers may be necessary. For the purposes of underwriting energy efficiency loans based on the future energy savings, lenders must have confidence in the quality of the work performed and the energy savings projected. Therefore, the program's design should contain provisions for certifying contractors that are qualified to perform the retrofits as well as the energy efficiency audits before and after the retrofits are completed. This certification may be based on past performance, contractors' qualifications, or a combination of the two. Some programs charge contractors a fee to be certified or to join the program's network.

Contractors must then be educated about the program, as they are the ones with the most contact with the building owners and likely will explain much of the program to its users.

4.3 Measuring and Monitoring

An effective retrofit program must develop a mechanism to measure and monitor the energy savings achieved. This will not only assure the program is meeting its goals, but will help future program users to project the energy savings that can be attained through a retrofit. This projection, and its validation through the performance of previous retrofits, is important in loan underwriting and in attaining financing partners. In addition, monitoring the performance of retrofits will assure that the work is completed as intended.

4.3.1 Guaranteeing Savings

A guarantee of the energy savings that a retrofit will achieve provides protection for a building owner in ensuring that his/her investment in the retrofit will pay itself off through energy savings. This guarantee is also important in attracting financing partners for the retrofit program. A retrofit program could require such a guarantee from its contractor partners.

4.4 Financing

4.4.1 Protections for Lenders

Lenders have concerns in underwriting loans for energy efficiency retrofits, in part because no commonly-accepted underwriting standards for such loans exist. A centralized energy efficiency retrofit program could establish these standards and thus make financing more available to the program's users. Such standards could establish a minimum threshold rate of return or payback period for efficiency measures to ensure that only those measures representing the highest value investments are undertaken and that energy savings will exceed loan repayment obligations. This reduces the risk to lenders and building owners of project failure. Measuring and monitoring the savings achieved through the retrofits is an essential element of establishing these underwriting standards.

Lenders also face challenges in securing their loans for energy efficiency retrofits. They may require a lien on the property to secure their loan but may not accept a lien subordinate to the primary mortgage. Alternatively, Tariffed Installation Programs (TIPs) or on-bill financing programs attach the retrofit's loan payments to the building's electricity meter. In these programs, the building owners' loan payments are included on their utility bills and the utility provider's ability to disconnect power in the event of nonpayment is used as security for the loan. These programs require high levels of cooperation with utility companies. Other programs use Property Assessed Clean Energy (PACE) financing mechanisms, in which the loan payment is included on the property's tax assessment. In these cases, like property taxes, the assessment has priority over the property's mortgage payment. In the event of nonpayment, the local government can foreclose on the property.

Potential lenders also have concerns regarding the obligation to repay the retrofit loan in the event the property is sold. Rigorous underwriting standards could address this, in that such standards would ensure that only high value energy efficiency measures, those that increase the property's value, are undertaken. On-bill financing programs overcome this obstacle, as the obligation to repay is passed on to the next building owner through their utility bill. PACE programs similarly address this as the obligation to repay remains with the property when it is sold and is assessed to the next owner through their property tax bill.

A centralized, coordinated retrofit program could address these concerns by establishing rigorous underwriting standards, exploring financing mechanisms that provide alternative security for lenders and providing loan guarantees or loss reserves to provide added security for lenders. Aggregating many small retrofit loans may also address some financing barriers, as a larger loan representing a group of projects may be able to secure lower interest rates and reduced transaction costs than many smaller individual loans. Another potential benefit of aggregating retrofit loans is that ESCos may be more willing to undertake retrofits and their financing for aggregated groups of small projects.

4.4.2 Loan Term

Another obstacle to obtaining financing for retrofits is the standard loan term offered by lenders. Often these loans carry terms of 5 to 7 years while the retrofits' payback periods are 7 to 10 years. In order for a building owner to successfully pay back a retrofit loan, the term must be aligned with the payback period of the retrofit. This alignment, along with a contractor's guarantee of energy savings that will be achieved by the retrofit, will provide for the ability of the owner to repay the loan as well as comfort for the lender in providing the loan.


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