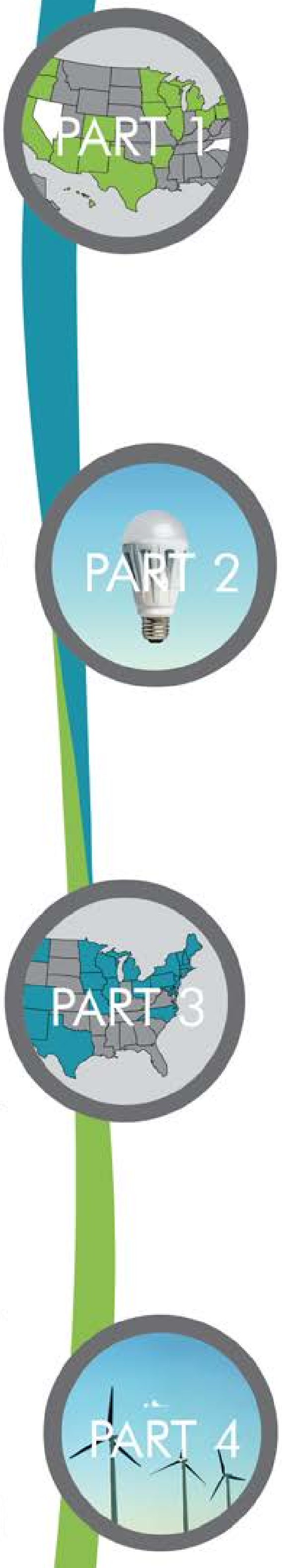
SUMMER SERIES



PART 2

State Policies to Expand Market Certainty for Energy Efficiency without an Energy Efficiency Resource Standard

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In the previous paper in this series, *Driving Energy Efficiency Markets: The Conventional Approach*, the Center for the New Energy Economy (CNEE) provides empirical data demonstrating that state adoption of EERSs has slowed and that, without policy maintenance, many will expire in the coming years. This will be a natural decision point for states as they evaluate whether to continue EERSs, which have largely been successful in driving deployment, and/or look to new policy approaches.

In this second paper, Advanced Energy Economy Institute (AEEI) and CNEE identify 21 policies that level the playing field for energy efficiency and allow it to be deployed at scale either in conjunction with, or in the absence of, an EERS. This paper also provides exampes of best practices of these policies in select states in an attempt to help policy-makers think beyond the EERS when it comes to energy efficiency.

Jeff Lyng, J. Cook, J. Culkin, C. Edmonds,
K. H. Hoffer, D. Manning, and T. Plant

CENTER FOR THE NEW ENERGY ECONOMY

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1. About This Series

Since the late 1990s, state Renewable Portfolio Standards (RPS) and Energy Efficiency Resource Standards (EERS) have been the largest drivers of the renewable energy and energy efficiency sectors. However, state target dates are quickly approaching: by 2026, 29 RPS and 12 EERS policies will need to be extended or replaced in order to maintain market certainty for continued investment and business growth. In this paper series, the Center for the New Energy Economy analyzes energy efficiency policies (Parts 1 and 2) and renewable energy policies (Parts 3 and 4). Parts 1 and 3 discuss the prospects for extending and enhancing established policies and Parts 2 and 4 propose innovative options that could work with or without an EERS and RPS.

2. Introduction

Energy efficiency, broadly defined, means using less energy to provide the same service. Energy efficiency is the least cost resource available to both consumers and utilities to meet the energy needs of today and in the future. Energy efficiency is not only cost-effective, it also provides grid-wide benefits such as improved resiliency and reliability, and lower system operating costs – all at relatively low risk. Moreover, there is reason to believe that ongoing technological innovation will further drive down the cost of energy efficiency improvements and offer even greater savings and improved grid performance. Considering these myriad benefits, it is not surprising that energy efficiency is already being deployed, at some level, by every state in the country.

Nevertheless, energy efficiency deployment lags behind what is economically achievable due to a wide range of barriers. These are primarily policy barriers which vary from state to state. For example, in some states, there is a disincentive for electric power utilities to invest in energy efficiency because, as ratepayers consume less electricity, utilities lose revenue from sales to those customers. In other states, consumers may lack the knowledge or resources to invest in energy efficiency measures, despite it being in their best interest. In order to overcome these barriers, states must implement policies supporting energy efficiency, thereby creating market certainty for services and products that reduce energy consumption.

Historically, the most common way to advance energy efficiency has been via a legislative or regulatory mandate – known as an energy efficiency resource standard (EERS) – which require utilities to save a certain amount of energy per year. EERS policies have been successful in driving efficiency deployment, but, they are beginning to hit their target dates at the same time that energy efficiency markets are maturing. Consequently, many states are looking for ways to increase the market certainty for energy efficiency in a way that would complement an EERS but do not necessarily require one to be in place. This paper focuses on that suite of policy options.[1]

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[1] For a discussion of EERSs, see the first paper in our series entitled, *Driving Energy Efficiency Markets, a conventional approach*.

3. The Benefits of Energy Efficiency

Energy efficiency is widely recognized as a least cost resource. It is also increasingly viewed as a low risk resource. We explain these two concepts in this section. Figure 1 (below) compares generation resources in terms of a single numerical measure of their respective costs. This measure, the levelized cost of energy (LCOE), represents the cost per megawatt hour (MWh) of energy over the life of a plant and encompasses all expected costs during that lifetime including capital costs, fuel costs, as well as operations and maintenance costs.[2] Among every other common generation resource, energy efficiency is virtually always the least cost.

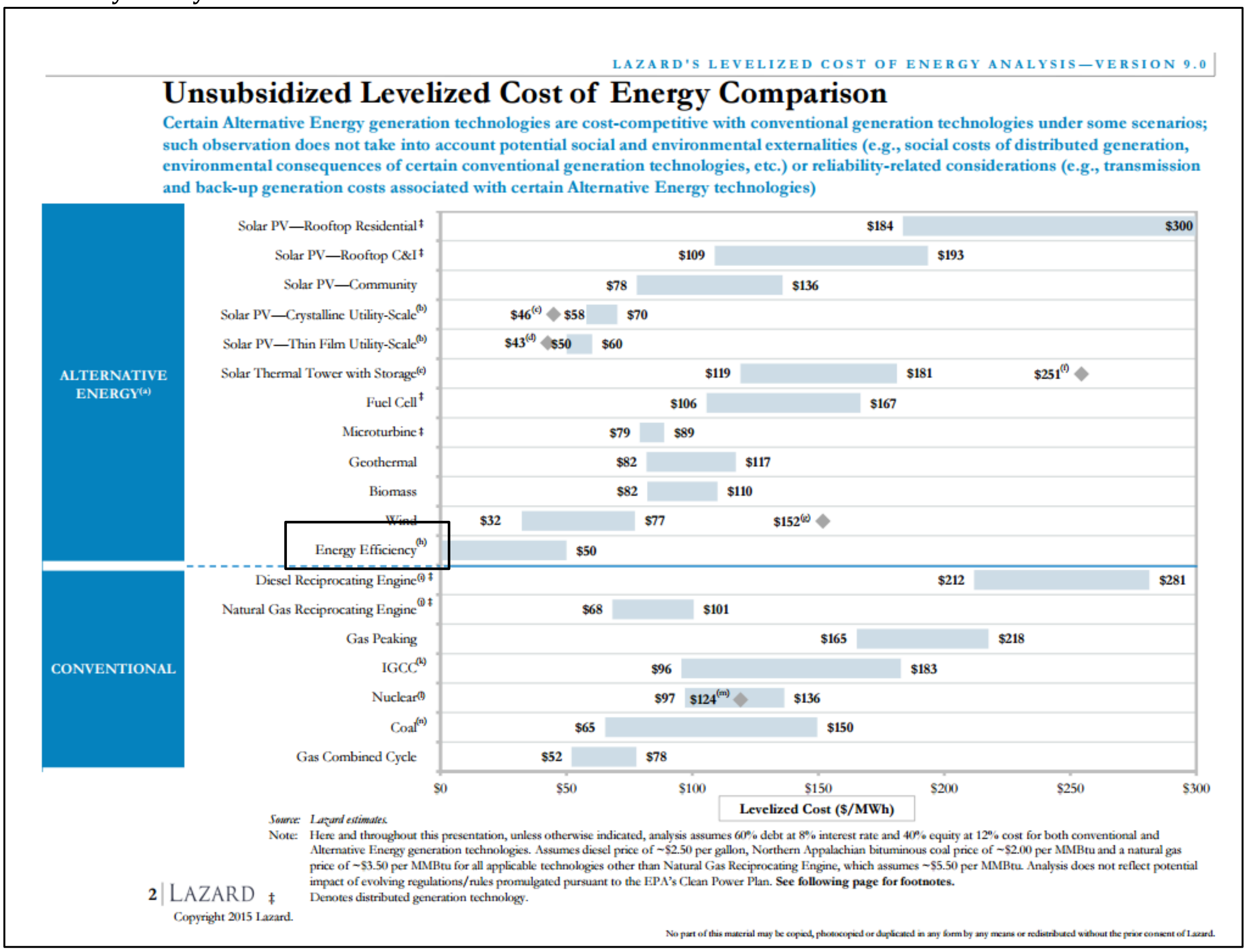


Figure 1. Levelized Cost of Energy Comparison, Version 9.0 (Lazard, 2015)

There are many different types of risks associated with investment in electricity generation assets. Figure 2 (below) outlines two major types of risk: cost-related risk and time-related risk. Cost-related risk reflects the risk that investments will cost more than originally expected, or that cost recovery for those investments will be different from original expectations. Examples of cost-

[2] Lazard's Levelized Cost of Energy Analysis—Version 9.0 (Lazard, November 2015) https://www.lazard.com/media/2390/lazards-levelized-cost-of-energy-analysis-90.pdf.

related risks include higher than expected construction costs, or fuel price fluctuations. Time-related risks reflect the possibility that circumstances will change over time and will do so in a manner that affects the cost-benefit calculation for the investment.[3] Examples of time-related risks include new environmental regulations or longer than expected construction times.

Figure 2. Projected Utility Generation Resources in 2015: Relative Costs and Relative Risk (Ceres, 2015)

Energy efficiency also carries the least amount of financial risk compared to other investments in electricity generation. A recent analysis, *Practicing Risk Aware Regulation*, explores the inherent risk of utility and regulator asset decisions. Figure 2 depicts utility generation options plotted in relation to their LCOE and relative risk. Energy efficiency has both the lowest LCOE and lowest risk. This is especially true compared to investment in conventional generation assets which may experience fuel price fluctuations or long, complex construction timelines that cause unexpected increases in cost.

[3] Ibid.

Cost-related	Time-related
Construction costs higher than anticipated	Construction delays occur
Availability and cost of capital underestimated	Competitive pressures; market changes
Operation costs higher than anticipated	Environmental rules change
Fuel costs exceed original estimates, or alternative fuel costs drop	Load grows less than expected; excess capacity
Investment so large that it threatens a firm	Better supply options materialize
Imprudent management practices occur	Catastrophic loss of plant occurs
Resource constraints (e.g., water)	Auxiliary resources (e.g., transmission) delayed
Rate shock: regulators won't put costs into rates	Other government policy and fiscal changes

Figure 3. Varieties of Risk for Utility Resource Investment (Ceres, 2015)

While there is a strong argument for energy efficiency as a least cost and least risk resource, policy barriers exist in every state. Furthering a public policy objective of using electricity more efficiently requires deliberate policy and, often, ongoing policy maintenance. In the sections that follow, CNEE and AEE explore a wide range of policy options that promote market certainty for this least cost, least risk resource.

4. Policy Approaches

In this section, we discuss a range of state policies, some conventional, some unconventional, that create market certainty for investments in energy efficiency. These policies can act as a complement to an EERS but can also be implemented independent of one. The policies are divided into five groups: regulatory mechanisms, financial programs, technology-specific energy efficiency, improving administration of existing programs, and investment in low-income communities. The degree to which these policies can be implemented varies by state and, depending on how a state's energy markets are organized, may be implemented under the jurisdiction of different governmental bodies. The next section provides a list of examples drawn from successful implementation of these policies in a number of states.

A. Regulatory Mechanisms

One of the most common ways for energy efficiency to be deployed is through utility programs, often referred to as demand side management (DSM). This portfolio of programs is funded by ratepayers and overseen by state economic regulators (public utilities commissions, or their equivalent). Likewise, the utility incentive policies refer to incentives that would apply to investor owned utilities – where regulatory bodies control the rate of return on equity. These programs are often designed to achieve compliance with energy efficiency mandates such as an EERS. However, public utilities commissions have many other regulatory tools at their disposal that can encourage utilities to invest in energy efficiency. The following policies are regulatory mechanisms that achieve this objective.

1. Decoupling

Arguably, one of the biggest barriers to energy efficiency investment exists because of the alignment of energy sales with utility revenue earnings. Utility commissions set electricity rates. In some states, the ratemaking process provides utilities with an incentive to increase the sale of electricity—this same incentive acts as a disincentive to invest in energy efficiency. This barrier can be removed through the ratemaking process in what is known as decoupling.

Decoupling is widely viewed as the foundational policy for removing the disincentive for utilities to invest in energy efficiency. Utilities are allowed a regulated rate of return (RoR) from ratepayers on all of their investments that are obtained by revenues from ratepayers. This return is traditionally based on volumetric sales – for electricity, the amount of kilowatt hours sold. In states that are not decoupled, a decrease in electricity use results in lower revenue, which threatens the utility's RoR.

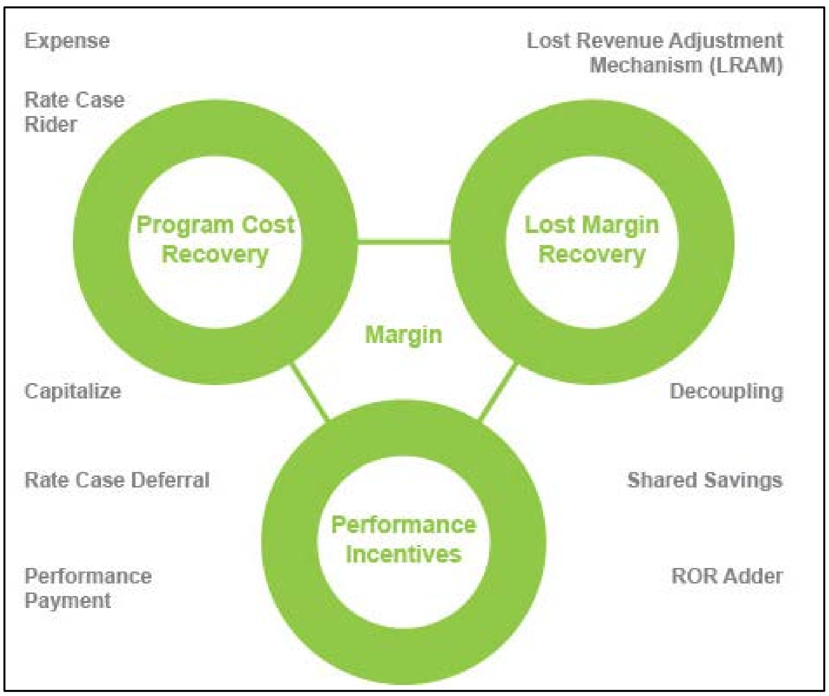


Figure 4. Program Cost Recovery and Performance Incentive Options (American Electric Power, 2016)

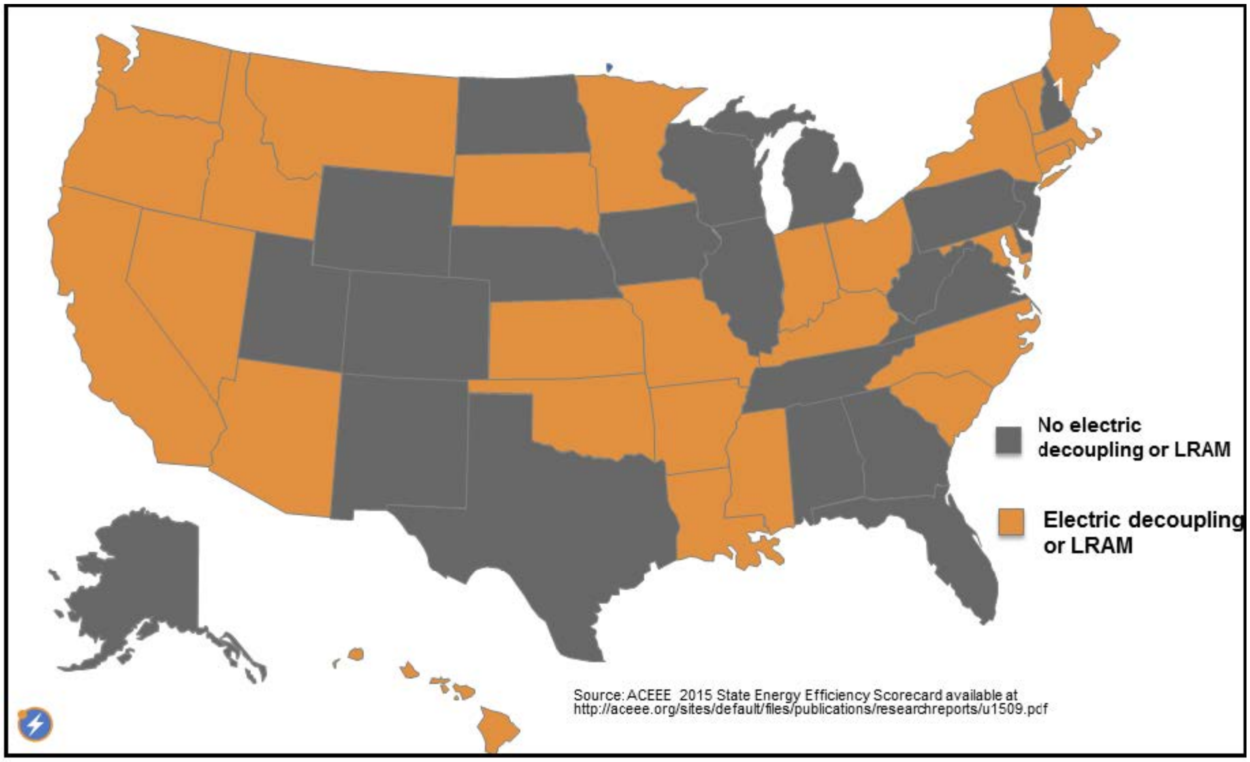


Figure 5. States with Electric Decoupling in the USA, March 2016 (AEE, 2015)

Decoupling flips this relationship on its head: it separates utility revenue from electricity sales and, instead, sets electricity rates in a way that ensures utilities receive their approved RoR. In this way, decoupling removes the disincentive for utilities to implement energy efficiency versus generating and selling that energy to customers. For this reason, decoupling is widely viewed as a foundational policy for energy efficiency.

Decoupling is sometimes achieved in the form of a lost revenue adjustment mechanism (LRAM). With an LRAM, the state utilities commission determines the volume of declining sales attributable to energy efficiency programs and calculates the marginal revenues lost to the utility due to those measures. The utility is then able to collect the lost revenue through an LRAM rider on utility bills.

It is important to note that decoupling, LRAMs, and program cost recovery simply get utilities to a point of indifference toward energy efficiency; they do not create an incentive for utility investment in energy efficiency. While it is important for utilities to recover the costs of their programs and investments, an incentive to invest is created by allowing utilities to earn a return on an investment. We discuss utility incentives in the next section.

2. Utility Incentives

Decoupling is really only one leg of a three-piece policy stool for motivating utilities to invest in energy efficiency (see Figure 4). Timely and full recovery for the cost of energy efficiency programs – staff time, rebates paid to consumers, etc. – is also a minimum requirement. The final leg is to establish some form of incentive for the utilities to invest in energy efficiency, often referred to as a performance or net economic benefit incentive. It is important to note that in order for utilities to fully embrace energy efficiency, all aspects of this three-policy suite need to be in place. Recovering costs, removing the disincentive from lost sales revenue and some form of investment incentive to invest all need to be in place.

There are three types of utility financial incentives that states have implemented: shared net benefits, savings-based, and multifactor benefits.[4] The shared net benefits approach allows a utility to earn a portion of the benefits accrued from a program; an energy savings-based incentive stipulates specific program targets and rewards a utility financially for achieving savings goals; multifactor mechanisms assess the impact of a program on a number of different objectives in addition to energy efficiency goals. These three approaches have their advantages and disadvantages (see Figure 6), and some may be more appropriate in one state than in another. Regardless of which type of performance-based incentive a state adopts, the important thing is they will help utilities see energy efficiency as a resource worth proactive pursuit.

[4] Only New Mexico uses rate of return incentives.

Policy Type	Strengths	Weaknesses
Shared Net Benefits	*Multiplies financial rewards to the utility to maximize cost effective energy savings. *Higher financial incentive relative to energy efficiency spending (may also be considered a negative).	*Excessive resources could be allocated to programs or customer classes with the most cost-effective savings opportunities, leading to potential inequities among customers. *May be more uncertainty in the measurements used to determine award, such as measurement or avoided cost. *May not promote deeper savings, which tend to be more expensive and have fewer net benefits.
Savings-Based	*Ties dollar incentive amounts directly to energy savings achieved. *Rewards effective program performance.	*May encourage simply meeting the minimum stipulated savings rather than maximizing the achievement of cost-effective energy efficiency measures. * May lead to disproportionate investment in programs and technologies with the largest energy savings opportunities, such as lighting.
Multifactor	*Integrates the incentive mechanism more fully with policy goals beyond the bounds of energy efficiency. *Can serve to focus utility and administrative attention on specific targeted objectives.	*Mechanism and process may become complicated to plan, administer, and regulate.

Figure 6. Strengths and Weaknesses of Various Types of Performance Incentive Mechanisms (Data recreated from ACEEE, 2015)

3. Make Energy Efficiency First in Utility Resource Loading Order

In order to match the supply of electricity with demand, grid operators often follow a pre-established loading order that prioritizes which assets will be used first to meet additional demand. By requiring that utilities consider energy efficiency as a "first-in" resource, state loading order policies can specifically prioritize energy efficiency and demand response in capacity and dispatch planning. This kind of policy requires system planners to consider energy efficiency as a resource alongside electric generation, moving energy efficiency and demand response investments from the margin of grid operations to the center.[5]

[5] Sylvia Bender et al, *Implementing California's Loading Order for Electricity Resources* (California: California Energy Commission, 2005) http://www.energy.ca.gov/2005publications/CEC-400-2005-043/CEC-400-2005-043.PDF , E-1.

When applied effectively, loading order policies can serve to defer new generation investments or to displace generation from existing plants. Additionally, demand response programs that target peak demand reductions can improve electricity price stability and reduce the need for costly peak generation investments.

Loading order policies can also be used to address anticipated load growth by expanding energy efficiency investments. As an example, the Northwest Power and Conservation Council's Seventh Power Plan predicts that energy efficiency and demand response can be utilized in such a manner as to meet almost all of the region's expected growth in energy and capacity needs through 2035.[6]

4. Appropriate Application of Cost-Effectiveness Tests

In order to ensure that energy efficiency investments are less expensive than new generation investments, every state employs some sort of cost-effectiveness evaluation. Many policy makers will start from the perspective that investments in energy efficiency must be "cost-effective" – but there are many varying approaches to determining cost effectiveness. Furthermore, the most widely deployed test, the Total Resource Cost Test, has also been shown to be the least accurate.

There are five standard cost-effectiveness tests for energy efficiency programs.[7] These tests vary in terms of how costs and benefits are calculated, and in how those costs and benefits are distributed among ratepayers and utilities. An energy efficiency measure may be considered cost-effective under one test, while the same measure would not be under a different test.

- Total Resource Cost Test (TRC). Originally known as the All-Ratepayer Test, this test examines efficiency from the viewpoint of an entire service territory. This test compares the program benefits of avoided supply costs to costs for administering a program and the cost of upgrading equipment. When a program passes the TRC, this indicates total resource costs will drop, and the total cost of energy services for an average customer will fall.
- Ratepayer Impact Test (RIM). Originally known as the Non-Participant Test, RIM is also known as the "no losers test." The RIM tests from the viewpoint of a utility's customers as a whole, measuring distributional impacts of conservation programs. The test measures what happens to average price levels due to changes in utility revenues and operating costs caused by a program. A benefit/cost ratio less than 1.0 indicates the program will influence prices upward for all customers. For a program passing the TRC but failing the RIM, average prices will increase, resulting in higher energy service costs for customers not participating in the program.
- Utility Cost Test (UCT). Also known as the Program Administrator Test (PACT), this test measures cost-effectiveness from the viewpoint of the sponsoring utility or program

[6] Northwest Power Conservation Council. 2016. Seventh Power Plan Summary. https://www.nwcouncil.org/energy/powerplan/7/home/.

[7] These five tests are explained in detail in the California Standard Practice Manual: Economic Analysis of Demand-Side Programs and Projects (2001). http://www.calmac.org/events/spm_9_20_02.pdf.

administrator. If avoided supply costs exceed costs incurred by the program administrator, average costs decrease.

- Participant Test (PCT). This test measures benefits and costs to customers participating in demand-side management (DSM) programs. The test compares bill savings against incremental costs of the efficient equipment. It measures a program's economic attractiveness to customers and can be used to set rebate levels and forecast participation.
- Societal Cost Test (SCT). A variation of the TRC, this test expands the program assessment from the service territory to society's perspective. The TRC and the SCT differ in two important ways: 1) while the TRC uses an average cost-of-capital discount rate, the SCT uses a societal discount rate; and 2) the SCT also includes all quantifiable benefits attributable to a program, such as avoided pollutants, water savings, detergent savings, and other non-energy benefits.[8] By far the most commonly used of the five tests is the TRC. Stated simply, the TRC test is a measure of the total program benefits (for participants and non-participants) divided by the total program costs (for participants and non-participants). Importantly, the TRC test considers both ratepayer-funded incentives and individual customer costs as the "total cost" in determining cost effectiveness.

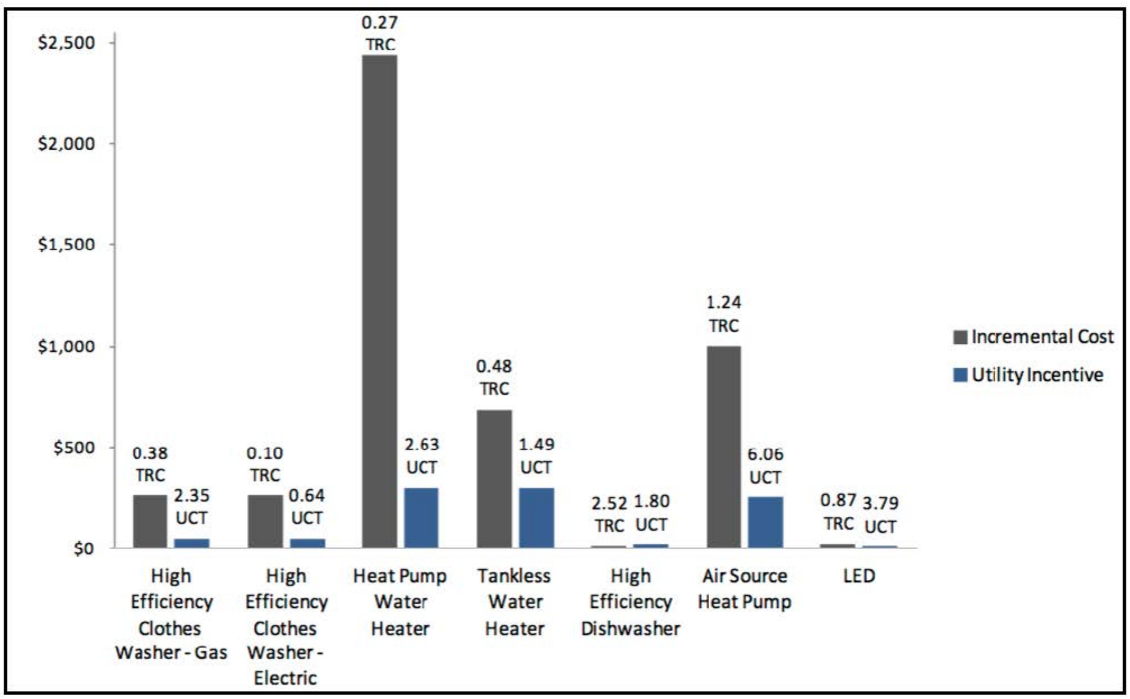
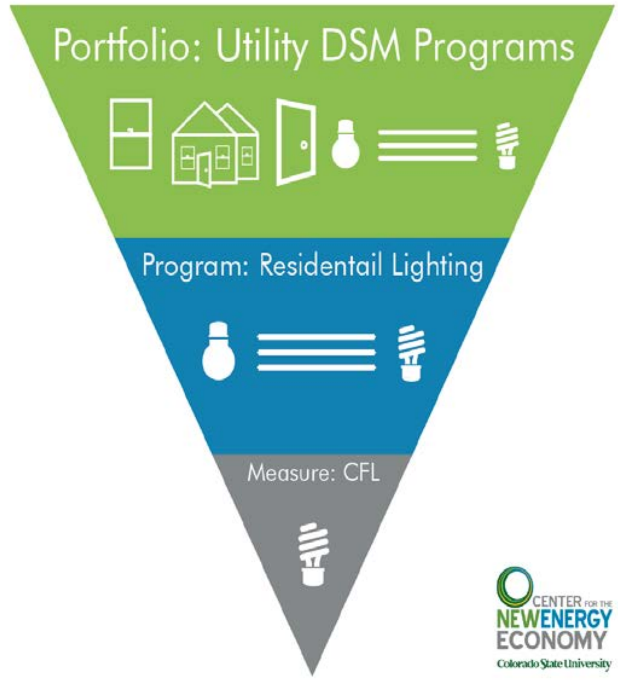


Figure 7. Incremental Cost Summary vs. Utility Incentive by Measure (data recreated from The Cadmus Group, 2012).

[8] *California Standard Practice Manual: Economic Analysis of Demand-side Programs and Projects* (California: Governor's Office of Planning and Research, State of California,2002). http://www.calmac.org/events/spm_9_20_02.pdf

A recent analysis by the Cadmus Group suggests that applying TRC for both program approval and for utility cost recovery may under credit the value to program non-participants. The Cadmus Group, instead, proposes testing DSM programs with the TRC when compared to supply-side resources, and relying on the Utility Cost Test (UCT) for program approval and cost recovery. In this way, only the costs to all ratepayers (the rebate level, essentially) would be considered in determining the application of ratepayer funds, not the cost to participating customers[9], allowing for small ratepayer-funded incentives to stimulate investments by program participants. The Cadmus Group further argues that participation rates by customers are a better metric of whether, from the customer's perspective, benefits outweigh costs to participate in a given program.[10]



5. All Cost-Effective Requirement

An "all cost-effective" requirement obligates energy efficiency program administrators to fully fund and implement all energy efficiency programs that are deemed cost-effective (see previous section on the application of cost-effectiveness tests). As of 2014, California, Connecticut, Maine, Massachusetts, Rhode Island, Vermont, and Washington had implemented all cost-effective requirements. The American Council for an Energy-Efficient Economy (ACEEE) has found a correlation between all cost-effective requirements and higher state energy efficiency targets (see Figure 8). This suggests that the presence of an all cost-effective requirement

A note about measures vs. programs. vs. portfolios

These three terms are commonly used interchangeably; however, they mean different things in the utility DSM world. Let's look at an example – Utility's compact fluorescent bulb rebate program. The CFL bulb is a "measure". The program is Residential Lighting and the Portfolio would be Utility's DSM Portfolio. Cost benefit tests are typically applied at the program level.

[9] It should be noted here that while customers may value energy savings in their decision-making process, there also may be numerous other factors the customer sees as a benefit that does not fit within a utility's cost effectiveness calculation.

[10] Elizabeth Daykin, Jessica Aiona, Brian Hedman, *Whose Perspective? The Impact of the Utility Cost Test* (Portland: The Cadmus Group, 2012) http://www.cadmusgroup.com/wp-content/uploads/2012/11/TRC_UCT-Paper_12DEC11.pdf.

allows states to achieve higher energy savings levels. Looking across the country at just these two policies together, one can appreciate the patchwork of policies that are currently in place (see Figure 9).

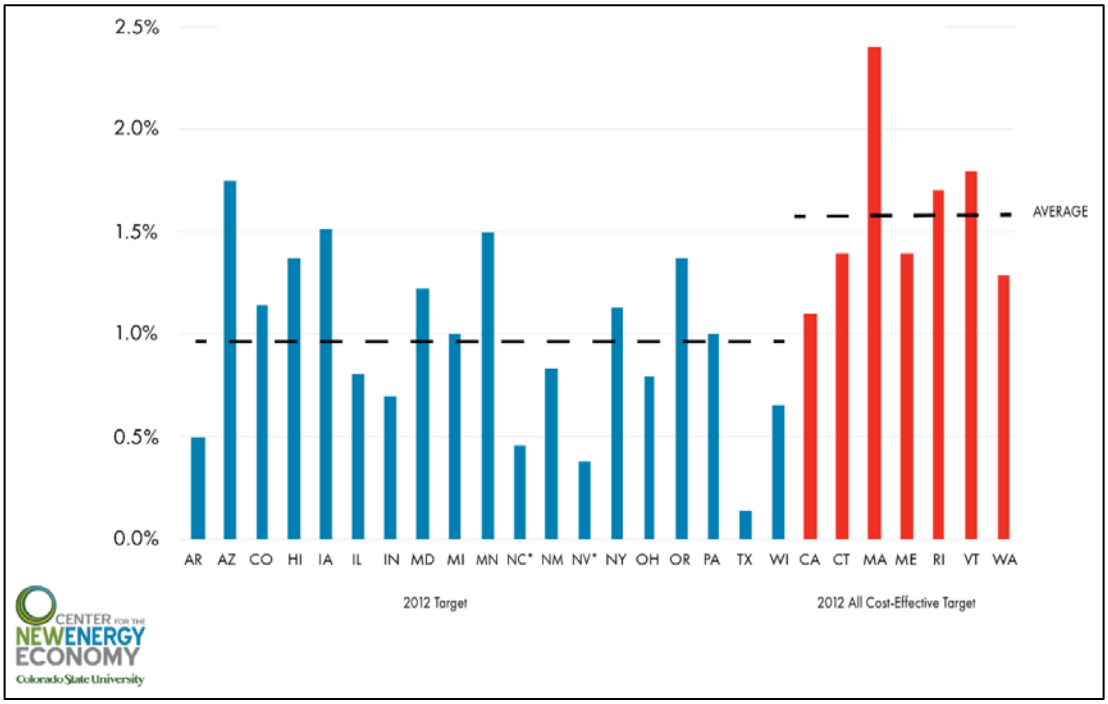


Figure 8. Incremental Electricity Savings Targets (data recreated from ACEEE, 2014)

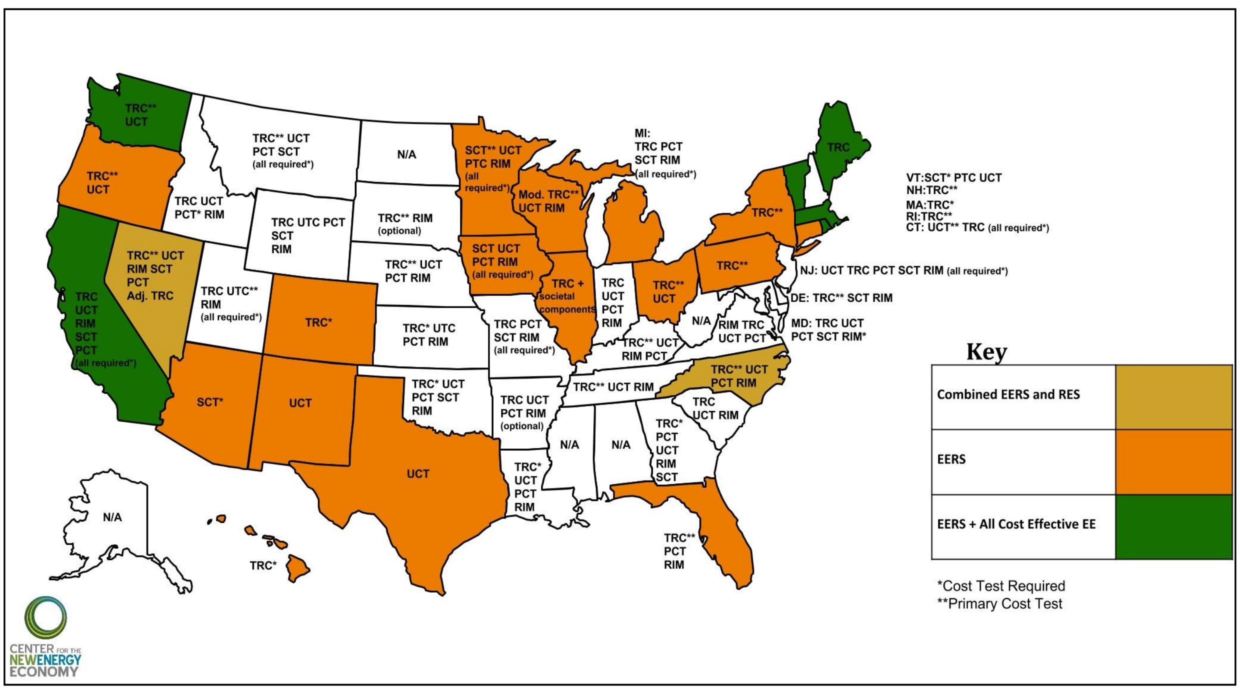


Figure 9. Cost Benefit Tests and All Cost-Effective EE (data recreated from ACEEE)

6. Conducting Energy Efficiency Potential Studies

Energy efficiency potential studies are the process for evaluating the potential of energy efficiency in a given utility service territory. There are three layers (see Figure 10) of energy efficiency potential: **Technical potential** represents the combined savings of all measures that can physically be installed. **Economic potential** is all of the technically feasible measures that are also cost effective. Finally, **Achievable Potential** consists of the technical and cost effective measures that can be captured under current market and adoption conditions, including statutory and regulatory limits on energy efficiency spending. The third layer—achievable potential—is really the most useful to policy makers because it is a prediction of the realistic level of energy savings. This percentage informs energy efficiency program planning, goal setting, and resource planning.

The Department of Energy (DOE) has catalogued potential studies in each state since 2007 and finds that the average achievable potential is between 1.5% and 2%, with 60% of studies showing an annual, achievable savings rate between 1% and 2.5%.[11]

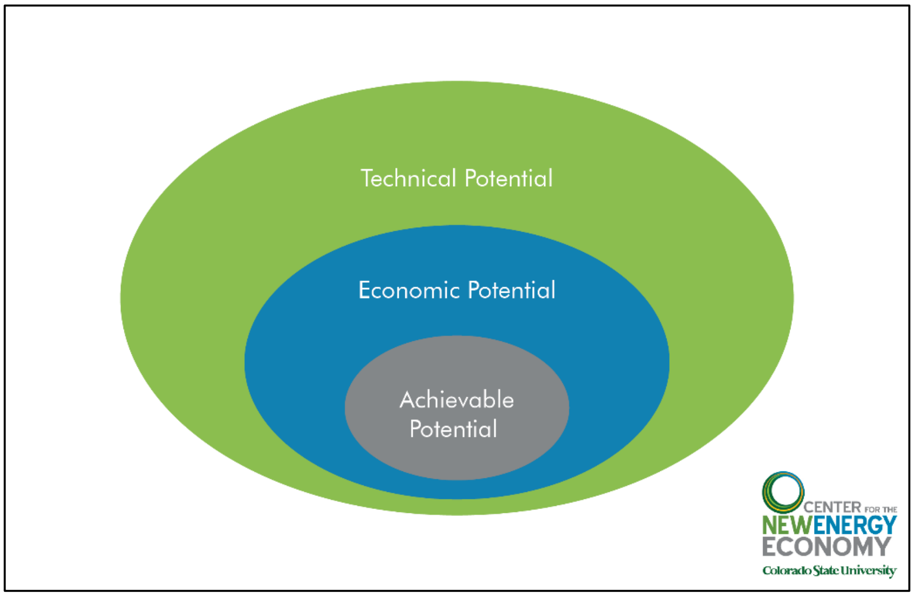


Figure 10. Scope of Achievable Potential Studies

[11] Department of Energy, "Energy Efficiency Potential Studies Catalog," 2015. http://energy.gov/eere/slsc/energy-efficiency-potential-studies-catalog.

Energy efficiency potential studies have a range of costs and levels of detail depending on their purpose.[12] The least detailed potential studies build a general case for energy efficiency with a high level of aggregation. Other potential studies seek alternatives to supply-side investments and have an intermediate level of depth. The most comprehensive potential studies are used for designing and planning the specifics of energy efficiency programs. These latter two cases are most often commissioned by regulators and utilities as part of an integrated resource plan (IRP). Some states direct utilities to perform an analysis of cost-effective energy efficiency on a regular schedule, while others are more intermittent. In either context, regulators require potential studies in demand-side management dockets which carry over to the IRP and go on to inform the utility's rate case. Because most utilities include demand-side resources such as energy efficiency only to the level that meets statutory and regulatory directives, sound predictions from energy efficiency potential studies are essential to providing utilities with a fair energy efficiency threshold.

B. Financing Programs

In addition to the regulatory barriers identified in the previous section, energy efficiency also has upfront financial barriers to adoption at the consumer level. Take a utility-funded appliance rebate program, for example. A utility customer pays the full cost of a more expensive, higher efficiency appliance and then must apply for and wait to receive a rebate from the utility's program, which they may receive weeks after the purchase. Even for measures with relatively quick payback periods, consumers may be unwilling to make these investments due to the upfront cost barrier. At its essence, this is really a cash flow problem.

States have many options at their disposal to empower consumers to bring forward future savings with wiser energy investments today through innovative financing. This section explores some of those options.

7. On Bill Financing/On Bill Repayment

One way to overcome the issue of upfront costs is through on-bill repayment (OBR) or on-bill financing (OBF) - two mechanisms for financing residential and small commercial investments. OBR/OBF programs offer consumers the ability to install energy efficiency measures and repay them over time through a charge on their monthly utility bill. The upfront capital for the energy efficiency measure can either come from the utility itself (OBF), or through a private third party (OBR). Either way, the cost of the energy efficiency measure is amortized and combined with the savings from the measure in the utility bill. The energy savings happen immediately, while the customer pays for them over time. In this way, it is not unheard of for participants to be net cash flow positive in the first month of the program. The most successful OBR/OBF policies have a dedicated source of funding such as a loan loss reserve, private funding (either open source access by multiple lenders or closed source to a single lender), utility ratepayer funds, or another funding source.[13]

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[12] Environmental Protection Agency, "Guide to Conducting Energy Efficiency Potential Studies," 2007. https://www.epa.gov/sites/production/files/2015-08/documents/potential_guide_0.pdf.

[13] For more information, review CNEE's OBF and OBR policy brief.

8. Residential and Commercial Property Assessed Clean Energy (PACE)

Property assessed clean energy (PACE) is another mechanism that can be used to overcome the barrier of upfront costs to residential and commercial property owners. It is also a way to make loans available to customers who may lack the credit to secure a conventional loan. PACE financing allows qualified energy improvements, such as energy efficiency, to be financed in the same way that other public infrastructure investments are financed. Here is how it works – a local government issues a bond to fund a portfolio of energy improvements. Homeowners evaluate their options through an energy audit and select which measures they would like to have installed and financed. The improvements at each premise are then bundled into an "assessment" on the property. Repayment of the assessment is through a line item on a participant's property tax bill. In this way, the municipal bond is repaid by participants of the program. Loan repayment responsibility transfers to the next owner if the property is sold. PACE financing is typically implemented by local governments, although states may need to pass authorizing legislation for local governments to issue bonds by creating taxing districts.[14]

In 2008, Colorado and California passed the first PACE legislation, allowing households to finance energy improvements on their homes through a simple assessment on their property tax bill. The revenue collected was bonded to finance energy improvements, creating a seamless and easy process for homeowners. Shortly thereafter, 30 states followed with their own PACE legislation and programs began popping up around the country.

In 2010, the Federal Housing and Finance Agency (FHFA) issued a letter saying that Fannie Mae and Freddie Mac could not guarantee mortgages on homes that included a PACE loan. While states had structured their PACE programs in different ways, some states had given PACE assessments seniority over mortgages just as they would with other property tax assessments. FHFA would not allow federally-backed mortgages to take second position to PACE loans in the event of foreclosure. This action by the FHFA effectively stopped residential PACE in one pen stroke.

Since then, the Obama administration has been working with financing experts, the FHFA and other stakeholders to try and solve this thorny problem. New FHFA guidance,[15] issued July 19, 2016, clarifies that the PACE assessment does not take first lien position ahead of a mortgage and that the assessment transfers with the property itself. It also requires home appraisers to factor in PACE-related improvements in the value of the property. This clarity is the linchpin that states and municipalities needed to begin, once again, offering a valuable service to their residents.

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[14] For more information, review CNEE's R-PACE and C-PACE policy briefs.

[15] *Mortgagee Letter 2016-11*, (Washington, DC: U.S. Department of Housing and Urban Development, 2016) http://portal.hud.gov/hudportal/documents/huddoc?id=16-11ml.pdf.

9. Revolving Loan Funds

Revolving loan funds (or “evergreen” funds) provide loans for energy efficiency improvements in a way that reduces risk for loan providers. The distinguishing characteristic of these public funds is that the repaid principal and interest from loans made are re-issued to other loan recipients. In this way, the program funding “revolves” over time. Some of these programs incorporate a loan-loss reserve, where a percentage of a program or project (for example, 10% of the principal) is held in reserve and only drawn in the event of a default. These programs are used to leverage or reduce the risk of private capital investment in energy efficiency and other clean energy projects. Finally, a few aggregator programs exist such as the Warehouse of Energy Efficiency Loans (WHEEL) that bundle un-securitized loans offered by private sector lenders with an interest rate buy-down from a public funding source, as under the American Recovery and Reinvestment Act.[16] The loans are then bundled and sold to the secondary bond market replenishing the loan fund.[17]

10. State Green Bank

A green bank blends public and private capital to fund the upfront cost of clean energy improvements. The intent is to reduce the risk for investors and to scale the market for projects. Sometimes these banks will attempt to address a limitation in the private lending sector. For example, while most bank commercial loans are 5-10 years, the New York Green Bank extends these terms for 20 years and assumes the risk of the investment on the back end.[18] In this way, the public bank is partnering with the private lending institutions to address barriers for investment in energy efficiency.[19]

As of July 2016, New York, Connecticut, Rhode Island, Montgomery County-Maryland and California have active green banks. Several other states—Nevada, Colorado, Virginia, Pennsylvania, Delaware, Massachusetts and Vermont—are actively pursuing a green bank.[20]

11. Energy Savings Performance Contracting

Energy savings performance contracting (ESPC) is a private financing mechanism for retrofitting buildings with more efficient technologies and, more recently, distributed renewable technologies. Under an ESPC, energy service companies (ESCOs) assume the risk of the investment and are re-paid through the savings derived from the installed measures themselves.

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[16] NASEO, “Warehouse of Energy Efficiency Loans (WHEEL), last modified 2016, http://www.naseo.org/wheel.

[17] For more information, review CNEE’s Innovative Financing Programs policy brief.

[18] NYSERDA “NY Green Bank,” last modified 2016, http://greenbank.ny.gov/.

[19] For more information, review CNEE’s Innovative Financing Programs policy brief.

[20] Coalition for Green Capital, “About CGC,” last modified August 4, 2016, http://coalitionforgreencapital.com/.

ESPCs are typically implemented in municipal buildings, universities, K-12 schools and hospitals—the so-called "MUSH" market—and by federal government users. Building owners in these sectors tend to be willing to install measures with longer payback periods and, therefore, the projects tend to generate deeper retrofit savings. ESPCs can also be used by public housing authorities (PHAs). PHAs may even be required by public policy to enter into an ESPC for all multi-family public housing stock.

In addition to requirements to pursue ESPCs, states can take other steps to establish robust ESPC programs. While the availability of private sector funding for ESPCs is not generally a barrier (there is sufficient capital waiting to lend to quality projects), the biggest barrier, at least for new programs, involves where the financial savings from ESPCs go. If the result of an ESPC is savings that simply result in lower agency budgets, there may not be an incentive to participate. For public projects, programs may need to include an incentive for participation that accrues directly to the agency. Some states have instituted "shared savings" models that split the accrued savings with the agency.[21]

The commitment of personnel and funding to support the implementation of a good ESPC program is essential. Because ESPC contracts are often very technical, and energy savings must be verified, many state administrators lack the expertise to pursue and execute them. States can help solve this problem by providing model lease-purchase contracts and a list of pre-qualified ESCOs. The most effective state programs also designate an independent (non-governmental) third-party adviser responsible for assisting in ESCO selection, contract development, and project due diligence.

12. State-wide Incentive Clearinghouse

Successful policy adoption, especially the utilization of energy efficiency and clean energy incentives, relies heavily on the ratepayer's ability to find and take advantage of available programs. Often, active incentive programs are not fully utilized because consumers that would fully qualify if they applied are unaware that the program exists. Online incentive clearinghouses provide a one-stop shop for people to view what incentives are available in their area and if they qualify. Implementing an incentive clearinghouse dramatically increases the likelihood that a citizen will find and take advantage of the program(s) for which they are eligible. Statewide incentive clearinghouses may be most effective in states with a large number of programs and utilities. Currently, only Oregon, Massachusetts, and Vermont have active and funded clean energy incentive clearinghouses. It is no coincidence that these three states also have third party DSM administrators.[22]

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[21] For more information about ESPC best practices, visit Energy Services Coalition's [Statewide Program Best Practices website].

[22] See policy 17, 3rd Party Program Implementers, of this paper for more information.

C. Technology-specific Energy Efficiency

As technologies evolve over time, state policies need to be updated to keep up with the pace of change. Policies to maximize the efficiency of industrial applications may be needed to bring the latest technologies to the marketplace. More broadly, a growing industry of energy-related data management is prepared to transform the public's relationship with energy to achieve individualized objectives and provide utilities with multiple pathways to meet changing resource needs. Many of these technological advances, however, require a platform upon which to operate, capital investment for infrastructure and policies to protect privacy.

13. Adopting the Most Recent Building Codes

The DOE projects that, over time, improvements in building codes can have the greatest single impact in energy efficiency within the built environment compared to any other policy initiative. Because buildings will be around for generations, energy efficiency within the built environment is a matter of statewide and long-term importance. Energy efficient building code legislation typically establishes a baseline International Energy Conservation Code (IECC) standard to be incorporated into state and local building code requirements. The International Code Council (ICC) updates the IECC every three years. Adoption of new building energy codes can occur directly by legislative action or regulatory agencies authorized by the legislature.

States frequently implement an IECC code but do not keep their codes current. In order to maintain reasonably stringent standards, states should create a review committee of code officials, representatives of local governments, architects, and members of the building community. The legislature should then establish a review period whereby the review committee may recommend, or establish, a new standard. This review period should be offset from the three year IECC schedule to ensure that the review committee has the opportunity to review and accept the most current international standards. If possible, states can also choose to automatically approve IECC standards when they are set. This automatic approval would ensure that new standards are being implemented as they become available.

14. Utilizing Combined Heat and Power

Combined heat and power (CHP) is a technology that uses fuel, often natural gas, to boil water to produce steam that drives a turbine generator that produces electricity. The excess steam can be used for district heating in the winter or absorption cooling in the summer. Sometimes referred to as cogeneration, the primary benefit of CHP is very high system efficiency. Whereas separate electricity and heat generation systems may have 40-50% efficiency, CHP systems have system efficiencies in the 70-80%+ range. A key consideration in CHP deployment is identifying the right application – namely, a consistent heating/cooling load. Large industrial customers, breweries, universities, and hospital complexes are all well-suited for CHP deployment.

CHP tends to suffer from the lack of a clear home in state policy. Defined in some states as efficiency and in others as clean or renewable energy, CHP counts towards EERS compliance in some states, and towards Renewable Portfolio Standards (RPS) in others. And in many states, its treatment is not clearly defined at all. Part of this confusion occurs because the primary fuel of CHP systems varies. In some cases, the primary fuel is biomass, making the CHP a renewable resource subject to renewable energy policies. In other cases, the primary fuel is natural gas, making CHP primarily an energy efficiency technology, subject to energy efficiency policies. States must clearly define how CHP is treated and where they believe it should be housed in order to create a certain market for CHP.

From a public policy perspective, a key consideration for deployment is having a clear utility tariff for utility customers who want to utilize CHP. More specifically, utilities impose "stand-by" charges on customers that have onsite generation but who may need backup power when their onsite generation is offline. In some cases, these charges can make CHP uneconomic for customers. Legislation directing public utilities commissions to design and approve a reasonable stand-by charge is critical for CHP adoption.

15. Enabling Smart Grid Deployment

Advances in information technology and communications networks are enabling improvements to grid performance. An electric power grid that makes use of these technologies to detect and respond to changes in local power supply and demand is called a smart grid. Barriers to greater smart grid technology deployment and access are generally divided into two categories: hardware and data. The hardware that is needed to enable smart grid development includes things like advanced metering infrastructure (AMI), distribution automation systems, and syncrophasers. Distributed placement of this hardware can help grid operators collect granular information on electricity usage over time. This data, in turn, can be used by customers, utilities, and third parties to lower electricity consumption while improving grid efficiency and performance. State policy can help drive the development of smart grid by addressing both the hardware and data barriers.

AMI, or "smart meters," are meters or systems of meters that transmit energy use information from residential or commercial customers in various time increments, from minutes to hours. The higher the resolution of the data (smaller time increments), the more valuable the information is to the customer or the utility. High resolution data from smart meters enable utilities and third party providers to gather energy usage trends, identify outages, implement and track energy efficiency practices all without having to physically go to a site to read a meter. The dynamic nature of the data allows for dynamic rate structures that can send pricing signals to customers to promote particular energy practices that are desirable to the utility or ratepayers. It also allows third parties to market energy information and management services to customers if policies are in place to support such a market. Some AMI can both transmit and receive communication. As a result, AMI has the potential to be centrally managed to directly improve grid performance through control strategies and demand response.

Many states and utilities are looking toward the smart grid as a mechanism for improving and modernizing the utility grid.[23] However, much of the potential for improving service to customers

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[23] Open Energy Information, "Utility data access map," last modified 2012. http://en.openei.org/wiki/OpenEI:Utility_data_access_map.

relies on an active private sector to develop applications targeted at increasing consumer value. Providing for third party access to timely and detailed customer data is a low- to no-cost method for expanding the energy efficiency marketplace. This increases the scope for efficiency gains at building, community, and regional levels. Additionally, in developing a robust framework to provide customer data access, it is important to address privacy concerns. To this end, data access policy should include clear guidance on data ownership and third party access. Effective policy will maximize the resolution of data, while safeguarding customer privacy.

Green Button Connect is one program that enables developers to access consumer energy data in a secure and streamlined way instantaneously, instead of having the customer approve every data transfer. Green Button Connect improves the ability for applications to retrieve and analyze energy data to assist consumers in becoming more energy efficient.

16. Targeting Location-Specific Energy Efficiency

Transmission and distribution (T&D) investments represent a significant cost in the electricity sector. According to the Edison Electric Institute (EEI), whose members are utilities providing electricity for 220 million Americans in all 50 states, transmission investments rose 110% from 2008 to an estimated $19.2 billion in 2015.[24] Capital expenditures on the distribution grid are even larger, with EEI estimating a total of over $28 billion in 2015.[25] Despite these high and steadily rising T&D investment levels, there has not been a corresponding improvement in reliability.[26] Energy efficiency represents a useful tool to potentially reduce reliability concerns without expensive T&D investment.

As regional demand grows, specific areas of the grid can be put under greater strain, especially during peak periods, threatening reliability. When demand exceeds system capacity, T&D buildouts are sometimes required to install new infrastructure to maintain reliability. While T&D upgrades are often appropriate and necessary investments, they can be deferred or avoided entirely through energy efficiency in many cases. Targeted energy efficiency programs that develop energy efficiency in stressed areas of the grid can defer or in some cases obviate the need for T&D investments.

From a utility perspective, targeted energy efficiency programs that push T&D investments further into the future can generate value for companies, which prefer to incur a cost in the future rather than the present. For a system planner, this approach can reduce overall costs to ratepayers. Some utilities have been leveraging targeted energy efficiency since the 1990s, and, more recently, some states have supported the strategy in legislation and regulatory measures.

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[24] Edison Electric Institute, *Transmission Projects: At a Glance (*EEI, 2015) http://www.eei.org/issuesandpolicy/transmission/Documents/Trans_Project_lowres_bookmarked.pdf.

[25] R Kress, "Utilities ratchet up spending on reliability" (Energy Central, 2015). http://www.energybiz.com/article/15/11/utilities-ratchet-spending-reliability.

[26] Peter Larsen, et al., *Assessing Changes in the Reliability of the U.S. Power System* (LBNL 2015). https://emp.lbl.gov/sites/all/files/lbnl-188741.pdf.

There are a number of obstacles to deploying energy efficiency as a T&D resource, however, in many states, investment in physical T&D infrastructure is a more common strategy and typically returns greater revenue to the utility. A report by the Regulatory Assistance Program (RAP) on the use of efficiency as a T&D resource recommends that institutionalizing a longer T&D planning horizon would make it more likely that non-wire alternatives, including energy efficiency, are considered.[27] Addressing these barriers to leveraging targeted energy efficiency as a least-cost T&D resource can help integrate energy efficiency into system planning.

In spite of these regulatory challenges, there are several examples of where location-targeted energy efficiency has been implemented. In response to voltage collapse concerns as a result of the Puget Sounds' heavy reliance on a single high-voltage transmission line, Bonneville Power Administration (BPA) invested in voltage support devices and targeted deployment of energy efficiency resources to reduce load in key locations. This project was successful in significantly deferring the expensive investments required to build a new high-voltage transmission line.[28] Maine's 2013 bill, LD 1559, "An Act to Reduce Energy Costs, Increase Energy Efficiency, Promote Electric System Reliability and Protect the Environment," requires Maine's utilities commission to consider non-transmission alternatives to T&D investment where they present a lower-cost substitute to transmission projects.[29] Under the program, energy efficiency and demand response projects are instrumental low-cost, non-transmission options. Also, Consolidated Edison (Con Edison) runs a program in New York City that specifically strives to defer distribution upgrades, which is primarily achieved through energy efficiency programs. Con Edison estimates that the program has resulted in over $300 million in ratepayer benefits.[30]

D. Improving Administration of Existing Programs

Energy Efficiency programs often suffer from lack of consistency, transparency and outreach to ratepayers who could benefit from already active programs. This section discusses two policy approaches that could streamline and improve administration of existing programs.

17. Third Party Program Implementer

There are four main types of administrators of state energy efficiency programs (see Figure 11). State administrative structures vary. The selection of the specific administrative structure for the

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[27] Chris Neme and Rich Sedano, *US Experience with Efficiency as a T&D System Resource* (RAP, 2012). https://www.raponline.org/document/download/id/4765.

[28] Chris Neme and Jim Grevatt, *Energy Efficiency as a T&D Resource: Lessons from Recent U.S. Efforts to Use Geographically Targeted Efficiency Programs to Defer T&D Investments* (NEEP, 2015), p. 15. http://www.neep.org/sites/default/files/products/EMV-Forum-Geo-Targeting_Final_2015-01-20.pdf.

[29] Ibid, p. 41-42.

[30] Neme and Sedano, p. ii-iii.

delivery of ratepayer-funded programs will depend on factors and goals specific to each state, and it is clear that successful program administration depends, at minimum, upon the clarity of and consensus on program goals, purposes, and evaluation metrics; policy consistency across time; and stakeholder consensus on performance-based regulation.[31]

Administrator Type	Description
State Agency	A state agency (typically a state energy office or utilities commission) is responsible for statewide program administration.
Utility	Utilities are responsible for administration within their service territories.
Third-Party	An independent, non-governmental organization is responsible for statewide program administration.
Hybrid	Responsibility for program administration is shared between multiple program administrators.

Figure 11. Typology of Ratepayer-Funded Energy Efficiency Program Administrators (Data sourced from RAP)

For states with an existing EERS, there is an important trade-off to consider when using a state agency or third-party program administrator. Utilities will likely resist being held to savings reduction targets when they have little control over the implementation of energy efficiency programs. In states with state agency or third-party program administrators, it is these entities that should be responsible for meeting EERS targets.

There have been studies of the comparative effectiveness of the different types of program administrators. In general, the consensus is that the best fit will depend upon local and regional context, though state agency and third-party administrators may have advantages over utility administrators. [32]

Some of the advantages of state agency and third-party administrators are as follows:

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[31] Richard Sedano, *Who Should Deliver Ratepayer-Funded Energy Efficiency?: A 2011 Update* (RAP, 2011). https://www4.eere.energy.gov/seeaction/system/files/documents/rap_sedano_whoshoulddeliverratepayerfundedee_2011__11_15.pdf.

[32] Philippe Dunsky and Jeff Lindberg, *Nobody's Perfect: Choosing (and Improving) Models for Program Administration* (ACEEE, 2010) http://aceee.org/files/proceedings/2010/data/papers/2063.pdf.

- Directly aligning an administrator's goals and responsibilities can be important for effective program delivery. Because third-party providers are tasked only with administering energy efficiency programs and receive all compensation based on their performance in their delivery of these programs, third-party administrators may be better at setting goals and focusing exclusively on energy efficiency. [33]
- In a similar vein, state agency administrators may better understand the nuances of the state's energy efficiency policy goals and so are likely to be better equipped to design programs that will meet those objectives. [34]
- Utility program administrators operate in limited service territories, and many customers may not know where to turn for energy efficiency services. This gives third-party and state agency administrators, with statewide jurisdiction, an inherent advantage because they can market and link program services to all customers in a state.
- Statewide jurisdiction also makes it more likely that state agency and third-party administrators will be better able to achieve economies of scale in administration and program delivery, consistency in programming, and market transformation goals.[35] Due to existing capacity in state-run energy assistance and weatherization programs, state agency administrators might be especially well-suited to serve specific market segments, particularly low-income customers.[36]
- Third-party administrators, because they can provide higher pay and work within less restrictive procurement procedures, are likely to be better able than state agencies for to attract highly qualified staff and contractors.[37]
- While state agency and third-party providers might be at a disadvantage relative to utilities in terms of access to customer data, state policies to make this data more accessible could negate this advantage.

18. The National Energy Efficiency Registry (NEER)

The reporting of energy savings from energy efficiency programs tends to suffer from a lack of transparency. Part of the reason for this is the diversity of evaluation, measurement, and verification (EM&V) activities in use by states, utilities, and other non-utility efficiency program administrators. This variation of processes and underlying assumptions across EM&V programs

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[33] Matthew Brown, *Models for Administering Ratepayer-Funded Energy Efficiency Programs* (ASE, 2009). https://www.ase.org/sites/ase.org/files/EE_Admin_Structures.pdf.

[34] Ibid.

[35] Philippe Dunsky and Jeff Lindberg, *Nobody's Perfect: Choosing (and Improving) Models for Program Administration* (ACEEE, 2010) http://aceee.org/files/proceedings/2010/data/papers/2063.pdf.

[36] Luisa Freeman, Dr. Shawn Intorcio, Jessica Park, *Implementing Energy Efficiency: Program Delivery Comparison Study* (The Edison Foundation Institute for Electric Efficiency, 2010) http://www.edisonfoundation.net/IEE/Documents/IEE_EEProgDeliveryComparison.pdf.

[37] Matthew Brown, *Models for Administering Ratepayer-Funded Energy Efficiency Programs* (ASE, 2009) https://www.ase.org/sites/ase.org/files/EE_Admin_Structures.pdf.

creates uncertainty for regulators as to the amount of savings realized and also creates concerns about the double counting of savings.[38] Another barrier to transparency is that program-related data is disaggregated and terminology varies across regulators and program administrators.[39] Transparency and full accounting of energy savings related to all energy efficiency programs within a state has also been hindered by a lack of market and policy motivation for tracking non-utility, ratepayer-funded programs.[40]

Some have suggested that it would be much easier for states to ensure proper EM&V, catalogue all savings within the state, and avoid double counting if they could create a registry or participate in a national registry to certify savings. Such a registry would ensure clear ownership of energy efficiency instruments, create serial numbers to prevent the issuance of duplicates, allow for inter- and intrastate trading, and provide for retirement of these instruments.[41] In addition, a national registry would decrease the administrative costs associated with program oversight, facilitate the interstate exchange of information and best practices, and enable multi-state cooperation.[42] A national registry would also reduce barriers to and costs of energy efficiency projects, open new markets for energy efficiency, and drive carbon reductions at scale.[43]

In 2015, Tennessee, five partner states (Georgia, Michigan, Minnesota, Oregon, and Pennsylvania), and two partner organizations (The Climate Registry and the National Association of State Energy Officials) won a competitive award from DOE to develop a roadmap for voluntary adoption and implementation of the National Energy Efficiency Registry (NEER). Under this award, the states and their partners will facilitate a two-year, state-driven stakeholder process to develop the NEER's Principles and Operating Rules. E4theFuture and APX are also supporting the project.[44]

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[38] For additional guidance, see: Mary Shoemaker, *Best Practices in Developing Energy Efficiency Programs for Low-Income Communities and Considerations for Clean Power Plan Compliance* (ACEEE, 2016). http://aceee.org/sites/default/files/cpp-low-income-0416.pdf.

[39] National Association of State Energy Officials, *Energy Efficiency Strategies for Clean Power Plan Compliance: Approaches and Selected Case Studies*. 2015. http://111d.naseo.org/Data/Sites/5/media/documents/naseo-ee-for-cpp-2015-aug-20.pdf.

[40] Ibid.

[41] The Alliance to Save Energy et al, *Joint Comments on Energy Efficiency in EPA's Proposed Mass-Based Federal Plan and Model Trading Rule*. 2016. http://aceee.org/sites/default/files/joint-comments-mass-based-012116.pdf.

[42] The Climate Registry (TCR), *National Energy Efficiency Registry Stakeholder Introduction Webinar*, March 2016 https://vimeo.com/158405358.

[43] Lars Kvale, *Energy Efficiency Registry*, presentation to the U.S. Climate Partnership Association on March 23, 2015, (APX) www.usclimatepartnership.org/documents/Kvale_000.pdf.

[44] U.S. Department of Energy, State Energy Program Competitive Award Selections, 2015 http://energy.gov/eere/wipo/state-energy-program-2015-competitive-award-selections.

The NEER is a central repository that will allow the public and private sectors to transparently track energy efficiency attributes associated with energy efficiency initiatives, as well as help demonstrate progress towards energy goals and potential compliance with existing and future state and federal environmental regulations.[45] For instance, NEER could be used to provide credit to energy efficiency programs for associated reductions in criteria air pollutants, enable private vendors to bid energy efficiency projects for utility Energy Efficiency Resource Standard (EERS) compliance, support energy efficiency as a resource in regional transmission organization energy and capacity markets, and serve as a resource for broader state planning purposes.[46]

While NEER would be a new system for tracking energy savings, the fundamental elements for such a system are already in place and are actively used by states. State experience in implementing RPS and verifying utility compliance through renewable energy certificate (REC) tracking systems will assist in implementation of NEER.[47] In addition to this, the Northeast Energy Efficiency Partnerships (NEEP) already operate the Regional Energy Efficiency Database (REED). The database "serves as a dashboard for the consistent reporting of electric and natural gas energy efficiency program energy and demand savings and associated costs, avoided emissions, and job impacts" across NEEP's member states (Connecticut, Delaware, the District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont).[48]

NEER will offer the following services:

- Energy efficiency project registration and accounting of savings with full disclosure of applicable documentation (measurement and verification activities, savings ownership, and savings years);
- Energy efficiency project qualification, with third party verification, as a compliance resource;
- Documentation of whether savings for a particular project in a particular year were used to claim tradable compliance instruments for state or federal programs; and,

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[45] The Climate Registry (TCR), *Thought Leadership: Energy Efficiency*, https://www.theclimateregistry.org/thoughtleadership/energy-efficiency/

[46] National Association of State Energy Officials, *Energy Efficiency Strategies for Clean Power Plan Compliance: Approaches and Selected Case Studies*. 2015. http://111d.naseo.org/Data/Sites/5/media/documents/naseo-ee-for-cpp-2015-aug-20.pdf.

[47] Ibid.

[48] Patrick Wallace, *What's Under the Hood?: Building Consistency and Transparency in Energy Efficiency Savings and Underlying EM&V Methods through a Standardized, Integrated Reporting Platform*, Presentation at the 2015 ACEEE National Conference on Energy Efficiency as a Resource, http://aceee.org/sites/default/files/pdf/conferences/eer/2015/Patrick_Wallace_Session1D_EER15_9.21.15.pdf.

- Designated agent services to perform reviews of applications for qualification as a compliance resource.[49]

As currently designed, NEER would provide clear attribution of the ownership of energy savings to facilitate trading, exchange, and allocation of these certificates in both inter- and intrastate markets. Clear attribution of ownership would also mitigate double counting of savings.[50] NEER will also be designed to ensure transparent reporting of energy savings. It will do so by driving convergence around common approaches and terminology and aggregating data for different programs. While the registry would encourage standardization of EM&V activities, the platform would support state-specific customization based on unique policy goals.[51]

The project is in the first of four phases of development. In the coming year, the States Initiative on Principles and Governance will work to define NEER principles and operating rules. The stakeholder working group's activities will be funded by the 2015 DOE award, with final principles and operating rules expected in June of 2017.[52]

E. Investment in Low-Income Communities

While most households in the United States spend 4% of their annual income on energy, low-income households typically spend 17%.[53] Even though energy is such a significant portion of the average low-income household's annual cost, many low-income residents live in homes with substandard insulation and inefficient appliances, windows, and lighting. As a result, they spend more than they need to on energy–directly taking away from other household needs. But while low-income families are excellent candidates for cost-effective upgrades, a lack of liquid capital, lower than average credit scores, and lack of access to the usual avenues of marketing means they have been a difficult group to engage on energy efficiency.

States can approach the expansion of energy efficiency in the low-income sector through several avenues:

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[49] Pat Stanton, *Registry Primer: National Energy Efficiency Registry Project Steering / Advisory Committee Kick-Off Meeting*, Power Point Presentation, 2016, http://energyoutlook.naseo.org/Data/Sites/8/media/presentations/Registry-Primer.pdf.

[50] National Association of State Energy Officials, *Energy Efficiency Strategies for Clean Power Plan Compliance: Approaches and Selected Case Studies*. 2015. http://111d.naseo.org/Data/Sites/5/media/documents/naseo-ee-for-cpp-2015-aug-20.pdf

[51] Peggy Kellen, *Introduction to The National Energy Efficiency Registry*, Power Point Presentation, https://www4.eere.energy.gov/seeaction/sites/default/files/pdfs/TCR%20SEE%20Action%20Webinar%2011-05-15.pdf.

[52] The Climate Registry (TCR), *National Energy Efficiency Registry Stakeholder Introduction Webinar*, March 2016 https://vimeo.com/158405358.

[53] *Weatherization Assistance Program Fact Sheet* (US DOE Weatherization Assistance Program, 2009) https://www1.eere.energy.gov/wip/pdfs/wap_factsheet.pdf.

- Building upon the existing federal Weatherization program.
- Streamlining enrollment in a broadened low-income program for the state.
- Implementing an all cost effective requirement.
- Establishing a credit enhancement fund (such as a loan loss reserve) that allows the private sector to market to low income customers with lower credit scores.

19. Building on the Existing Federal Weatherization Program

The federal government runs the Weatherization Assistance Program (WAP) out of the Department of Energy.[54] There is also a Low-Income Heating and Energy Assistance Program (LIHEAP) which provides cash assistance to those low-income families.[55]

The federal program comes with some limitations on deployment. For example, states may not contract with for-profit entities. There are also limitations on the types of investments a state may make. As a result, the program can be inefficient in maximizing the deployment of energy efficiency across low-income households.

With the addition of dedicated state funds, the state can leverage the resources of the federal WAP while expanding offerings. Some examples:

- The state might run "neighborhood sweeps" in areas with low-income residents. Much of the cost of delivering weatherization services is getting the crew to the house. States can realize financial savings by servicing surrounding houses once the crew is in the neighborhood. Non-federal funds may be used to do the outreach and deployment of services to households that are not eligible for WAP.
- The state could also use a low-income fund to provide additional measures, those that are outside of the WAP allowable expenditures, to existing WAP recipients. Such measures could include renewable energy installation, or ownership in a shared renewable facility, which would further reduce the occupant's energy costs.
- States can expand the WAP program budget to reach more households, especially if there is a waiting list. Such funds could be established through policy either as a utility ratepayer-funded program or through dedicated state revenues.
- States may establish policies to streamline or facilitate enrollment in WAP. Historically, WAP only serves those who expressly fill out an application and request weatherization services. However, states use similar qualification criteria for programs such as food stamps. A state could streamline enrollment by automatically enrolling anyone in other low-income assistance programs in WAP, or, at a minimum, sign them up for an energy audit that could then be used to enroll them in the program if it were deemed appropriate.

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[54] US DOE, " Weatherization Assistance Program," last modified 2015, http://energy.gov/eere/wipo/weatherization-assistance-program.

[55] LIHEAP, "LIHEAP Clearinghouse," last modified July 2016, https://liheapch.acf.hhs.gov/.

- A scaled back version of the program described above could focus automatic WAP enrollment on those who receive cash assistance through LIHEAP. While enrollees could opt-out of WAP, this more proactive approach would likely reach a larger segment of the low-income community than do opt-in programs. By signing people up for WAP, the state can not only decrease utility bills for the low-income customer, but also free up LIHEAP funds to serve more people.
- As a condition of the WAP or LIHEAP programs, states might require that all improvements found to be cost effective be completed in a home. Ratepayer funds, like a systems benefit charge, or a dedicated revenue stream that would be used to supplement WAP funding, ensure that ratepayer bill assistance and LIHEAP funds are used in more, rather than fewer, efficient homes. This would also have the effect of decreasing utility bills for the low-income customer, freeing up LIHEAP funds to serve more people. Alternatively, as a condition of enrollment in the LIHEAP program, a state could require that the utility fund all cost-effective energy efficiency improvements on the home and finance those improvements through the customer's utility bill.

20. U.S. EPA's Clean Energy Incentive Program[56]

The EPA's Clean Power Plan includes a voluntary early-action program called the Clean Energy Incentive Program (CEIP), which rewards renewable energy and low-income solar and low-income energy efficiency projects that come online during a specific eligibility period.[57] For this program, which should be finalized by the end of 2016, the EPA has set aside allowance credits to be distributed to states participating in the program. Investments in low-income communities will receive double credit through the program.[58] Participation in the program would thus give the state a jumpstart on compliance with EPA carbon regulations, provide insulation from any potential rate hikes for low-income customers, and inject the state with extra allowances to help it meet its compliance obligations.

[56] The CEIP is on hold following the Supreme Court stay of the Clean Power Plan in February 2016. Currently, the case against the CPP, State of West Virginia et al. v. EPA et al., awaits en banc review before the DC Circuit Court.

[57] The EPA re-proposed the CEIP through proposed design details published in the Federal Register on June 30, 2016.

[58] To put this in monetary terms: there are 300,000,000 tons of credits in the CEIP, each counts double for low-income energy efficiency – if ½ of the credits go to low-income and the price per ton is $4, the value to states of this incentive is $1.2B – available for free to states that take advantage of the program

5. Model State Policies and Programs

Program	Example 1	Example 2	Example 3	More Info
Prioritizing EE in Loading Order	California	Rhode Island	Maine	ACEEE Energy Efficiency as a Resource
Decoupling & Utility Incentives	California	Hawaii	Connecticut	Decoupling Map from NRDC
Cost Benefit Test	Oregon	Washington	Vermont	ACEEE EMV
All Cost Effective EE	Massachusett	Vermont	Connecticut	ACEEE paper on all cost effective EE
On Bill Financing	Connecticut	New York	Hawaii	ACEE Policy Toolkit
R-PACE	California	Florida	Missouri	PACE Nation
C-PACE	Connecticut	Michigan	Florida	PACE Nation
Revolving Loan Funds	Iowa	Nevada	Texas	EERE Revolving Loan Funds
Green Bank	Connecticut	Hawaii	Rhode Island	The Coalition for Green Capital
Energy Savings Performance Contr	Hawaii	Kentucky	Delaware	EERE ESPC
Location Targeted DSM	New York	Vermont	Rhode Island	NEEP
EE Potential Studies	California	Vermont	Iowa	ACEEE
Building Codes	Virginia	Illinois	Maryland	DOE Building Energy Codes Program
Combined Heat and Power	Massachusett	California	Connecticut	ACEEE
Customer Data Access	California	Texas	Oklahoma	Mission Data State Activities
Incentive Clearinghouse	Oregon	Massachusett	Vermont	
Third Party EE Program Administr	Vermont	Oregon	Delaware	ACEEE

Figure 11. Index of Model State Policies and Programs

Some of these state programs are also further analyzed in CNEE's State Policy Opportunity Tracker (SPOT) for Clean Energy. [59]

For each of the 20 policies and programs discussed in this paper, we highlight three successful state models. This table is not intended to be a ranking or an evaluation of the programs. Rather, it is representative sample.

6. Conclusion

States have a variety of policy options available to them for the support and growth of energy efficiency markets that complement or can operate separately from traditional EERS programs. This paper outlines this suite of programmatic, regulatory, and legislative actions; points to states that have implemented them well; and suggests opportunities for future work.

It is important to remember that states are diverse entities. Not all of the policies listed in this paper will be impactful in every state. CNEE recommends that states evaluate and implement policies that fit their state's public policy objectives. With so many policies available to encourage more energy efficiency deployment, states can think broadly about their options.

To find more information on these policies and others, visit the SPOT for Clean Energy, a State Policy Opportunity Tracker developed by the Center for the New Energy Economy (CNEE) in partnership with The Nature Conservancy (TNC). The State Policy Opportunity Tracker (SPOT) for Clean Energy is a hub of information on both existing state clean energy policies and, uniquely, future policy opportunities.

SPOT synthesizes existing information related to 38 clean energy policies at the state level and documents whether a given state policy exists and where it stands related to 3 – 6 policy components.

This resource is not a state scorecard. It is a planning tool for states as they develop their clean energy policy roadmaps. The overall value of this hub is to inform decision-making processes by providing policymakers, regulators, and interested stakeholders a clear snapshot of existing state policies as well as opportunities for future policy adoption.

[59] For more information, visit http://spotforcleanenergy.org/.

7. Figure Citations

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