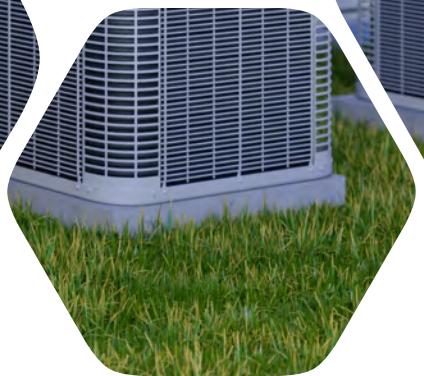
EPA

State and Local Climate and Energy Program

State Energy and Environment Guide to Action:

Energy Efficiency Programs and Resource Standards

2022



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Preface and Acknowledgments

The U.S. Environmental Protection Agency (EPA) *State Energy and Environment Guide to Action* offers real-world best practices to help states design and implement policies that reduce emissions associated with electricity generation and energy consumption. First published in 2006 and then updated in 2015, the *Guide* is a longstanding EPA resource designed to help state officials draw insights from other states' policy innovations and implementation experiences to help meet their own state's climate, environment, energy, and equity goals.

As part of the 2022 update, each chapter reflects significant state regulatory and policy developments since the 2015 publication. *Guide* chapters provide descriptions and definitions of each featured policy; explain how the policy delivers energy, climate, health, and equity benefits; highlight how states have approached key design and implementation issues; and share best practices based on state experiences.

Unlike earlier *Guide* editions, which were released as a complete set of chapters comprising a single document, the 2022 update is being released in phases of collected chapters. This chapter is one of seven addressing state-level utility policies that support clean energy and energy efficiency:

- Overview of Electric Utility Polices
- Electricity Resource Planning and Procurement
- Electric Utility Regulatory Frameworks and Financial Incentives
- Interconnection and Net Metering
- Customer Rates and Data Access
- Maximizing Grid Investments
- Energy Efficiency Programs and Resource Standards

Guide chapters are available online on the *Guide to Action* webpage.

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Policy Description and Summary

Summary

Energy efficiency programs provide significant benefits to customers, utilities, and the public by reducing energy bills, alleviating household energy burdens, reducing the emission of greenhouse gasses (GHGs) and other harmful pollutants, helping utility planners manage energy supply and demand, promoting health and safety for customers, and creating local jobs. Energy efficiency program impacts can be substantial. Some states have saved up to 2.5 percent of annual electricity sales from energy efficiency programs (ACEEE 2020d). According to recent estimates, efficiency programs in the United States achieved 33,672 gigawatt-hours (GWh) of incremental annual electricity savings in 2019 (CEE 2021). These annual savings led to more than 25 million tons of avoided carbon dioxide emissions in 2019, and health benefits of $513 million to $1,159 million (net present value) from avoided health damages.[1]

Key Definitions

Energy efficiency means using less energy to meet the same need – and in the process, reducing energy bills and lowering pollution. Energy efficiency is a demand-side resource, meaning that savings occur on the customer side of an energy meter, and is therefore often considered a distributed energy resource (DER).

Energy efficiency programs provide financial incentives and technical assistance for energy-efficient goods and services such as lighting; heating, ventilation, and air conditioning (HVAC) equipment; and whole-building upgrades.

An **energy efficiency resource standard (EERS)** requires utilities or other program administrators to achieve a minimum level of annual and/or cumulative energy savings through energy efficiency over a set period. An EERS treats energy savings as a demand-side resource, whereas power plants and wind turbines are supply-side resources.

This chapter focuses on customer-funded[2] energy efficiency programs and energy efficiency resource standard (EERS) policies. In recent years, annual funding for customer-funded electricity and natural gas energy efficiency programs has increased from $1.6 billion in 2006 to $8.4 billion in 2019, with program administrators in all 50 states reporting savings (ACEEE 2020d). Programs typically reach a range of customers, including residential, commercial, industrial, and agricultural, while also dedicating investments to low-income households.

An EERS, which requires that utilities or other entities meet minimum savings targets by certain years, is one of the predominant state policies that drive investments in energy efficiency programs. More than half of states have an EERS and those states have achieved roughly four times greater savings than states without an EERS (ACEEE 2019a). Complementary state policies to promote efficiency programs include utility business model changes such as decoupling and performance incentives, integrated resource planning, building codes, appliance standards, and financing strategies. These policies are covered in other chapters of the *Guide*.

As state policymakers put more attention on climate change, air quality, and equity objectives, and as the adoption of variable, distributed energy resources (DERs)[3] increases in the electricity system, many states are

[1] Emissions estimates are based on an analysis using EPA's AVERT tool. The analysis uses AVERT's energy efficiency portfolio (EE portfolio) emission rate for each region and apportions the electricity savings across the 14 regions of AVERT based on relative share of savings by state provided in ACEEE's *2020 State Energy Efficiency Scorecard* (ACEEE 2020d). Health benefit estimates are based on an analysis using EPA's BPK resource.

[2] Funding for energy efficiency programs often comes directly from utility customers either through charges on their utility bills or through rates. As such, these programs are often referred to as ratepayer- or customer-funded programs. This chapter provides information on customer-funded energy efficiency programs; states may also use other types of funding from federal or state governments to administer energy efficiency programs.

[3] DERs are customer-side, grid-connected resources, including battery storage, rooftop solar photovoltaic (PV) systems, energy efficiency, demand response, and electric vehicles. Some energy efficiency programs support other DERs in addition to energy efficiency, but DERs are not the focus of this chapter.

updating their energy efficiency programs and policies to address gaps and better align efficiency with these other state policy priorities and utility system trends. For example, some states are expanding their energy savings targets from electricity and natural gas savings metrics to a more holistic framework that uses multiple goals, metrics, and tools. This broader set of policy drivers for efficiency programs include GHG emissions reduction targets, utility performance incentives, integration of efficiency with demand flexibility, electrification, and other DER options, peak demand targets, and equity metrics (LBNL 2022; ACEEE 2022). For example, many states require dedicated levels of energy efficiency program investments or savings for low-income households to complement federal weatherization programs.

States may pursue a variety of policy options and program administrative options to fulfill these various policy objectives, which may range from containing energy system costs, to reducing emissions and investing in underserved communities. Utilities, state agencies, nonprofits, or private sector entities can serve as program administrators, or states can use a combination of these approaches. Research has shown that energy efficiency program implementation can be successful with a range of program administration models (Brattle Group 2019).

The following are several examples of action steps states use to realize the benefits of energy efficiency programs and resource standards:

- Define objectives based on state priorities and stakeholder input and consider the multiple benefits of energy efficiency. States pursue energy efficiency for a variety of economic, social, and environmental goals, which differ in priority depending on the location and the issues states are facing. These objectives determine the policy framework, administration, and design of energy efficiency programs.
- Pursue legislative or regulatory authorizations needed to establish energy efficiency programs, resource standards, and/or complementary policies.
- Assess existing energy efficiency offerings and determine gaps in spending, savings, customer participation, and underserved markets, and then select and design energy efficiency programs to fill gaps and meet state-specific objectives. Energy efficiency potential studies can also inform target-setting and program design.
- Engage key stakeholders and experts in program design through an inclusive engagement process and a statewide energy efficiency advisory group, which can guide and monitor programs over time. Inclusive engagement can ensure that efficiency programs serve the needs of diverse customer classes and stakeholder groups.
- Determine and maintain program funding needed to achieve desired energy efficiency levels and multiple benefits. States can also leverage federal, state, and local programs, funding, technical assistance, and tools. Consistent funding mechanisms avoid the potential for funds to be diverted to other purposes.
- Measure results and report progress regularly, and track participation in the evaluation process. States can communicate the benefits of energy efficiency programs to state legislatures, utility regulators, and other stakeholders, and document lessons learned and opportunities to enhance program effectiveness.

This chapter discusses these and other action steps for states, followed by detailed examples of energy efficiency programs and resource standards in Arkansas, Maryland, and Oregon.

Benefits

Energy efficiency programs and EERS policies provide net benefits to the energy system, customers, and society. For electric and gas utilities, efficiency programs reduce demand and peak demand and mitigate utility risks, which also ultimately benefit utility ratepayers. Customer benefits include bill savings, improved comfort, and reduced energy burdens. Societal benefits of energy efficiency include substantial environmental and public health benefits from emissions reductions, local economic development, and job creation.

The multitude of benefits from efficiency programs far outweigh the costs. Research has shown that the cost of saving electricity from efficiency programs has remained relatively constant at less than 3 cents per kilowatt-hour (kWh) for nearly a decade (LBNL 2021b). Energy efficiency is a least-cost resource for electric utilities. Many states consider cost-effectiveness more broadly and account for its value to the customer, the utility, and society. Many of the social and economic benefits of energy efficiency measures and EERS policies promote equity. This section expands on many of these benefits of energy efficiency programs and identifies tools to quantify and communicate the benefits. A resource for benefit-cost analysis of energy efficiency and examples of state approaches to cost-effectiveness tests are provided in subsequent sections of this chapter.

Energy System

As customers install energy-efficient products and technologies and modify energy practices, they lower overall energy demand and modify energy consumption patterns. Reduced and more flexible demand patterns can lead to reductions in fossil fuel-based electricity generation and direct fossil fuel use in buildings and facilities. Demand flexibility is the ability of utility customers to change their consumption patterns (e.g., through behavioral changes or grid-interactive technologies) by the hour or other timescale (LBNL 2021a). Load management and demand flexibility can be targeted through energy efficiency programs (refer to the Key Design Considerations section in this chapter for more information) as well as other state and local policies and utility DER efforts covered elsewhere in the *Guide*.

For electric utilities, energy efficiency is often a least-cost resource and combined with other DERs can help reduce the amount of energy used overall as well as during system peaks. This in turn can reduce the utility's fuel costs and wholesale costs of purchased electricity.

Efficiency and demand flexibility also support utility risk management by adding diversification to a utility's resource portfolio and reducing fuel price volatility. Energy efficiency programs can accelerate the adoption of smart, connected, data-enabled technologies that can save energy, shift load, and respond to grid needs. When aggregated, energy efficiency and other DER technologies can help grid operators balance supply and demand in real time. If state regulators direct utilities to use efficiency investments to help meet capacity needs, energy efficiency ultimately benefits ratepayers by reducing the need for large-scale investment in new fossil fuel generation, transmission, and distribution infrastructure.

Environmental and Health Benefits

Energy efficiency delivers environmental co-benefits, including the reduction of air pollutants associated with fossil fuel combustion for electricity generation (e.g., nitrogen oxides and sulfur dioxide). Energy efficiency can significantly and cost-effectively reduce the negative impacts of natural gas and electricity systems like air and water pollution, land use, associated environmental compliance costs, and the system and environmental effects of peak load. In addition to alleviating fossil fuel combustion impacts, energy efficiency also helps alleviate other negative environmental impacts, including land use and wildlife impacts of fossil fuel production and utility-scale renewables and toxic materials generated from energy technology manufacturing.

Many of the power system's negative environmental impacts, which can be reduced by energy efficiency, are regulated by state, local, and federal laws, and have significant financial and legal implications for generators and energy developers. Some of the environmental effects harm human and ecosystem health, particularly if they result in exposure to pollutants in air, water, or soil. In general, these negative environmental effects, which vary depending on how and where natural gas or electricity is generated, delivered, and consumed, can include the following:

- Emissions of GHGs and other air pollutants, especially from fuel combustion and gas pipeline leakage
- Water consumption for functions to produce electricity or steam, provide cooling, or extract natural gas (fracking)
- Pollution discharges into water bodies, including thermal pollution
- Solid waste production, such as hazardous coal ash
- Land use clearing and development for fuel production and siting of fossil fuel-based and utility-scale renewable power generation and transmission or distribution infrastructure
- Effects on plants, animals, and ecosystems that result from the air, water, waste, and land impacts

Energy efficiency policies, programs, and technologies that help to avoid or reduce the use of fossil fuel energy and criteria air pollutants can enhance public health by reducing incidences of premature death, asthma attacks, and respiratory and heart disease; avoiding related health costs; and reducing the number of missed days from school or work due to illnesses. Research has demonstrated that energy efficiency has also improved indoor air quality and comfort in buildings, which leads to better health (Abel et al. 2019).

Energy efficiency is one of the pillars of decarbonization pathways examined by governments and the Intergovernmental Panel on Climate Change. Modeling exercises used to identify pathways to U.S. carbon neutrality by 2050 highlight energy efficiency as one of a few essential strategies (Williams et al. 2021). Among other things, these pathways rely on the complete decarbonization of the power sector coupled with energy efficiency and the widespread electrification of end uses across sectors. Energy efficiency is an essential cost-saving strategy in these scenarios because it reduces the demand for new power system infrastructure that widespread electrification would otherwise create. Accelerated adoption of highly efficient technologies is essential to reducing energy use on the scale needed to reach decarbonization goals.

State spending on energy efficiency has demonstrated substantial reductions in GHG emissions. According to recent estimates, efficiency programs in the United States achieved 33,672 GWh of annual electricity savings in 2019 (CEE 2021). These annual savings led to more than 25 million tons of avoided carbon dioxide emissions in 2019, and health benefits of $513 million to $1,159 million (net present value) from avoided health damages.[4]

Equity Benefits

Energy efficiency programs and standards have the potential to improve economic, racial, and health equity. Energy efficiency measures reduce energy burdens, improve public health, improve indoor comfort, create workforce development opportunities, and enhance household and community resilience, particularly if

[4] Emissions estimates are based on an analysis using EPA's AVERT tool. The analysis uses AVERT's EE portfolio emission rate for each region and apportions the electricity savings across the 14 regions of AVERT based on relative share of savings by state provided in ACEEE's *2020 State Energy Efficiency Scorecard* (ACEEE 2020d). Health benefit estimates are based on an analysis using EPA's BPK resource.

programs are effective at tailoring outreach and implementation in ways that meet the needs of historically underserved and overburdened communities.

Because energy efficiency can lower a household's energy use, it can help alleviate energy burdens. Energy burden is the percentage of household income spent on energy bills, and the burden is much larger for low-income, Black, Hispanic, and Native American households than for White or non-low-income households (ACEEE 2020f). Energy efficiency can also support economic equity when utilities introduce new customer rate designs. For example, if electricity rates change in a way that could make bills increase, offering energy efficiency upgrades or efficient appliance rebates can help maintain or reduce customer electricity bills (for more information, refer to the Customer Rates and Data Access chapter in the *Guide*).

Several co-benefits of energy efficiency improve community health and resilience to extreme weather events. Well-insulated buildings maintain safe temperatures for longer periods and a less-strained grid is better able to respond to system emergencies (IMT 2019). To the extent the efficiency programs and technologies target peak load reductions, they can significantly reduce power plant operations and associated air emissions from peaking generation units. Research has shown that exposures to and health impacts of air pollution from electricity generation is higher in low-income and Black neighborhoods (Maninder et al. 2019). Leading states have passed laws and regulations to address health inequities by targeting power plants in communities with environmental justice concerns. Policy trends and examples related to improving equity of energy efficiency investments and benefits are detailed in the Current Regulatory Landscape section in this chapter.

Jobs and Economic Benefits

Energy efficiency offers a variety of job and economic benefits. At the household level, energy efficiency can improve economic equity in terms of household energy burdens and access to well-paying jobs. Recipients of energy efficiency programs experience bill savings that relieves energy burdens. Many households would otherwise need to choose between putting their money toward their energy bill or other basic necessities (Alliance to Save Energy 2018). At the local and state level, energy efficiency program implementation can create local jobs and economic development, including within low-income and racial minority communities. Energy efficiency is a substantial employment sector, representing 2.1 million jobs at the end of 2020 and making up the biggest portion of the energy sector (DOE 2021a). In addition, energy efficiency can increase the competitiveness of a state's business sector, fostering greater economic growth.

Quantifying and Communicating the Benefits

Governors, environmental regulators, state energy office officials, local governments, consumer advocates, utilities, and utility regulators (often called a public utility commission or public service commission) all have their own roles in shaping and implementing energy efficiency policies, and each group has different interest in the impacts of these policies (for more on participants and their roles, refer to the Participants section in this chapter). To help states and stakeholders analyze and quantify these impacts, EPA has a range of tools highlighted in the text box.

State air agency staff may focus on how energy efficiency programs, and associated demand response[5] and load shifting, can lessen environmental impacts by reducing emissions and contribute to meeting each jurisdiction's air quality goals. EPA's AVoided Emissions and geneRation Tool (AVERT) can be used by state energy office and air office staff to evaluate the emission impacts of energy efficiency and other targeted

[5] Demand response is the name for programs that use time-varying rates, financial incentives, or other customer feedback or interactive technology to reduce participating customers' electricity usage during peak periods to help utilities balance grid supply and demand during those times. For more information, see DOE's Demand Response page.

energy policies. With these tools, state environmental regulators can quickly and easily evaluate the impacts of one or more policies and their associated changes to load and emissions at different temporal (hourly to annual) and spatial (county to region) scales. For jurisdictions that consider or account for health impacts in their decision-making processes, EPA's Co-Benefit Risk Assessment (COBRA) tool and Health Benefits Per Kilowatt-Hour (BPK) values give health officials, utilities, and utility regulators the ability to quantify and monetize the health benefits from the demand reduction of rate design policies. Utilities and utility regulators can use the BPK values to quantify the public health impacts of changes in power generation from energy efficiency programs.

EPA Environmental Impacts and Health Benefits of Clean Energy Tools

EPA has a range of free tools available to support states and stakeholders with analyzing and quantifying the environmental impacts and health benefits of clean energy, including, but not limited to the following:

- **AVoided Emissions and geneRation Tool (AVERT)** is a tool designed to meet the needs of state air quality planners and other interested stakeholders. Non-experts can use AVERT to evaluate county, state, and regional emissions displaced at fossil fuel power plants by policies and programs that support efficiency, clean DER, and utility scale renewable energy. Because EERS policies are typically aimed at the power sector, AVERT is uniquely positioned to analyze estimated impacts of states' EERS policies.
- **CO–Benefits Risk Assessment (COBRA) Health Impacts Screening and Mapping Tool** is a tool that helps state and local governments estimate and map the air quality, human health, and related economic benefits of clean energy policies and programs at the national, state, and county levels.
- **Health Benefits Per Kilowatt-Hour (BPK)** is a set of values that help state and local government policymakers and other stakeholders develop screening-level estimates of the outdoor air quality-related public health benefits of investments in energy efficiency and other clean DER.
- **Energy Savings and Impacts Scenario Tool (ESIST)** is a customizable and transparent Excel-based planning tool for analyzing the energy savings and costs from customer-funded energy efficiency programs and their impacts on emissions, public health, and equity. ESIST enables users to develop, explore, and share energy efficiency scenarios between 2010 and 2040.
- **Emissions & Generation Resource Integrated Database (eGRID)** is a comprehensive source of data on environmental characteristics of electric power plants in the United States. The interactive eGRID Explorer dashboard offers data, maps, and graphs on electric power generated, emissions, emission rates, heat input, resource mix, and more.
- **Quantifying the Multiple Benefits of Energy Efficiency and Renewable Energy** describes methods, tools, and steps analysts can use to quantify these benefits so that they can compare costs and benefits and comprehensively assess the value of energy policy and program choices.

The state of Arkansas provides an example of how some of EPA's tools can be applied. The Arkansas Department of Environmental Quality and Arkansas Public Service Commission jointly relied on AVERT to quantify air quality benefits of the state's EERS as part of a proposal to credit those reductions for compliance with the Clean Air Act's Regional Haze Rule (AR DEQ 2019). The Regulatory Assistance Project has further proposed a methodology to use EPA's BPK values to estimate the health benefits of Arkansas's energy efficiency measures while noting generally that BPK values may help state regulators assess whether energy efficiency measures can meet federal air quality regulations at a lower cost (RAP 2021).

Energy efficiency can reduce bills for low-income communities that may suffer from high energy burdens. Accessing, analyzing, and quantifying those impacts can enable utilities to better serve their customers in need, and the needs of communities with environmental justice concerns. States can use EPA's Energy Savings and Impacts Scenario Tool (ESIST) to estimate the energy burden reductions than can be achieved through efficiency programs. Each jurisdiction conducts benefit-cost assessments for their programs differently.

Understanding the benefits and how to quantify those benefits enables stakeholders to develop, implement, and justify programs and policies, including those for energy efficiency.

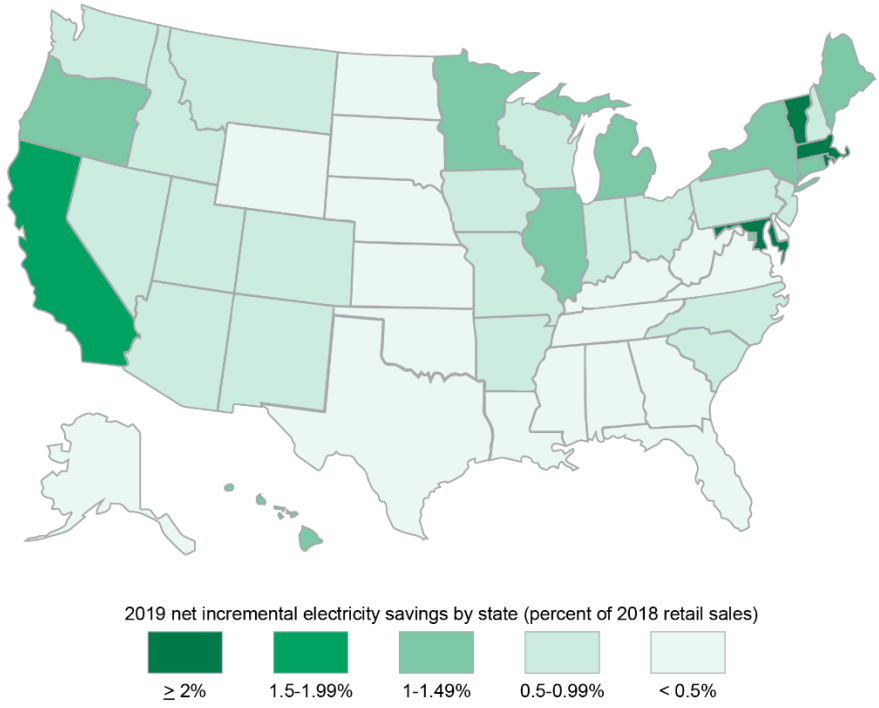
In addition to tools, EPA offers the detailed resource Quantifying the Multiple Benefits of Energy Efficiency and Renewable Energy: A Guide for State and Local Governments (EPA 2018). Also, EPA's ENERGY STAR program supports state and local governments in communicating the value streams of efficiency under three pillars: enabler of growth, mitigator of risk, and protector of the public good, and offers resources to harness the power of storytelling (EPA n.d.).

Current Regulatory Landscape

Overview

This section provides an overview of the current regulatory environment, identifies key policy trends, and highlights state-level leadership on energy efficiency programs and EERS policies. All states offer some level of customer-funded energy efficiency programs (Figure 1). These programs serve most sectors, including residential, government, and commercial buildings; industrial facilities; and agriculture. They include efforts to introduce and increase adoption of energy-efficient technologies, change behaviors, train and educate, transform markets to remove barriers and accelerate adoption of efficient products and practices.

Figure 1: Net Electricity Savings by State from Energy Efficiency Programs



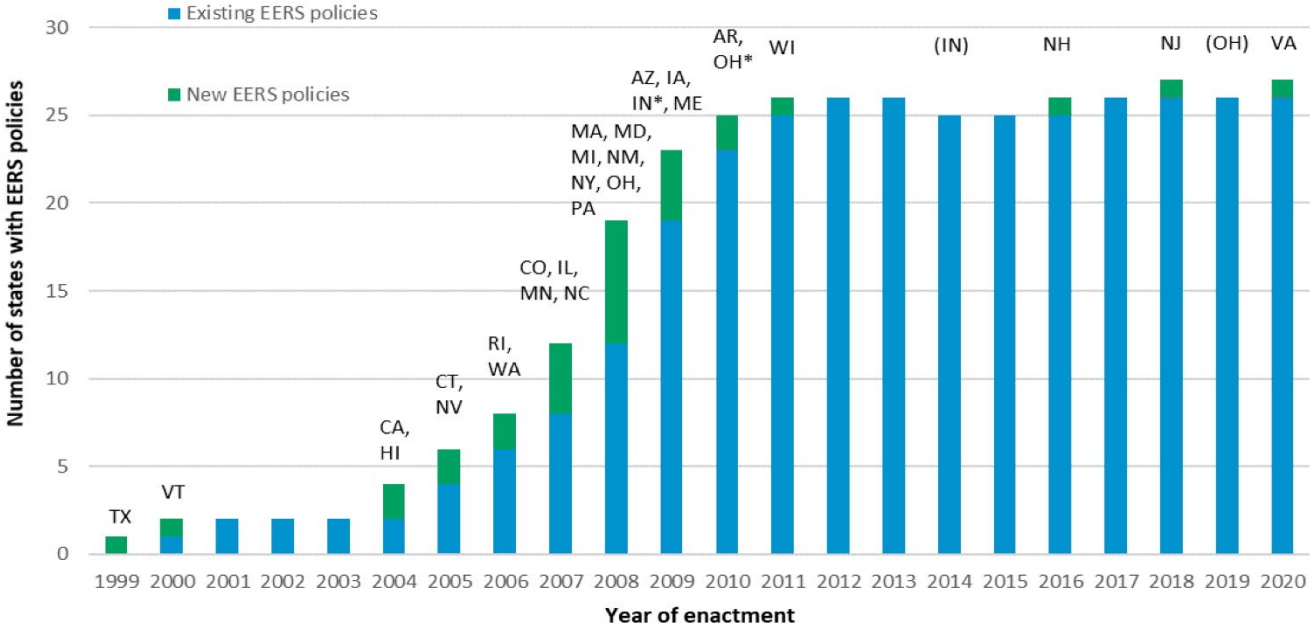
Note: Source explains its data sources, which include state utility regulator staff for savings data and U.S. Energy Information Administration for sales data, additional sources, and adjustments. Refer to the source report and its appendix for details.
Data Source: ACEEE 2020d

Utility regulators, state legislatures, and governors rely on various authorities and funding sources to establish, expand, administer, and oversee an efficiency portfolio. There are numerous policy options to support or enable energy efficiency spending, including EERS, voluntary savings or spending targets, and statutory requirements for a state or utilities to pursue "all cost-effective"[6] energy efficiency, which often lead to an EERS.

[6] In an "all cost-effective" efficiency requirement, utilities or other program administrators are required to determine and invest in the maximum amount of cost-effective efficiency feasible. As of 2014, seven states had all cost-effective efficiency requirements (Gilleo 2014). In determining the level of cost-effective savings that are required, these states prescribe savings levels, and therefore also have an EERS and are included in Figures 2 and 3.

An EERS has been shown to be an effective policy approach for saving energy. An analysis of the 25 states that had an EERS in 2017 found that 20 had met or exceeded their savings goals and all but one exceeded 80 percent of their target (ACEEE 2019b). The states that were the least successful were those that had their funding reduced significantly (ACEEE 2019b). The number of states with an EERS for electricity doubled from 12 in 2007 to 26 in 2011 but has since leveled off. Figure 2 shows state EERS adoption by year. As of 2021, 27 states have an EERS and these typically apply statewide or to investor-owned utilities (IOUs). In most states, utility regulators do not have the authority to set EERS for non-IOU utilities (municipal, federal, or rural cooperative utilities), and state legislation is often necessary to specify requirements and oversight for these entities.

Figure 2: States with an EERS (Electricity) by Year Enacted



* Indiana's and Ohio's EERS were rolled back in 2014 and 2019, respectively.
Figure modified from original to add 2019 and 2020 state policy changes.
Sources: ACEEE 2019b; NCSL 2021

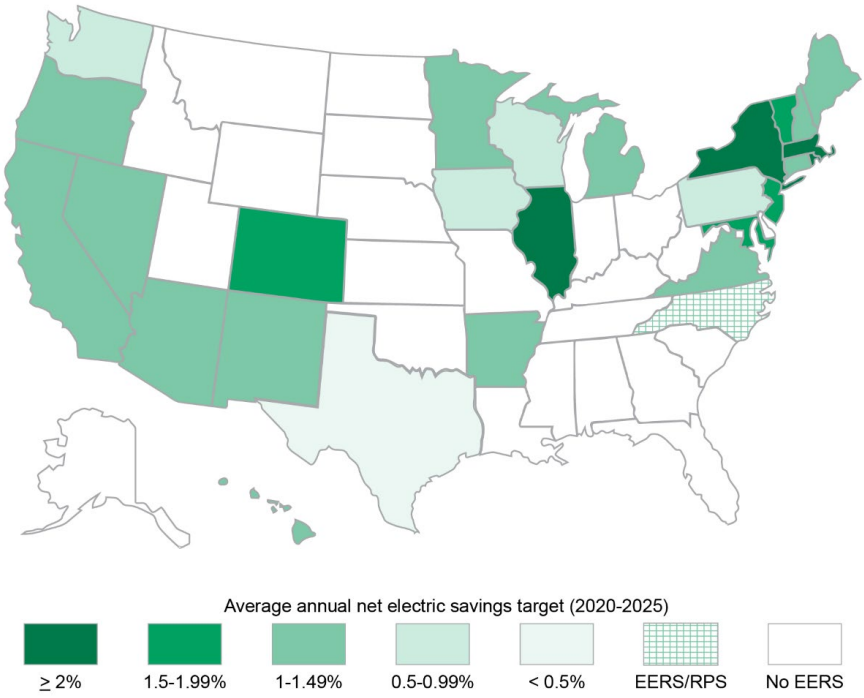
Eighteen of the 27 states with EERS for electricity also specify natural gas savings requirements. Natural gas energy efficiency resource standards vary from a quantity reduction in therms,[7] a percent annual reduction of sales, or a requirement to pursue all cost-effective energy efficiency.

EERS policies can differ substantially by state, with some requiring higher savings levels than others. Figure 3 shows the level of electricity savings required by each state. Some policies place a spending maximum on energy efficiency programs (ACEEE 2019a). Administrative models vary as well. Research has shown that some policy and program considerations drive policy success and energy efficiency savings more than others, but that implementation can be successful with a range of administrator models (Brattle Group 2019). Further, a separate analysis indicates that one target-setting framework is not more effective than another but suggests that states can use nested or overlapping goals to achieve multiple objectives. Multiple goals can incentivize investment in key sectors and promote continual investment in energy efficiency improvements. In addition,

[7] A therm is a measure of the heat content of fuels or energy sources, often used to describe quantities of natural gas.

as states consider developing or updating an EERS, many are aligning their energy efficiency targets with state climate, clean energy, and sustainability goals (ACEEE 2019b).

Figure 3: Annual Electricity Savings Targets in Each State with an EERS



Sources: ACEEE 2019a; Berg 2021

Although EERS can be part of a holistic approach to energy savings, many policies and mechanisms other than EERS can drive advancements in energy efficiency programs, including voluntary savings targets for utilities or other program administrators, utility demand-side management plans, and statutory requirements for utilities to pursue all cost-effective energy efficiency measures. A state that prioritizes utility system cost containment may prefer an "all cost-effective" energy efficiency approach that creates a framework for establishing and updating goals periodically. If the goal is easing energy burdens, the underlying policies and program designs may be different. Many state policies restrict energy efficiency spending, which limits the savings achieved. Such policy mechanisms adopted by a legislature or regulator may include upper limits on rate impacts or program spending, legislative or executive branch shifting of funds for energy efficiency to other state priorities, or provisions that opt out large commercial and industrial customers from energy savings programs and fees (LBNL 2018b).

Policy Trends

Several major policy trends are underway or emerging as states adopt and administer energy efficiency programs and resource standards. These trends include more stringent codes and standards, new performance metrics that include electrification and decarbonization, improving program equity, establishing both lifetime and annual energy savings targets, as well as using energy efficiency, demand flexibility, and other DERs as "non-wires alternatives" to infrastructure investments.

Rising Codes and Standards

As federal, state, and local codes and standards increase efficiency levels for appliances, equipment, and new building construction, program administrators must drive efficiency gains beyond these rising standards to meet their goals. Lighting programs provide an illustrative example. Lighting retrofit programs have for many years been a cornerstone of energy efficiency programs—comprising 45 percent of residential energy savings from 2009 to 2015 (LBNL 2018a). Now with higher baseline federal standards, the lighting market has been transformed to higher efficiency overall (DOE 2020b).[8] Following adoption of standards between 2012 and 2014 that required lighting to be more efficient (DOE n.d.), lighting manufacturers have shifted much of their

[8] For example, the U.S. DOE found that from 2016 to 2018, installations of LED products have increased in all applications, roughly doubling to 30 percent of all general illumination lighting (DOE 2020).

production capacity to LEDs (IEA 2021). The combination of government and private sector strategies have helped transform the lighting sector market (refer to the Market Transformation text box).

Market Transformation

Market transformation is a government or private sector program strategy of market intervention to achieve greater market share of energy-efficient products and technologies. By removing market barriers and supporting commercialization and adoption, newer energy-efficient alternatives more quickly replace less efficient versions of equipment, appliances, or practices until the efficient versions have most of the market share and become commonplace and standard practice.

While residential lighting programs are generally retiring, studies demonstrate that significant energy efficiency potential is still available in the lighting sector (DOE n.d.). Additional energy efficiency can be achieved through the implementation of more comprehensive lighting control systems, which can provide synergistic efficiencies such as through occupancy sensors that are integrated with controls for lighting and HVAC systems (NEEA 2020). DOE estimates the energy savings from lighting controls to be 126 terawatt-hours by 2035, which would save over $10 billion in energy costs (DOE 2019a). Utilities can also widen their program portfolios to focus on other technologies and on previously underserved markets such as multifamily buildings and low-income renters (LBNL 2018b).

Federal and Regional Market Transformation Programs

Market transformation programs are an area of increased attention. These program models provide strategic investments in initiatives and technologies to help change the types of products available in the market, ultimately accelerating the broad adoption of more energy efficient options. Market transformation programs complement the incentives that go directly to individual customers to make efficient choices.[9] EPA's ENERGY STAR program and federal appliance standards (e.g., residential lighting) play a complementary role in market transformation programs by labeling efficient appliances, setting measurement standards for defining efficiency, and using its partner network and national campaigns to increase market awareness of efficiency options and program best practices.

Regional organizations and programs also play a key role in moving markets. For example, the Northwest Energy Efficiency Alliance (NEEA) has supported regional market transformation for 25 years and the Midwest Market Transformation Collaborative (MTC)[10] launched in 2018 and has worked with the Illinois Energy Efficiency Stakeholder Advisory Group to create a market transformation framework that was included in the state's technical manual (MEEA 2020; ILSAG 2020). Other examples include the Consortium for Energy Efficiency (CEE), which can push market transformation if its members act collectively, and DesignLights Consortium, which can improve lighting performance and technology through technical resources (DLC 2021).

Energy Savings Goals in Units of Total Energy or Greenhouse Gas Emissions

Efficiency policies in the utility sector have not traditionally required or established specified environmental and health benefits goals. However, many jurisdictions account for some or all of these benefits in cost-benefit analyses to some extent, either directly by monetizing them or through proxies and other substitutes (ACEEE 2018). Some jurisdictions only monetize GHG benefits.

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[9] For example, one NEEA program encourages the installation of high-performance window attachments such as commercial secondary glazing systems and residential low-emissivity storm windows as a standard practice in buildings and homes in the Pacific Northwest.

[10] The MTC, launched with funding from Nicor Gas and ComEd, is a partnership between Resource Innovations, Midwest Energy Efficiency Alliance, NEEA, and the Gas Technology Institute to promote market transformation infrastructure in the Midwest (MEEA 2020).

Several states are now aligning their energy efficiency programs with decarbonization goals. Some have established fuel-neutral energy savings targets that express the overall energy savings goal in British thermal units (BTUs),[11] which allows for both efficiency and building electrification programs to count savings from any fuel (Molina et al. 2020). Other jurisdictions are designing savings goals and complementary policies around GHG emissions metrics, such as Sacramento Municipal Utility District's "avoided carbon" efficiency metric, established in 2020. The utility's board sees this metric as a way to align energy efficiency programs with carbon reduction goals and to encourage switching from gas appliances to efficient, electric appliances (SMUD 2020).

States have also begun to update benefit-cost analyses to account for GHG benefits. For example, in 2021, the California Public Utilities Commission (CPUC) adopted a new "total system benefit" metric that reflects the lifecycle energy, capacity, and GHG benefits of a utility's energy efficiency program portfolio (CPUC 2021). In 2021, the Commonwealth of Massachusetts adopted the Next Generation Roadmap, which updated the GHG emissions limits related to the 2008 Global Warming Solutions Act, and restricted emissions to no less than 50 percent for 2030 and no less than 75 percent for 2040 (MA S.9 2021). Utilities in Massachusetts are updating their programs to comply with these new emissions targets. The State Examples presented in this chapter provide more details on approaches used in Arkansas, Oregon, and Maryland.

Annual and Lifetime Savings Goals

Most EERS policies have been designed to achieve incremental annual energy savings targets for each year over the compliance period. Fewer policies have been designed to achieve longer-term, cumulative or lifetime energy savings. Recently, more states have established or demonstrated interest in lifetime energy savings targets, which can incentivize long-term energy efficiency measures that can improve emissions reduction and reduce long-term costs. States may find synergies in incorporating both annual and lifetime savings targets to improve their overall energy efficiency progress. For example, the Future Energy Jobs Act in Illinois established a target for cumulative energy savings reductions over time in addition to the original standard that was based on incremental annual savings. According to the policy, Illinois utilities must reach a certain percent of cumulative energy reductions by 2030—16 percent for ComEd and 21.5 percent for Ameren (IL S.B. 2814 2016). The state's Climate and Equitable Jobs Act, enacted in 2021, extended its cumulative energy savings targets beyond 2030 (IL S.B. 2408 2021).

Building Electrification

Several states are beginning to incorporate forms of efficient fuel switching, including building electrification, into their energy efficiency policies and programs to meet goals for emissions reductions. Building electrification refers to the full or partial replacement of fossil fuel-based equipment with efficient, electric alternatives. In general, building electrification reduces GHG emissions in situations where the new appliance is more energy-efficient than the old appliance and when the regional electricity grid has substantial low- or zero-emission generation factors.[12] Some states are changing their efficiency policies to include fuel switching and building electrification. For example, Colorado passed legislation that establishes "clean heat" GHG targets and requires gas distribution utilities to file a clean heat plan to show how they will meet the GHG reduction goals (CO SB 21-264 2021). In 2020, Minnesota passed the Natural Gas Innovation Act (NGIA) SF 3013 that

[11] A BTU is a measure of the heat content of fuels or energy sources.

[12] For example, a series of analyses finds that electrification of end uses, when coupled with power sector decarbonization, can substantially reduce economy-wide emissions of carbon dioxide associated with fossil fuel combustion. In the absence of any additional power sector carbon policy, electrification has the potential to reduce economy-wide fossil fuel combustion emissions by 41 percent (below 2005 level) by 2050 (NREL 2017).

allows gas utilities to implement and recover costs from a range of GHG-reducing resources, including, but not limited to, energy efficiency and strategic electrification (MN SF 3013 2020).

Other examples include New York and Massachusetts, which have added goals related to building electrification to their statewide energy efficiency framework along with electric and natural gas savings goals. New York's Public Service Commission established an overall fuel-neutral savings target of 185 trillion BTUs over a ten-year time frame, 2015–2025, relative to forecasted energy consumption in 2025. By establishing the overall target in BTUs, efficiency and building electrification savings can count toward both goals, which can reduce electricity demand growth and keep down program costs (NYSERDA 2018; EERE 2020). In addition, the state's IOUs must reach energy efficiency savings equal to 3 percent of electricity sales by 2025 (NY PSC 2020). Massachusetts established a 2022–2024 plan that includes energy savings goals for electric and gas program administrators, aggregated as lifetime, all-fuel savings goals, as well as GHG emissions reduction goals (MA DPU 2022a). The plan includes strategic electrification components, such as the linking of utility profits from the efficiency programs to increasing the deployment of heat pumps, and dedicated program spending on electric heat pump incentives for residential, income-eligible, and commercial and industrial customers (MA DPU 2022b).

Other states are also developing policies to include building electrification. Rhode Island launched a Heating Sector Transformation Initiative in 2019, which was designed to decarbonize heating in the state's residential and commercial sectors (RI OER 2020). In its pathways to decarbonization by 2050, the state outlines three broad categories for its heating sector transformation: energy efficiency, carbon-neutral fuels, and replacing fossil fuel-based heating systems with electric heat pumps powered by carbon-free electricity. In 2021, the state of Illinois adopted the Climate and Equitable Jobs Act, which extended the state's energy efficiency goals to 2040 and enables electric utilities to incorporate electrification programs into efficiency portfolio plans (IL S.B. 2408 2021). Energy savings from electrification programs can be counted toward their EERS, subject to caps as specified in the legislation.

While energy efficiency generally reduces electricity demand, building electrification may increase electricity demand. For example, an electric heat pump may be more efficient than a fossil fuel-powered furnace but may increase electricity load on the grid. The integration of building energy codes, market transformation programs, and energy efficiency programs can lead to synergies between efficiency and electrification because efficiency savings can offset increases in electricity demand from electrification (EERE 2020). Leveraging existing efficiency programs for building electrification is practical because it can reduce administrative costs.

Currently, state policies regarding fuel switching[13] are evolving and range from offering specific guidance for meeting fuel-switching objectives as part of energy efficiency targets, to prohibiting fuel switching as a way to meet these targets (ACEEE 2020e).

In addition to action by states, many local governments have been active in policy development to advance building electrification through efficiency programs, particularly where they can adopt stretch codes for buildings that exceed the statewide energy code. Stretch codes are designed to achieve higher levels of energy savings than the base codes through the incorporation of advanced technologies and practices for new construction and major building upgrades (NBI n.d.).

[13] Note that fuel switching is a comprehensive term that does not, on its own, denote positive environmental outcomes. Fuel switching can include electrification through the replacement of fossil fuel-powered equipment with electricity. Fuel switching can also include changing electric-powered equipment to fossil fuel powered operation.

Non-wires Alternatives

Some regulators are ordering utilities to consider alternative options, including energy efficiency, to defer or avoid expensive traditional infrastructure investments like power plants, transmission lines, and distribution system upgrades like substations. Non-wires alternatives, also referred to as non-wires solutions, frequently include targeted deployments of combinations of DERs like rooftop solar, energy storage, demand response, and energy efficiency that provide value to the distribution grid to defer or eliminate the need for a specific infrastructure investment in locations where equipment like substations or distribution lines are overloaded. Many states are now considering or implementing efficiency and other non-wires alternatives on a pilot or permanent basis, or as part of a distribution system planning requirement (for more on non-wires alternatives, refer to other chapters in the *Guide*). In 2016, New York's Public Service Commission issued guidance requiring utilities to include non-wires alternatives in their planning, identifying location-specific benefits (NEEP 2017). The Brooklyn-Queens Neighborhood Program is an example non-wires alternative that combines DERs, including energy efficiency (DOE 2019b).

Improving Equity

Nationally, energy burdens, or the share of household income going to energy bills, are above average for low-income, Black, Hispanic, Native American, and older adult households, and there are several reasons for this level of underservice (ACEEE 2020f). An emerging realization is that lower-income households are underserved by energy services in general, including by current state and utility energy efficiency programs and federal weatherization programs. The Presidential Executive Order 14008, Tackling the Climate Crisis at Home and Abroad, acknowledges the need to address the disproportionately high and adverse human health, environmental, climate-related, and other cumulative impacts on disadvantaged communities. The Order introduced the Justice40 initiative, which sets a goal for certain federal investments in climate and clean energy to result in at least 40 percent of benefits flowing to disadvantaged communities (The White House 2021).

Current policy barriers to equitable levels of service in efficiency programs include program budgets, participation requirements (e.g., verifying eligibility, obtaining consent, overcoming housing structural or safety issues), split incentives, and the upfront cost of efficient technology. Federal weatherization programs have limited budgets and may meet as little as 1 percent of the need (Alliance to Save Energy 2018; LIHEAP Clearinghouse and U.S. DHHS 2016). State programs complement federal weatherization funds, but the situation varies by state. When states use cost-effectiveness alone to determine which energy efficiency efforts to fund, they tend to fund fewer low-income projects.[14] Approaches to measuring cost-effectiveness are described in the Key Design Considerations section in this chapter. Some states do not have robust efficiency programs generally, and some have programs that make it difficult for low-income households to participate (such as mail-in rebates, which require initial payment in full). Studies in Michigan found that 12 percent of households fall into an energy efficiency financing coverage gap due to their income (Forrester and Reames 2020). For efficient light bulbs, the cost to upgrade from incandescent to LED was two times higher in high-poverty areas (Reames, Reiner, and Stacey 2018).

States are using a variety of strategies to improve the equitable distribution of their energy efficiency program benefits. These include increasing funding for low-income recipients, developing policy strategies to better reach underserved groups and include their input in program design, creating programs to repair building issues that would otherwise prevent energy efficiency and weatherization measures, seeking to understand the demographics of program recipients, and striving to increase the diversity of workers implementing energy

[14] The Energy Equity Project provides more information on this area of research (Energy Equity Project n.d.).

efficiency programs. Some states have assembled equity stakeholder groups that provide input to these efforts (for more information, refer to the Participants section in this chapter).

Most states are setting aside funds specifically for low-income customers, and many are creating equity metrics for their programs. As of 2020, 21 states have energy efficiency spending targets for low-income households, and 42 states have special or waived cost-effectiveness requirements for low-income programs (ACEEE 2020d). Examples of states leading on low-income energy efficiency program spending include Massachusetts, Rhode Island, and Vermont, according to ACEEE's 2020 State Energy Efficiency Scorecard (ACEEE 2020d). In 2019, normalized spending in these states was at least two or three times more than other states because these states are covering the cost of energy efficiency measures. The District of Columbia requires that a minimum proportion of energy efficiency spending go to low-income households and that a minimum level of energy savings come from low-income programs (DOEE 2020). The California Energy Commission maintains energy equity indicators data and a geospatial mapping tool to view the energy equity indicator maps and data. It identifies low-income areas with low investment in energy efficiency, in addition to other clean energy indicators, by community (CEC n.d.).

Some states are exploring ways to support repairs to buildings that, if left unaddressed, would prevent energy efficiency and weatherization measures from being implemented. For example, Illinois' 2021 Climate and Equitable Jobs Act requires utility programs to invest at least 15 percent of the low-income weatherization budget in health and safety measures needed to implement energy efficiency improvements and requires 80 percent of electric utilities' low-income energy efficiency budgets to go to whole-building weatherization (IL S.B. 2408 2021; MEEA 2021). Massachusetts' residential weatherization programs provide funding to remediate common pre-weatherization barriers in buildings that have, for example, structural, mold, or electrical issues (Mass Save 2018).

In some states, agencies are trying to better understand the demographics of program participants and potential participants by disaggregating data by building type, household income, and neighborhood racial diversity. Here are several examples:

- An Energy Trust of Oregon study found that its customers who are renters, who are Black or Hispanic, or who have electric-only service tended to have less awareness of energy efficiency programs. The study recommended more targeted outreach and marketing to communities of color, low-income communities, and rental property owners and managers (Energy Trust of Oregon 2021b). Energy Trust of Oregon allows higher incentives for "moderate income" households than other households--the Trust calls this its "Savings within Reach" offer.
- The Northwest Energy Efficiency Alliance conducted a detailed building stock assessment by housing type, building age, insulation quality, and other parameters (NEEA 2019). Disaggregated utility customer or energy efficiency program participant data identified that multifamily residential buildings and smaller commercial buildings are underserved relative to the population and energy efficiency potential they represent (NWPCC 2018).[15]
- In Massachusetts, the state's Energy Efficiency Advisory Council worked with an Equity Working Group that advised more tracking and reporting on program participant demographics and more targeted outreach to geographic areas and population groups that have been previously underserved by energy efficiency programs (MA EEAC 2021).

[15] Mobile and manufactured housing are other types of buildings policymakers may wish to address since they are often energy inefficient and therefore may lead to very high energy bills.

- In New York under the 2019 Climate Act, a Climate Justice Working Group and the Environmental Justice Advisory Group were established to consult on the transition, host discussions, and provide recommendations that contribute to the state Scoping Plan (NY 2020).

Several states are developing policy strategies to better reach underserved communities with energy efficiency programs and include these groups in the design of the programs. In response to California's AB 617, the CPUC identified several program options that target energy efficiency in buildings to help reduce emissions (CA A.B. 617 2017); (CPUC 2019). CPUC identified utility energy efficiency programs, the Energy Savings Assistance program that provides fully subsidized weatherization services, and a Disadvantaged Communities Demand Response Pilot program, in which participating consumers are paid to power down appliances at designated times or shift their load. In Massachusetts, the 2022–2024 energy efficiency plan enhances outreach strategies to communities with lower historic energy efficiency participation rates and targets investments in moderate-income customers, language isolated customers, small businesses, renters and landlords, and workforce development (MA DPU 2022b). In addition, 12 states have passed legislation that allows regulators to financially compensate intervenors from community groups so they can participate in the policymaking process that creates the energy efficiency programs (Low-Income Solar 2020).

Some states are taking action to increase the diversity of workers implementing energy efficiency programs as part of an equitable transition to clean energy. The Massachusetts Clean Energy Pathway Program is one such effort, launched by the utilities in Massachusetts in 2021, focused on paid internships in weatherization and HVAC for young adults from backgrounds underrepresented in the Massachusetts energy efficiency workforce (Mass Save 2021).

Designing Effective Energy Efficiency Programs and Resource Standards

Key considerations for states establishing energy efficiency programs and policies, such as EERS, include identifying key participants and their roles, engaging stakeholders, designing cost-effectiveness tests to determine eligible energy efficiency programs, designating sufficient funding, determining how to prioritize equity impacts, and setting savings targets. Savings goals and targets may also include disadvantaged communities to prioritize equitable impacts.

Participants

Many participants play a role in designing and developing energy efficiency programs, policies, and standards. States have established robust and ongoing stakeholder processes to inform the design, implementation, and effectiveness of energy efficiency programs and policies. Examples range from statewide collaboratives with statutory permanence and significant operating budgets to stakeholder advisory groups created for a temporary basis to examine a defined set of issues over a specified period (for example, refer to SEE Action 2015). Experience from New England states, Arkansas, and elsewhere demonstrate how these groups can shift the nature of decision-making from an adversarial process to collaboration to identify solutions that satisfy multiple objectives and can allow decision-makers to address many issues in an accelerated time frame (Sosland, Loiter, and Schlegel 2012; AR PSC 2015).

States typically involve the following groups and agencies in developing energy efficiency programs, policies, and standards and engaging stakeholders.

- *State governors*. Governors establish policy priorities and can leverage funding for pilot programs or other investments, assemble advisory groups, engage stakeholders, and direct other state entities to conduct targeted research in support of state energy efficiency policy.
- *State legislatures.* Legislation may be required to establish or expand customer-funded energy efficiency programs, whether through an EERS policy or other policy options. In most states, legislation is required to set EERS targets, which may be codified in bill text or directed to a state agency to do so. In either case, states designate entities to administer implementation of the targets. The state legislatures may need to authorize and ensure periodic reviews of energy efficiency programs implemented by utilities and third-party administrators that are not otherwise under the jurisdiction of the state electric utility regulators. Legislation may also determine energy efficiency goals and objectives, establish funding, specify implementing and oversight organizations, establish benefit-cost analysis approaches, and review program authorization at specified intervals.
- *State energy offices.* State energy officials, often on behalf of the state governor, play an important role in developing policies to support energy efficiency programs and in reporting on results of policies and programs. State energy offices may also play a role in administering energy efficiency programs, particularly those funded through state budgets and/or federal grants.
- *Local government.* Local governments, many of which have climate, energy, and economic goals, play an important role in the regulatory process that determines the savings targets and types of utility-delivered energy efficiency programs. Utility programs are often among the largest sources of energy efficiency spending available to local governments to meet their goals and address issues, including rate setting, program access and affordability for under-resourced communities, and meeting GHG emissions reduction targets. Cities and counties may work with public utility commissions and provide a local perspective in regulatory proceedings (NARUC 2019). Local governments may engage with public utility commissions through relationship building, participating in public comment and stakeholder meetings, and working in tandem with other local governments or large customers (NARUC 2019).
- *Utility regulators.* Utility regulators, often referred to as public utility commissions, play a key role in authorizing, reviewing, and approving customer-funded energy efficiency program plans, approving utility cost recovery and related ratemaking considerations, approving methodologies used to evaluate savings and co-benefits, and ensuring that programs are achieving anticipated results. Regulators advance these roles through processes that allow for various levels of stakeholder participation. In some states, utility regulators also have authority over specific aspects of cooperatively and publicly owned utilities that give them jurisdiction over energy efficiency programs. Utility regulators that require customer-funded energy efficiency programs to be administered by third-party entities, instead of the utility companies, may contract directly with the third-party program administrators. In some states, utility regulators have the authority to set EERS targets directly. Utility regulators often evaluate energy efficiency programs and EERS policies given their oversight of utilities.
- *Other state agencies.* State environmental agencies; departments of commerce, economic development, housing; and other agencies may play a role in supporting policy, establishing funding, incentivizing economic development, and implementing energy efficiency programs. The Benefits section in this chapter describes the reasons and ways for other state agency staff to engage on energy efficiency programs. For example, many air regulators analyze the environmental impacts of the electric power sector, which would vary based on energy efficiency program design, funding, and implementation. In another example, state

agencies that deliver assistance from the federal Low-Income Home Energy Assistance Program (LIHEAP) and Weatherization Assistance Program (WAP) also help implement energy efficiency programs to improve energy affordability.

- *Utilities.* In most states, utilities serve as program administrators for energy efficiency programs. In this role, utilities design, implement, and report on program results. Utilities process charges on customer bills and provide data sources for reporting results. Utilities may also coordinate with other energy efficiency program administrators, including state energy offices, LIHEAP and weatherization administrators, local community action agencies, and third-party administrators, during program design and implementation. Given the direct impact of energy savings targets on the utility sector, legislatures and utility regulators typically seek input from utilities on the potential impacts on utility profitability, risk, reliability, ongoing operations, and avoided costs. Legislatures and regulators increasingly seek information on emissions reductions and customer benefits.
- *Community advocates and representatives from communities with environmental justice concerns.* Consumer advocates are typically active participants in energy efficiency program proceedings with utility regulators. Their input informs decisions by regulators on rate design, the distribution of charges to customers to fund programs, and which customer classes will be offered programs, such as low-income, residential, commercial or industrial customers. Communities with environmental justice concerns, which may include low-income households, renters, manufactured home residents or multifamily residents, as well as Black, Hispanic, and Native American households, are less likely to have the resources or access to participate in the policymaking process. States have held public workshops and created public comment processes to help inform topics such as potential economic impacts, costs, and benefits, including health benefits and other reduced emission effects, as discussed in the Equity Benefits section in this chapter. States vary on level of ease or difficulty for the public to engage on a utility regulator proceeding. Offering intervenor financial compensation, evening or weekend meeting times, and translation services can improve inclusion of the least advantaged stakeholders.
- *Public and private sector organizations*. Businesses and other non-governmental organizations, including environmental groups, participate in various stages of policy design, adoption, and implementation of efficiency programs. Efficiency service providers and trade allies bring insights about program designs that work well based on their on-the-ground experience.
- *Customer representatives.* Large energy users and their representatives often focus their attention on rate impacts of efficiency programs and may seek to opt out of paying for efficiency programs in many states (LBNL 2018b). However, some are engaged in program design and can help ensure efficiency programs are relevant and beneficial for this customer class, potentially reducing the desire among industrial customers and other large energy users to seek opt out from programs (Goldberg et al. 2014). Small businesses and their representatives may affect utility policy when it is coupled with economic development policy.

Key Design Considerations

Some policy and program considerations drive policy success and energy efficiency savings more than others, but a wide variety of design approaches can lead to successful implementation and savings results. Research has identified several factors that drive higher levels of energy savings, including state-level energy efficiency goals, dedicated funding sources, the decoupling of utility revenue from sales, and performance incentive mechanisms (the latter two are covered elsewhere in the *Guide*) (Brattle Group 2019). Other research on state programs indicates that no single target type is more effective than another, but suggests that states should consider incorporating multiple targets simultaneously, such as resource-specific and fuel-neutral goals (ACEEE 2019b). States can use nested or overlapping goals to achieve multiple objectives, incentivize investment in

key areas by creating sub-targets, and promote continual investment in energy efficiency improvements. For more on target setting, refer to the EERS Targets Key Design Considerations section in this chapter.

Energy Efficiency Policy and Program Key Design Considerations

Energy efficiency policies and programs can offer many types of interventions to customers through a variety of delivery methods. Choosing these aspects of program design are an important consideration for states, while keeping in mind stakeholder needs. Following are several dimensions of energy efficiency programs for states to think through in the design process.

- *Policy approach and whether to establish an EERS.* Establishing an EERS can help build momentum for energy efficiency programs, but states can operate energy efficiency programs without an EERS. For example, state utility commissions can direct utilities to incorporate energy efficiency targets into their integrated resource planning processes (Southern Alliance for Clean Energy 2021). States that have enacted standards were responsible for 80 percent of utility electricity savings in the United States in 2016 and 2017 (ACEEE 2019b). All cost-effective efficiency requirements are another policy option, which typically lead to a form of EERS (Gilleo 2014).
- *Administrator model*. Choice of administrator model depends on state policy priorities and the unique roles of each type of administrator. Utilities, state agencies, nonprofits, or private sector entities can serve as program administrators, or states can use a combination of these approaches. As noted, research has shown that the type of administrator model used by a state does not determine efficiency program success, but each has unique considerations (Brattle Group 2019).
- *Customer classes and target populations.* For energy efficiency programs developed and run by utilities or other entities like nonprofits, states typically provide initial policy direction on which customer classes are to be offered programs. Program options are typically categorized within six sectors: residential, commercial, industrial and agricultural, commercial and industrial, cross-cutting, and low-income (LBNL et al. 2013). Policymakers can provide additional direction on serving certain populations such as low-income households or community institutions;[16] rural areas; [17] communities with environmental burdens; or other underserved customer classes such as renters, customers with language barriers, or customers with high energy burdens.
- *Program offerings to drive market transformation.* Policy direction is often provided at a portfolio level, leaving flexibility for program administrators to design and modify specific program offerings to meet policy objectives. Intervention options range from building codes and standards, education, behavioral programs, and engineering support, to direct installation of appliances and building improvements. Delivery methods range from rebates and financing to tax credits[18] and no-fee installations.

[16] Some energy efficiency programs are increasing their focus on non-residential buildings that serve low-income communities, such as nonprofits, schools, local government buildings, locally owned businesses, medical facilities, shelters, and community centers. More information is available in the report "Extending the Benefits of Nonresidential Energy Efficiency to Low-Income Communities" listed in the Information Resources section in this chapter.

[17] An emerging distributional issue is disproportionate program participation and thus disproportionate benefits to urban communities relative to rural communities in an area that includes both community types. This may result because urban households had higher incomes and thus were more likely to adopt efficient technologies, because there were more "trade allies" that served their areas, or because efficient products were more available at retail stores in the urban areas. Urban areas also benefit from economies of scale, as it is easier to reach many households within blocks of one another which often have houses with similar issues (e.g., degraded insulation, outdated HVAC systems and water heaters).

[18] Some advocates argue that burdens and benefits of tax impacts are not distributed equitably because taxes are collected from all residents but credits are typically received by middle and upper income households or larger businesses.

- *Integration with DERs and demand flexibility.* As states refine and expand their program offerings, some are incorporating and integrating other DERs to better serve customers with a more comprehensive "one-stop-shopping" experience. This streamlined customer experience could lead to more completed projects and greater energy savings, while gaining administrative efficiency. In addition, the expansion of program offerings to include demand-response and other flexible DER offerings helps accelerate adoption of flexible resources that serve grid needs. In the United States, DER adoption has grown due to enabling policies (inclusive of and in addition to energy efficiency programs) and favorable market factors (FERC 2018) and the U.S. Department of Energy (DOE) has established goals and a roadmap for incorporating more flexible, grid-interactive resources into buildings (DOE 2021b). Although relatively few states have integrated other DERs into their energy efficiency programs (ACEEE 2019c), some energy efficiency program administrators are offering or exploring flexible resources, including energy storage, demand response, and plug-in vehicle solutions. Other *Guide* chapters on policies to support DER deployment include Interconnection and Net Metering, and Customer Rates and Data Access.

  New York's Reforming the Energy Vision (REV) provides an example. The state called on utilities to integrate and operate DER solutions (NY ISO 2017). Energy Trust of Oregon provides another example of the marketing of DER offerings beyond energy efficiency, including customer-side renewables and demand response. Energy Trust worked with Portland General Electric (PGE) on their test bed project to demonstrate how to bundle energy efficiency and demand response marketing to customers for synergistic effects. Energy Trust also explored efforts with PGE to better balance renewable generation and grid needs using storage (Energy Trust of Oregon 2020a).

- *Participation of large energy users, including commercial and industrial customers.* Some states are finding ways to increase large energy users' participation in energy efficiency programs to better meet savings targets and to ensure equitable distribution of energy costs and benefits across all customers. However, many states have allowed large energy users such as industrial customers to opt out of paying for or participating in efficiency programs, which can be detrimental to other customers financially (ACEEE 2020d). One state study found that opt-out policies not only resulted in higher bills for the customers that opted out, but also higher overall utility system costs, and higher health costs due to increased air pollution (Baatz, Relf, and Kelly 2017). As a result, total savings are lower and the cost of acquiring energy savings are higher than they otherwise would be if the largest users are involved. Policies that successfully address low participation of industrial customers in energy efficiency programs offer opportunities in response to specific barriers. The Midwest Energy Efficiency Alliance found that policies that support industrial participation in energy efficiency programs will both improve industrial corporations' financial bottom line as well as states' achievement of energy savings goals (MEEA 2017).

- *Incentivizing combined heat and power.* Of interest to large energy users, many states administer programs that incentivize combined heat and power (CHP)[19] and/or count CHP as an eligible resource in their energy efficiency resource standards.

- *Applicability of policy by utility type or statewide.* State legislators can choose to apply their EERS or energy efficiency policy statewide or to types of utilities, including investor-owned utilities (IOUs), cooperative utilities, and/or municipal utilities. To date, most state policies apply to IOUs. The geographic coverage of energy efficiency programs may be affected by the jurisdiction of the agency establishing and implementing the policy. For example, utility regulators in many states do not have authority over cooperative or municipal utilities, limiting state-directed energy efficiency programs to investor-owned

[19] CHP is an energy-efficient technology that generates electricity and captures the heat that would otherwise be wasted to provide useful thermal energy—such as steam or hot water—that can be used for space heating, cooling, domestic hot water, and industrial processes. For more information on CHP, refer to EPA's CHP Partnership website and EPA's CHP Policies and Incentives Database.

utilities. However, the board of directors or municipal agency overseeing the utility may determine efficiency program coverage for a cooperative or municipal utility. Expanding applicability to all utilities and/or to a statewide program administrator may help states accelerate progress toward their goals and lead more customers to access benefits.

- *Development and application of cost-effectiveness tests.* States decide their approach to analyzing the costs and benefits of energy efficiency programs. Key factors are the types of costs and benefits included in a test, methods for determining costs and benefits, and other key methodological choices such as discount rates and whether certain programs such as low-income programs are exempted from cost-effectiveness requirements. States also decide how cost-effectiveness tests are factored into decision-making (e.g., benefit-cost thresholds that must be achieved) and what level of granularity to apply to these tests (e.g., portfolio level, customer sector, or measure level). Additional information on cost-effectiveness and a discussion of Oregon's approach are available in other sections in this chapter.
- *Definitions of goals and metrics*. States can set goals to achieve a certain amount of spending on energy efficiency programs, achieve a certain percent or quantity of energy savings (i.e., an EERS), and/or avoid a certain quantity of carbon emissions. States can establish multiple goals of nested or overlapping metrics. Metrics may also include the number of rebates issued, the number of households served, and/or the percent of customer bills that have become affordable. Leading states such as California are updating energy efficiency program guidance to align goals and metrics with other state policies on climate change, equity, and grid modernization (CPUC 2021).
- *Consideration to address equity of program outcomes and co-benefits.* States can design policies to ensure low-income customers and other customer groups receive energy efficiency program investments and benefits. Options include setting a minimum level of state or utility spending for low-income programs, targets for reducing energy burdens, incentives to program implementers for exceeding these targets in underserved communities, and exemptions to cost-effectiveness requirements for low-income programs.[20] Exemptions to cost-effectiveness requirements and special cost-effectiveness screening provisions may include studies that directly calculate non-energy benefits or use multipliers (for example, 20 percent or more) that approximate the additional benefits these programs provide. Virginia set a minimum spending level for low-income programs in HB 1152, passed in 2020, which established the state as a member of the Regional Greenhouse Gas Initiative and allocated 50 percent of cap-and-trade revenue to low-income energy efficiency (VA H.B. 1152 2020). Other low-income energy efficiency funding targets or requirements include those established by the state of Washington's 2019 Clean Energy Transformation Act (WA WAC §194-40 2020), the Illinois Future Energy Jobs Act (IL S.B. 2814 2016), and the California Clean Energy and Pollution Reduction Act (CA S.B. 350 2015). Targets for reducing energy burdens can look like the Pennsylvania Public Utility Commission's 2019 goal, which directs utilities to help the lowest-income customers pay no more than 6 percent of their income on energy bills (PA PUC 2019).

[20] For more on these policies, refer to *Guidelines for Low-Income Energy Efficiency Programs* (ACEEE 2021) and *Low-Income Energy Affordability: Conclusions from a Literature Review* (ORNL 2020).

Best Practices: Developing and Adopting Energy Efficiency Programs

The following best practices can help states develop effective energy efficiency programs. These best practices are based on the experiences of states that have longstanding and effective energy efficiency portfolios.

- Engage key stakeholders and experts in program design and establish a statewide energy efficiency advisory group to guide and monitor programs over time. Members of the advisory groups may be appointed by a state agency such as an energy office or the utility regulator.
- Base program designs on market characteristics and customer needs. Determine the equitable, cost-effective, and achievable potential for energy efficiency in the state. An energy efficiency potential study can identify program needs and opportunities. Many states include the multiple energy, environmental, and economic benefits of efficiency programs when reviewing cost-effectiveness and potential studies.
- Assess the level and diversity of support for energy efficiency programs. Engage key stakeholders (i.e., utilities; residential, commercial, and industrial customers; municipalities; representatives of underserved and low-income customers; trade allies; environmental groups; and experts) collaboratively to help design policies and programs—including the administering organization, funding, duration, and evaluation methods.
- Establish, revise, or extend long-term policy direction, such as through targets for energy savings, emissions reductions, all cost-effective efficiency requirements, and funding allocations. Establish specific provisions to prevent efficiency program funds from being used for other purposes or from being comingled with general state budget funds. Make funding a minimum level, not a cap on investment in energy efficiency. Approve long-term funding cycles (5 to 10 years) to let programs build market experience and capture return on investment.
- Pursue legislative or regulatory authorizations needed to establish an EERS, other efficiency policy approaches, or expanded efficiency portfolio.
- Ensure that efficiency programs serve the needs of diverse customer classes and stakeholder groups. Managing efficiency programs through portfolios allows program administrators to match incentive types and program features with different customer types and market needs. Keep program designs simple and clear.
- Determine the administering organization(s). Options include utilities, state agencies, independent companies and organizations, or some combination of these options. Consider a range of potential organizations for program delivery. When using a combination of program administrators, design distinct but complementary roles and responsibilities for each entity.
- Establish effective evaluation methods that build on proven approaches and are appropriate given the policy objectives and program design. Collect data that will allow assessment of distribution of benefits by location or demographics.
- Learn from other states' experiences to identify cost-effective ways to achieve energy savings through programs. Partner with regional and national market transformation initiatives.

EERS Policies Key Design Considerations

In addition to key design considerations for energy efficiency programs discussed in this chapter, EERS policies have additional considerations specific to how the targets are designed. State EERS policies have been set in various ways, including but not limited to the following considerations for additional information on setting targets).

- Measuring the target in relative terms (i.e., as a percent of energy sales), absolute terms (i.e., amount of energy savings expressed in BTUs or kWh), and/or emissions reductions (e.g., expressed in tons) (ACEEE 2019b).
- Specified as a portion of load growth or portion of peak electricity demand. Leading states are focusing on the changing electricity grid with higher levels of intermittent resources, variable load, and electrified end uses. With strategic target setting and sufficient grid planning, energy efficiency and other DERs can support the needs of the modern grid.
- Calculated on a "gross" basis or on a "net" basis. Gross savings are changes in energy consumption that result directly from program-related actions taken by participants of an energy efficiency program,

regardless of why they participated (NREL 2014). Net savings are attributable to particular energy efficiency interventions and may involve correcting for the effects of free ridership, spillover and market effects (NREL 2014).

- Specified as annual incremental savings and/or cumulative lifetime savings over the functional life of energy efficiency measures. States can seek to ensure the persistence of energy efficiency savings in their target-setting through a combination of annual and cumulative targets.

When setting targets, many states analyze their energy efficiency potential and estimate its costs and benefits. States also seek to understand which markets and end uses hold that savings potential. Energy efficiency potential studies are a resource that may help determine program funding needs, the level of energy savings that can be achieved at various thresholds of costs and benefits, and what may be achieved equitably (SEE Action 2011). As policymakers increase the focus on equity in efficiency programs, states may need to revise efficiency potential calculations to ensure the programs fully account for the benefits and costs of reaching more participants and that the programs are aligned with the state's cost-effectiveness screening practices such as inclusion of non-energy benefits and exemptions for low-income programs.

Funding Energy Efficiency

Adequate, consistent, and stable funding is critical for the success of efficiency programs and for ensuring the private sector's continued participation. Utility regulators as well as state executive and legislative branches rely on various funding sources to administer, oversee, and expand an EERS or efficiency portfolio. Energy efficiency program funding covers the costs incurred by program administrators; incentives paid to customers, manufacturers, distributors, retailers, contractors; performance incentives paid to the utility or other program administrators; and evaluation, measurement, and verification. Funding sources include ratepayer funding, carbon market revenues, electricity capacity markets, bond issuances, private capital leveraged by green banks and energy service companies, and government grants.

Many programs use money collected from ratepayers through customer utility bills, for example through rates or riders such as a system benefits charge or public benefit fund. Utilities may recover program costs from their operating budgets, with funding levels and cost distribution across customers determined as part of the broader ratemaking process. States also use other sources of customer funding, including proceeds from emissions allowance auctions, such as in Regional Greenhous Gas Initiative (RGGI) states,[21] and energy efficiency programs bidding into electricity capacity markets, (e.g., operated by the New England Independent System Operator and the PJM Interconnection).

Sources of non-customer funds include federal or state governments, such as grants and loans from the U.S. Department of Agriculture (USDA) for energy efficiency programs in rural communities. State energy offices administer programs using state funding and grants from foundations and the federal government (e.g., formula grants and competitive awards from DOE). Energy efficiency programs can also coordinate with weatherization assistance programs to leverage an additional funding source while also ensuring complementary program design and implementation for low-income residential customers (refer to the Interaction with Federal Programs section in this chapter). Additional state examples include state tax revenue and bonding authorities. States and localities have also established financing mechanisms to leverage private capital for efficiency programs, such as through state and local green banks (e.g., Connecticut[22]), energy

[21] In 2019, several states directed some funding for energy efficiency programs through proceeds from the RGGI auction (ACEEE 2020d).

[22] Connecticut established the nation's first Green Bank, which offers incentives and financing for clean energy, including efficiency (CT DECD n.d.).

savings performance contracting (ESPC), or other financing programs. Maine is one example of a state applying funds from multiple sources. Efficiency Maine Trust, the independent administrator, uses funds from ratepayers, RGGI revenues, capacity markets, settlements (e.g., Volkswagen settlement), and government grants (ME Climate Council 2020).

Market interruptions have occurred in cases when states facing budget shortfalls deferred resources from ratepayer energy efficiency funding sources for other purposes. Some states have developed legislation to guard against this.[23] To maintain funding and support for energy efficiency programs, states may collect and share information on program performance and continually educate stakeholders about the energy, economic, and environmental benefits.

Sometimes states find there is a gap in funding building improvements and repairs needed prior to building energy retrofits for older homes with existing problems such as asbestos removal, as discussed in Policy Trends – Improving Equity. This could be addressed through coordinated, complementary programs (e.g., to identify and fund prerequisite hazardous material removal). States could leverage health-related federal funding of up to $2 billion from the departments of Health and Human Services, Housing and Urban Development, and Treasury to support residential energy efficiency programs (ACEEE 2020a). In another form of braiding program funding, some states have opted to integrate broader DER programs with energy efficiency programs, directing utility or other funding to the same program administrator, as discussed in the Key Design Considerations section in this chapter.

Evaluating Energy Efficiency Cost-Effectiveness

Most states incorporate benefit-cost analysis, often referred to as cost-effectiveness testing, into the design and evaluation of their programs to determine whether the benefits exceed the costs, and many consider multiple benefits (such and health and environmental improvement) in this evaluation. Analysis of cost-effectiveness helps ensure the prudent use of program funds and can be used to compare program and technology performance in developing effective future programs. The National Standard Practice Manual for Benefit-Cost Analysis of Distributed Energy Resources (NSPM for DERs) includes principles and guidelines for aligning cost-effectiveness tests with state goals such as environmental protection and equity (NESP 2020b). As of 2018, 19 states have incorporated health or environmental benefits into their energy efficiency cost-effectiveness tests (ACEEE 2018).

Cost-effectiveness tests have traditionally been conducted within the context of one or more perspectives, primarily: the utility system, the total resource system, or societal. Some types of cost-effectiveness tests value environmental and other non-energy benefits, as described in the NSPM for DERs. Most states use at least two types of tests to determine cost-effectiveness (DOE 2020a).[24] The most common test for screening is the Total Resource Cost (TRC) Test, which in theory evaluates all benefits and all costs to the participating customers and the utility but in practice faces several challenges. For example, the test often does not reflect the state's policy goals and objectives nor accounts for costs and benefits symmetrically, e.g. by excluding hard-to-quantify benefits.[25] This can create bias in resource investment decisions by undercounting energy efficiency program benefits such as environmental and non-energy benefits. States can look to the NSPM for DERs

[23] For example, Vermont legislation states, "Funds collected through an energy efficiency charge shall not be funds of the state, shall not be available to meet the general obligations of the government, and shall not be included in the financial reports of the state" (VT S.137 1999).

[24] For example, Oregon uses both the TRC Test and the Utility Cost Test to determine the maximum incentive to pay the customer. The TRC Test reflects the perspective of the participant and utility, whereas the Utility Cost Test reflects the perspective of the utility system and program administrator (Energy Trust of Oregon 2021a).

[25] Implementation of the TRC Test can vary and may cause results to vary.

principles to ensure their cost-effectiveness test aligns with the state's policies, which may be unique to that jurisdiction, and not necessarily be the same as one of the traditional tests. The process the NSPM for DERs lays out can lead a state to develop a jurisdiction-specific test (JST), such as in Rhode Island and New Hampshire (NESP 2018; 2020a).

A range of methods or approaches are described in the NSPM for DERs that can be used to monetize hard-to-quantify non-energy benefits. One way to monetize hard-to-quantify benefits or metrics is to use a proxy in the form of percentage adder. For example, a percent multiplier for low-income program evaluations estimates the unique non-energy benefits of these programs, which improves the benefit-cost ratio of the program. Alternative benefit-cost thresholds are also sometimes used, where the threshold is set at less than 1.0, recognizing that there are more benefits to low-income customers than are quantified in the analysis. Benefits that may not be captured in the analysis include reduced arrearages, health benefits, and reduced lost days from work or school. Cost-effectiveness results in the form of net benefits are easy to compare across programs of different sizes, whereas an alternate form, benefit-cost ratios, do not have this advantage but are a complementary evaluation approach to cost-effectiveness.

Air quality regulators may wish to be involved in the choice or development of their state's cost-effectiveness test for efficiency programs to ensure that air quality benefits are appropriately included, both in terms of avoided environmental compliance costs (e.g., cap and trade program, pollution control equipment), anticipated future environmental compliance costs, and societal benefits associated with achieving state carbon emission reduction goals.

Cost-effectiveness is generally evaluated at the following four levels: measure, program, sector, and portfolio. Evaluation at the portfolio level is the most flexible; programs can be viewed together for cost-effectiveness purposes, allowing program planners to consider all customer classes, even though some measures and programs may not pass cost-effectiveness tests when looking at them individually. The NSPM for DERs provides further guidance on the assessment levels of efficiency programs.

Interaction with Federal Programs

Several federal energy efficiency programs are available to assist state and utility energy efficiency programs. These include but are not limited to: weatherization; federal energy efficiency standards for equipment, appliances, and lighting; market transformation partnerships; and technical assistance.

State programs complement federal minimum efficiency standards by supporting broader adoption of newer, more efficient products and help bring down the costs for more efficient technologies. However, in most applications, program administrators can only take credit for the energy savings above the minimum federal standards. Therefore, once a new federal standard is promulgated, state program administrators modify their programs to continue achieving cost-effective energy savings.

State policymakers and energy efficiency program administrators should also be aware of other federal programs to avoid duplication and to design programs that complement existing federal financial incentives and assistance. For example, if a federal tax credit becomes available, the magnitude of the program rebate or incentives to customers could be redirected to underserved customers that are not likely to benefit from tax credits. In those cases, federal programs can expand states' ability to advance faster toward EERS with less funds. Specific federal programs that may work synergistically with state and utility energy efficiency programs include, but are not limited to, the following:

- *EPA's ENERGY STAR* program defines efficiency through voluntary requirements adopted by partners such as manufacturers and home builders and makes it easy for consumers and businesses to identify and ask for efficient products, services, homes, and buildings.
- *DOE's Better Buildings and Better Plants Programs* advances strategies to make state, local, commercial, industrial, and residential buildings more energy efficient. In this voluntary program, executives can take the Better Building Challenge to reduce energy use by 20 percent in 10 years.
- *DOE's Grid-Interactive Efficient Buildings Program* offers technical support to state and local governments, utilities, builders, engineers, and manufacturers on how to make buildings energy efficient and demand-flexible with smart technologies.
- *State and Local Energy Efficiency Action Network (SEE Action)* is a state- and local-led effort facilitated by DOE and EPA to promote energy efficiency. SEE Action provides resources, discussion forums, and technical assistance to state and local decision-makers. State policymakers and program administrators use SEE Action tools and resources to learn about policies and best practices from other states when adopting and implementing energy efficiency programs.

The federal government also provides direct financial support to states, local governments, and utilities which may be used to support energy efficiency programs. Financial support is available via loan, grant, and cooperative agreement programs, each with their own unique eligibility and funding requirements. Federal funding sources include, but are not limited to the following:

- *DOE's State Energy Program (SEP)* helps states establish and implement energy efficiency and renewable energy plans, policies, and programs to reduce energy costs, increase competitiveness, enhance economic development, improve emergency planning, and improve the environment. SEP provides state energy offices with grants to address critical clean energy challenges.
- *DOE's Weatherization Assistance Program (WAP)* funds energy efficiency services for low-income households with a primary goal of reducing energy costs for the residents. States receive funds through formula grants and they contract with organizations to implement home weatherization services. In 2021, DOE issued an expansion of WAP client eligibility determination (DOE 2021c).
- *USDA's Rural Utilities Service* operates an Energy Efficiency and Loan Conservation Program. Through this program, utilities in rural areas may apply for financing support to administer customer programs for energy efficiency and renewable energy.
- *USDA's Rural Energy for America Program (REAP)* provides grants and loan guarantees to agricultural producers and rural businesses for energy audits, energy efficiency projects, and renewable energy systems.

Interaction with State and Local Programs

State and utility energy efficiency programs are likely to complement other state programs such as weatherization assistance, bill pay assistance, workforce development, and programs that make health or safety improvements. Energy efficiency programs may also be designed to enhance state and local building energy benchmarking policies and emerging building performance standards, and clean energy or DER market transformation efforts.

Over the last several years, many local jurisdictions and several states have adopted policies requiring commercial and multifamily building owners to measure, benchmark, and share their energy use. These policies can benefit other state and utility energy efficiency programs, provide direct efficiency improvements,

and increase customer awareness of the opportunity to make energy efficiency investments in their facilities. In many jurisdictions, building energy use is required to be disclosed publicly, providing energy efficiency program administrators with a new dataset to inform program design and delivery.

Some state and local governments have also recently established building performance standards (BPS), which are emerging policies that establish energy performance levels that buildings must achieve. Colorado HB 1286, for example, requires annual energy reporting for large buildings and development of a performance standard to reduce GHG emissions from these structures (CO H.B. 21-1286 2021). Customer-funded efficiency programs and state financial incentives can complement these BPS policies. For example, in Washington State, utilities and the Washington State Department of Commerce will be administering a program to incentivize early compliance (WA Commerce n.d.). More information on these policies is provided by EPA's Benchmarking and Building Performance Standards Policy Toolkit and the Customer Rates and Data Access chapter in the *Guide*.

Some states have clean energy workforce development policies that can help support energy efficiency programs by ensuring that in-state qualified installers are available and can also promote equity goals through workforce development policies. For example, Maine's legislature created the Maine Climate Council in 2019, focused on planning for a clean energy economy, which includes the energy efficiency industry. The Maine Climate Council Four-Year Plan for Climate Action includes strategies for training or re-training workers for clean energy jobs and developing apprenticeship programs (ME Climate Council 2020).

Other state polices that support or enable energy efficiency spending and savings include voluntary savings targets, statutory requirements for utilities to pursue all cost-effective energy efficiency, public benefit charges, integrated resource plans, demand-side management plans, and utility business model changes such as decoupling and lost revenue adjustments (other *Guide* chapters offer details on these polices).

State policies that restrict energy efficiency spending and savings include upper limits on rate impacts or program spending from the legislature or regulators, legislative or executive branch shifting funds for energy efficiency to other state program, and opt-out provisions for large commercial and industrial customers from energy savings programs and fees (LBNL 2018b).

Implementation and Evaluation

Implementation

Choice of administrator model depends on state policy priorities and the unique roles of each type of administrator. Most states rely predominately on utility-led administration. Several states, including Wisconsin, Maine, Vermont, and Oregon, as well as Washington, DC, have statewide, non-utility entities serving as the main program administrator. Many states use a combination of approaches. For example, in Illinois, both the utilities and the Illinois Department of Commerce and Economic Opportunity (DCEO) serve as program administrators, with DCEO responsible for serving state and local governments, school districts, and low-income households (ACEEE 2020d). Involvement from state utility regulators, energy offices, or other state agencies can be also helpful in overseeing the development of implementation rules, ensuring the necessary funding is available, analyzing the benefits of a program, and promoting measures that contribute to compliance.

Whether the utilities, a statewide administrator, or some combination leads overall program administration, these entities typically contract with vendors to manage program implementation and select different vendors for different program types. The vendors are responsible for managing the program, documenting and approving projects, handling rebates or other incentives, and acting as an intermediary between the program

administrator and the building contractor or homeowner. To implement a program, vendors use service providers to deliver energy efficiency services directly to residential and commercial customers. Service providers may include air conditioning contractors, insulation installers, lighting contractors, retail electric providers, energy service companies, and other energy efficiency service contractors who receive incentive payments from the utility or promote incentives to customers for installing energy efficiency measures that result in energy savings. To effectively deliver low-income energy efficiency programs, some utilities contract with specialized low-income-focused firms or community action agencies (e.g., the Community Action Partnership) for this population subgroup.

For states with an EERS, oversight of the EERS implementation is typically provided by the utility regulator and sometimes also by independent third-party evaluators hired by the regulator. Some states also establish official oversight or advisory bodies, typically composed of stakeholders who periodically review progress toward the EERS to determine whether its goals are being met and whether other aspects of implementation need modification. For example, the Massachusetts Energy Efficiency Advisory Council (EEAC) guides the development, implementation, and long-term direction of the state's efficiency programs. The EEAC is made up of representatives from a variety of stakeholder organizations, including residential consumers, energy efficiency experts, realtors, small businesses, nonprofits, non-voting utility representatives, and key government agency staff.

Evaluation, Measurement, and Verification

Evaluation, measurement, and verification (EM&V) is a key element of successful energy efficiency programs and policies. EM&V is used to provide accurate, transparent, and consistent measurements, and considers both program impacts and program processes. Assessment of program impacts help to analyze the program's costs and benefits, design, implementation effectiveness, environmental impacts, and equity. EM&V of program processes consider how the program worked, whether its design logic performed well in the field, how it was implemented, and how customers responded, with the goal of using insights to improve program design. Market assessment, monitoring and evaluation, and measurement and verification are aspects of evaluation (Schiller 2012). Robust EM&V can achieve the following goals (ACEEE 2017):

- Provide accountability and document a program's benefits to determine whether the program met its energy goals and reached the intended participant distribution.
- Inform ongoing decision-making and improve program delivery based on lessons from previous performance.
- Support energy demand forecasting and resource planning by understanding the contributions and costs of energy efficiency programs (discussed further in the *Guide* chapter on electricity resource planning).
- Enable the calculation of other benefits, such as reductions in GHGs and other air pollutants, and equitable outcomes.
- Provide information and data that can be used to improve program performance in the future.

Best Practices: Evaluating Energy Efficiency Programs

State policymakers require evaluation to ensure accountability of the impacts and to continuously improve program performance. EM&V requirements in states with the most experience implementing and overseeing energy efficiency programs are typically based upon the following industry best practices:

- Use one or more of the industry-standard EM&V protocols or guidelines.
- Consider local factors, such as climate, building type, and occupancy.
- Evaluate distribution of benefits, if possible, to determine and correct for any inequities.
- Involve stakeholders and solicit expert advice regarding EM&V processes and resulting energy savings impacts.
- Conduct EM&V activities on a regular basis.
- Update protocols and deemed savings to

During the program planning process, program administrators develop a baseline forecast of efficient technology or service adoption absent the program and with the program. Data collection can vary by program type, technologies and systems addressed, and customer segment. Program tracking systems include details such as participating customer information. Anonymized customer information such as income, race or ethnicity, and location, could be used to track the equitable outcomes of program design, implementation, and distribution of benefits.

States can learn from the research on energy efficiency program evaluation practices. For example, a national survey about state practices on EM&V may be helpful as states develop or amend their existing EM&V programs (ACEEE 2020b). In addition, several national and regional efforts have focused on developing standard EM&V definitions and protocols. By adopting these approaches, states and other stakeholders can improve the consistency and accuracy of their evaluations and make it possible to compare efficiency initiatives across states. These initiatives also promote transparency in reporting. Examples of standard protocol efforts include the following:

- *The International Performance Measurement and Verification Protocol (IPMVP)* is an accepted industry standard that provides a flexible set of EM&V approaches for evaluating energy savings in buildings.
- *DOE Uniform Methods* provide a straightforward method for evaluating gross energy savings for common residential and commercial measures offered in customer-funded initiatives in the United States. The first set of protocols was published in April 2013.

Northeast Energy Efficiency Partnerships (NEEP) EM&V Forum

NEEP works across the Northeast and Mid-Atlantic to accelerate energy efficiency in the building sector and improve transparency and consistency in EM&V reporting. NEEP's Regional Evaluation, Measurement, and Verification Forum has developed the Regional Energy Efficiency Database, which includes electric and gas energy efficiency program data for 10 jurisdictions and can be used to analyze program and policy design, air quality reporting and planning, system planning, and comparisons of state energy efficiency impacts to promote cross-state consistency.

Today's energy efficiency programs address increasingly complex problems: an evolving electricity grid, upstream supply chain barriers, behaviors of individuals and organizations, and complex technical processes that involve not just machines or components but the ways in which and timing when they are operated. As the work of efficiency programs grows more complex, so do their evaluation needs.

Evaluators try to assess the impact of an efficiency program's intervention apart from other market forces. Techniques for evaluations vary by program type. For example, evaluators of behavior change programs have used randomized controlled trials (RCTs) to measure changes in energy use in two similar population groups - one that received an efficiency intervention and one which did not. Evaluators of market transformation programs use multiple methods to assess the difference between the current market conditions, which reflect the efforts of efficiency programs, and a hypothetical market baseline in which no such interventions occurred. These evaluators may use quantitative and qualitative methods to assess the role of efficiency programs in introducing market changes.[26]

[26] For more information on how to evaluate difficult-to-evaluate energy efficiency programs, see work by SEE Action (SEE Action 2018). Argonne National Lab provides an overview of methods to evaluate behavior-based energy efficiency programs with examples including programs deployed for Virginia and utilities such as American Electric Power in Ohio and Baltimore Gas and Electric in Maryland (ANL 2012).

Evaluation can leverage utility and customer data that is collected for billing purposes and deemed savings approaches. For example, Efficiency Vermont has refined the operation of its statewide program based on various program evaluation activities. Program refinements include collecting additional customer data to provide a more accurate measurement of savings, allowing more flexible timelines for customers to take up projects while maintaining current incentives, and investing in new software to enhance customer engagement and improve the efficiency of data collection and feedback efforts (Efficiency Vermont 2014). States can implement innovative measurement and verification (M&V) approaches (M&V 2.0), which include the implementation of advanced data analysis and the use of meters and other hardware to collect better data. The collection of real-time data through smart meters and cloud computing software can allow programs to analyze granular data and make faster improvements (Brattle Group 2018). The move toward M&V 2.0 also permits the integration of pay-for-performance (P4P) programs, which use time and energy use data to compensate customers for actual energy savings achieved, instead of deemed savings that provide average savings for energy-efficient appliances or pieces of equipment (Brattle Group 2018). The Energy Trust of Oregon offers an example of M&V 2.0 in practice; it conducted a P4P pilot using an automated M&V platform for performance payments and market outreach to current contractors to shape the program design (Best 2019). Refer to other *Guide* chapters for more information on customer rates, data access, and advanced metering.

States can follow emerging efforts to develop and standardize equity measurement such as the Energy Equity Project (Energy Equity Project n.d.) and the Leading with Equity initiative (ACEEE n.d.).

Action Steps for States

Developing or Improving Energy Efficiency Programs

States interested in developing a new program or strengthening an existing program can use the following steps:

- Define objectives based on state priorities and stakeholder input. States pursue energy efficiency for a variety of economic, social, and environmental goals, which may differ in priority depending on the location and issues facing the state at the time of development. The individual state priorities inform the policy objectives. The identified objectives in turn drive the selection of the policy framework, the process and protocols by which those policies are executed, and ultimately the design of energy efficiency programs.
- Pursue legislative or regulatory authorizations needed to put an EERS or expanded efficiency portfolio in place.
- Assess existing energy efficiency offerings and determine gaps, and then select and design energy efficiency programs to meet state-specific objectives. States can begin the process by assessing current levels of energy efficiency spending, savings, and customer participation within their state, determining which markets are underserved, analyzing options for achieving greater levels of efficiency, and analyzing the energy and cost savings that energy efficiency programs would offer. Regulators and/or program administrators can obtain information on costs and savings from other jurisdictions and acquire information for their own markets. These steps, including energy efficiency potential studies, inform target-setting.
- Engage key stakeholders and experts in program design through an inclusive engagement process and a statewide energy efficiency advisory group, which can guide and monitor programs over time. Inclusive

engagement can ensure that efficiency programs serve the needs of diverse customer classes and stakeholder groups.

- Determine and maintain program funding needed to achieve desired energy efficiency levels and multiple benefits. States can also leverage federal, state, and local programs, funding, technical assistance, and tools. Consistent funding mechanisms avoid the potential for funds to be diverted to other purposes.
- Measure results, report progress regularly, and track participation in the evaluation process. States can communicate the benefits of energy efficiency programs to state legislatures, utility regulators, and other stakeholders. States can document lessons learned and opportunities to enhance the program's effectiveness.

Additional actions can help states best align energy efficiency programs with other state policy goals related to the environment, primarily through policies complementary to energy efficiency policies. In line with environmental goals, states may adjust cost-effectiveness screening to include, for example, clean air. States may re-examine fuel-switching rules and programs that promote equipment relying on fossil fuels. If applicable, states can extend energy efficiency programs statewide by making policies applicable to all types of utilities (IOUs, cooperatives, and municipal) and/or by establishing statewide programs.

States may consider complementary policies to incentivize home and business energy retrofits, such as policies for building energy efficiency benchmarking or rating requirements. States may also consider complementary policies to remove utility financial disincentives to energy efficiency (another *Guide* chapter discusses aligning utility financial incentives with environment and equity policy goals). To further reduce barriers to energy efficiency, states may use strategies such as increasing program marketing and communication, motivating landlords and builders to invest in energy efficiency, making the process of choosing energy-efficient products fast and easy, and providing access to low-interest-rate financing that includes options for low-income households and no-credit participants along with consumer protections.

For state goals on equity, states may pursue strategies to increase inclusion and participation. In line with equity goals, states may review strategies for each customer type to overcome barriers to participation, for example, appliance financing may be a barrier for some participants but not for others. A number of states have specific low-income household oversight boards, which may oversee energy efficiency programs. States could increase inclusion by establishing or expanding existing statewide energy efficiency advisory councils, energy affordability workgroups, and other stakeholder engagement platforms. States can seek improved coordination across state agencies on issues slowing down energy efficiency, such as health and safety issues in buildings, that prevent energy efficiency measures from being installed until corrected.

Developing or Improving Energy Efficiency Resource Standards (EERS)

In addition to the action steps for emergency efficiency programs, states have found that the following similar steps can be effective for establishing EERS policies:

- Conduct a robust analysis of energy efficiency potential, an economic assessment of potential benefits and costs, and a determination of the range of savings targets that would be realistic for the EERS. To collect data that will help measure equity progress, the energy efficiency potential study could be disaggregated by demographics and dwelling type.
- Establish a proactively inclusive stakeholder engagement process to gather input and build support for the EERS. A state may consider running a stakeholder process outside of a docketed proceeding.

- Determine appropriate goals and timeframes, sectors covered by the goals, the way the program will be funded, the kinds of programs that can be implemented, and the interaction with other state and federal programs.
- Define an implementation and evaluation process that sets rules and procedures for identifying efficiency programs, funding sources, EM&V requirements and procedures, and general oversight.
- Provide for periodic evaluation and program review at specified intervals.
- Consider complementary policies that incentivize utilities to invest in energy efficiency.

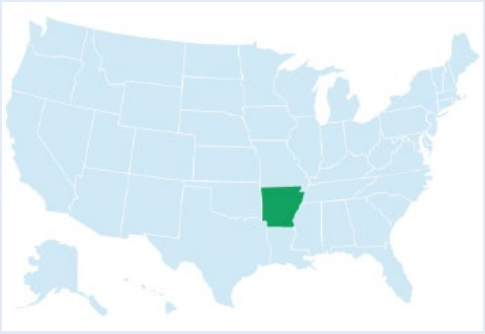
State Examples

Arkansas

In Arkansas, utilities administer energy efficiency programs and must meet targets established by the state's EERS. A key equity component is the state's inclusive stakeholder advisory group that shapes and evaluates the programs. The state's programs include direct install measures, rebates, and free retrofits or installations for low-income households.

The Arkansas Public Service Commission (APSC) undertook a multiple-year development and engagement process to establish energy efficiency program rules in 2007.[27] Throughout this process, APSC established a utility-stakeholder collaborative advisory group, Parties Working Collaboratively (PWC), to work through program evaluation, design, and other policy issues. The PWC stakeholder group began with government, utility, and industrial/commercial customer representatives, and expanded to include advocates for low-income customers, representatives from colleges and technical schools, and efficiency program contractors and evaluators (Johnson and Klucher 2014). To date, the PWC has contributed in several meaningful ways to program development, including developing a standard approach to annual reporting and identifying best approaches to statewide weatherization programs. The PWC has also made recommendations to APSC on quantifying carbon costs and non-energy benefits and has deliberated over strategies to attract Commercial and Industrial (C&I) customers to participate in both prescriptive and custom program offerings. The PWC has allowed diverse stakeholders, often with divergent viewpoints, to work together in promoting statewide energy efficiency programs; this process has made Arkansas an energy efficiency leader in the Southeast.

Arkansas Uses a Collaborative Process to Develop Energy Efficiency Policies and Programs



Arkansas' experience highlights a collaborative process to develop efficiency policies and programs. The collaborative process is a key reason Arkansas is a leader in promoting energy efficiency in the Southeast.

For more information, refer to

- National Standard Practice Manual for Distributed Energy Resources: Application to the state of Arkansas – An Example
- Arkansas Energy Office's energy efficiency policies and programs
- Arkansas Public Service Commission Energy Efficiency Resources

[27] The Energy Efficiency rulemaking launched in 2006 in Docket No. 06-004-R and the first program rules were codified in the same docket in 2007 (AR PSC 2018).

Energy efficiency programs in Arkansas include, but are not limited to, an incentive program with home appliance rebates, a consistent weatherization assistance program that is not means-tested but is based on the age and relative inefficiency of the home, and a public sector energy efficiency loan program.

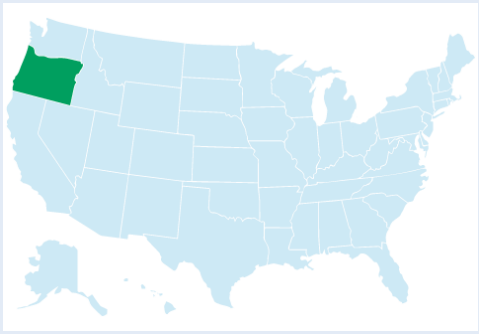
In 2010, APSC adopted an EERS for both electric and natural gas IOUs (AR PSC 2010). APSC has also approved utilities to earn performance incentives for meeting the targets and to recover lost contributions to fixed costs[28] that result from efficiency programs (Nixon 2021). Cooperative and municipal utilities do not participate in energy efficiency program delivery. In 2018, APSC ordered an increase in savings targets for IOUs through 2022, from 1 percent annually to 1.2 percent annually relative to 2018 electric utility baseline sales (refer to Docket No. 13-002-U).[29] The gas savings target is set to 0.5 percent annually relative to 2018 baseline sales. This 2018 order reflected the push from advocacy groups for higher levels of energy efficiency (Sierra Club 2018). Utilities have consistently been successful in achieving or exceeding their energy savings targets (Nixon 2021). In 2019, the net incremental savings was 0.63 percent of statewide (including cooperatives and municipal utilities), 2018 sales for electricity and 0.5 percent for natural gas (ACEEE 2020d).

Oregon

The state of Oregon has a long history of leadership on energy efficiency. In 1980, Congress passed the Pacific Northwest Electric Power Planning and Conservation Act, which created the Northwest Power and Conservation Council (the Council) to guide electricity resource planning in the Northwest (ODOE 2018). The Act directed the Council to prioritize cost-effective efficiency and was the first instance where energy efficiency was defined as an energy resource equivalent to generating resources (ODOE 2018).[30]

More recently, Oregon's Governor Brown has issued executive orders on energy efficiency and climate policy. These include Executive Order 17-20, which contains directives on building energy efficiency in new construction and retrofits of existing buildings and leadership in state government buildings, and Executive Order 20-04, which directs several state agencies to adopt climate change

Oregon Uses Energy Efficiency to Meet Future Load Growth



Oregon has been a leader in energy efficiency policy for more than 30 years, ranking ninth among all states on ACEEE's 2020 State Energy Efficiency Scorecard. Energy efficiency is the second highest electricity resource in the state behind hydro power. The Northwest Power and Conservation Council has indicated that energy efficiency will be essential for future load growth and is estimated to meet 85% of future demand by 2030.

For more information, refer to:

- Energy Trust of Oregon's 2021–2022 Action Plan
- Energy Trust of Oregon 2020 Annual Report
- Oregon's 2020 Biennial Energy Report
- The 10-Year Plan: Reducing Energy Burden in Oregon Affordable Housing

[28] Another *Guide* chapter discusses lost contribution to fixed costs (LCFC), also called lost revenue adjustment mechanism (LRAM).

[29] Prior to this increase, the targets had been raised incrementally beginning in 2011 from 0.25 percent to 0.5 percent to 0.75 percent to 0.9 percent to 1 percent (Nixon 2021).

[30] Oregon is part of the four-state region where the Council has the responsibility for resource planning. The 1980 legislation also introduced integrated resource planning, which allowed energy efficiency to be included as a resource (ODOE 2018). In a 1989 order, the Oregon Public Utility Commission (OPUC) codified the Act's requirement, stipulating that IOUs must treat energy efficiency as a resource in their integrated resource plans (OPUC 1989).

policies within their regulatory jurisdictions (OR EO 17-20 2017; OR EO 20-04 2020).

The nonprofit Energy Trust of Oregon, founded in 2002, administers most of Oregon's statewide energy efficiency programs. The organization was designated by the Oregon Public Utility Commission (OPUC) to administer the energy efficiency components of the state's public purpose charge, which was initially created by the state legislature in 1999 (S.B. 1149 1999).[31] In 2007, the legislature enacted SB 838 to fund Energy Trust of Oregon to acquire additional, cost-effective electric efficiency savings (OR S.B. 838 2007).

Energy Trust prepared long-range strategic plans in 2010 and 2014 that established its first energy savings targets for electricity and natural gas. In 2016, Senate Bill 1157 established that all utilities must pursue an all cost-effective energy efficiency strategy by incorporating these energy saving targets into the utility's integrated resource plan (IRP) and that Energy Trust is responsible for achieving cost-effective energy savings (S.B. 1157 2016). Also a leader in EM&V, Oregon was among the first states to begin testing and implementing M&V 2.0 (Best 2019).

Energy efficiency savings have been substantial in the state. In 2017, electric savings exceeded 574,000 megawatt-hours and gas savings were 6.8 million therms, accounting for 1.2 percent of electricity retail sales and 0.7 percent of natural gas sales, respectively (ODOE 2018). Energy Trust calculated that in 2020 its energy efficiency upgrades for customers prevented 270,000 tons of carbon dioxide emissions (Energy Trust of Oregon 2021c). Energy efficiency was the second highest energy resource in the state in 2017, accounting for 18 percent of electricity load, behind hydropower, which served 47 percent of electricity load and remained the second highest energy source according to the 2020 Biennial Energy Report (ODOE 2020). For the 2020–2021 period, energy efficiency savings account for 1.3 percent of annual electric sales, and 0.5 percent of annual natural gas sales (ACEEE 2020c; Energy Trust of Oregon 2020b). In its draft 2021 Northwest Power Plan, the Northwest Power and Conservation Council is forecasting 750–1000 average megawatts of energy efficiency over the next 5 years (NWPCC 2021). The Council reports this level of efficiency is less than prior plans due to past efficiency accomplishments and because of lower avoided costs than prior plans, which are due to forecasted reductions in the cost of solar and wind.

The state and the Energy Trust have taken multifaceted approaches to advance energy equity in energy efficiency programs, including research, data collection, goal setting, and accountability. A 2019 Energy Trust study found that its customers who are renters, Black or Hispanic, and who have electric-only service tended to have less awareness of energy efficiency programs, and the study recommended more targeted outreach and marketing to communities of color, low-income communities, and rental property owners and managers (Energy Trust of Oregon 2021b). In 2019, the state released a 10-year plan to reduce energy burden on low- and middle-income (LMI) residents. In addition, the Energy Trust and Oregon Housing and Community Services identified $113 million in potential energy cost savings through LMI energy efficiency projects (ODOE, OPUC, and OHCS 2019). Energy Trust allows programs to spend more money on moderate-income households than on other households, so incentives can be more generous. The Trust calls this its "Savings within Reach" offer.

The OPUC has incorporated equity-related performance metrics to all aspects of the Energy Trust's operations. The Energy Trust 2020 Annual Report reported that it completed a Diversity, Equity and Inclusion Operations

[31] S.B. 1149 directed the two largest electric IOUs in the state– Portland General Electric and Pacific Power – to collect a 3 percent public purpose charge from their customers to fund energy efficiency, renewable energy, and low-income weatherization. Oregon Department of Energy provides more information on the public purpose charge (ODOE n.d.).

Plan to better serve communities of color, customers with low incomes, and rural communities (Energy Trust of Oregon 2021c).[32]

Oregon uses two types of tests to determine cost-effectiveness: the TRC Test to determine whether a program or measure may be funded, and the Utility Cost Test to determine the maximum incentive to pay the customer (Energy Trust of Oregon 2021a). The state is considering how to include costs for avoided carbon, including the possibility of using the social cost of carbon (SCC). In response to Executive Order 20-04, the OPUC approved work plans to take action to reduce GHGs and address other climate-related priorities (OPUC 2021). The OPUC's Utility Planning Work Plan is focused on incorporating the costs of GHG emissions into long-term utility planning and exploring how the SCC could be incorporated into IRPs, resource procurement, and cost-effectiveness tests for efficiency and demand response (OPUC 2021).

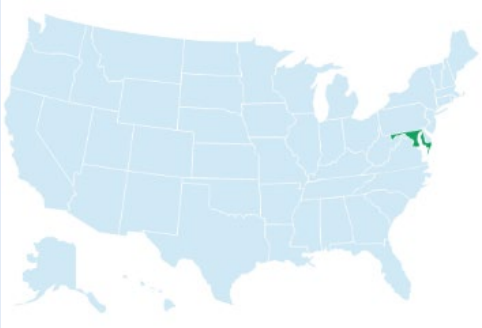
Energy Trust of Oregon demonstrates how integrating program offerings benefits customers, gains efficiencies in program administration, and can spur adoption of flexible resources that support grid needs. Energy Trust supports energy efficiency, customer-side renewables, and electric vehicle-readiness for new homes and buildings, which has resulted in direct and substantial effects on GHG emissions. Energy Trust also worked with Portland General Electric (PGE) on their test bed project to demonstrate how to bundle energy efficiency and demand response marketing to customers for synergistic effects. Energy Trust explored efforts with PGE to better balance renewable generation and grid needs using storage (Energy Trust of Oregon 2020a).

Maryland

Maryland's EERS applies to all utilities, including investor-owned and municipally owned utilities. Maryland's energy efficiency programs are a mix of utility- and state-administered offerings, including two different state agency administrators. Programs are funded primarily through utility surcharges on customer bills. The programs support low-income households, both through energy efficiency investments and bill assistance. Over time, the programs have reduced household bills and reduced energy cost for businesses in Maryland (RGGI 2020).

Maryland's EERS was initially enacted through the EmPower Maryland Energy Efficiency Act of 2008 (MD S.B 205 2008). In 2015, Maryland's Public Service Commission (PSC) issued an order to require utilities to achieve 2 percent annual incremental energy savings (MD PSC 2015). In 2017, the legislature codified the savings goal into law and extended EmPower Maryland through 2023 (MD S.B. 184 2017). The 2017 legislative action also added a requirement to quantify certain non-energy

Maryland's Holistic Approach to Energy Efficiency Places Value on Non-energy Benefits and Equitable Implementation



Maryland ranked sixth out of all states on energy efficiency efforts in the ACEEE's 2020 State Energy Efficiency Scorecard for reasons including strong building energy codes and legislation enacted in 2020 that calls for a 10% reduction in energy use for state-owned buildings by 2029, relative to a 2018 baseline (MD H.B. 662 2020).

For more information, refer to:

- Maryland Public Service Commission's EmPower Maryland
- Maryland State Bill 184 (2017) extending EmPower Maryland through 2023, increasing savings target, and requiring consideration of non-energy benefits during cost-effectiveness

[32] The report lists a dozen diversity, equity, and inclusion goals, including activity highlights and status, such as "completed 723 projects with minority-owned businesses and 1,574 projects with women-owned businesses in 2020." The associated performance measure established by the PUC to complete 1,000 projects with trade allies that are minority-owned businesses was not met as a result of disruptions due to COVID-19 and wildfires (Energy Trust of Oregon 2021c).

benefits, and consider those benefits in evaluating savings measure's cost-effectiveness eligibility (MD S.B. 184 2017).

To measure cost-effectiveness, Maryland relies on the Total Resource Cost (TRC) test and Societal Cost Test (SCT). These tests consider cost-effectiveness for the total utility system, including all utility and participant costs and all utility-system benefits for the TRC; and societal benefits in the case of the SCT. Low-income programs do not need to pass either cost-effectiveness test; this exemption allows more low-income households to benefit from energy savings and improves the utility's ability to meet their required efficiency targets. The PSC is also able to approve individual programs that are not individually cost-effective to promote innovative technologies and market-transformative practices that ultimately lead to greater energy savings, as long as the total portfolio of programs are cost-effective (MD PSC 2015).

The Maryland Energy Administration manages EmPower Maryland energy efficiency grants, loans, rebates, and tax incentives. Low-income programs are implemented by the state's Department of Housing and Community Development through the EmPower Maryland Limited Income Energy Efficiency Program. Through this program, low-income households can receive energy efficiency measures at no additional charge (MD DHCD n.d.).

One component of EmPower Maryland funding is the Strategic Energy Investment Fund, of which a portion is designated for energy efficiency measures for low- and moderate-income households. Money for this fund comes from the Regional Greenhouse Gas Initiative. Of the Strategic Energy Investment Fund's end uses, the largest is direct energy bill assistance for low-income households, with over $25 million going to this use in 2018 (RGGI 2020). Most funding for EmPower programs is from ratepayers via a surcharge on their utility bills.

EmPower programs have been successful in reducing energy, demand, and costs. Through 2020, the EmPower programs have saved 11,972 GWh and 2,363 MW, and expected financial savings is almost $12 billion over the life of the installed measures (MD PSC 2021).

The Maryland legislature has passed several complementary policies that support energy efficiency. In 2019, to support clean energy workforce development, Maryland legislatures passed the Clean Energy Jobs Act, which created a fund for clean energy job training in the Maryland Department of Labor (MD S.B. 516 2019). In 2020, the state passed a law to set energy performance standards to reduce energy consumption in state buildings by 10 percent from 2018 levels by 2029 (MD H.B. 662 2020).

Information Resources

Information about States

Title/Description
American Council for an Energy-Efficient Economy. Equity Metrics and Workforce Development (2021). This area of the State and Local Policy Database provides information on equity in state energy efficiency and clean energy policies and programs. There are other key policy areas of the database, including utility policies.
American Council for an Energy-Efficient Economy. Guidelines for Low-Income Energy Efficiency Programs (2020). This database provides information for all 50 states on requirements for state and utility support of low-income energy efficiency programs, cost-effectiveness rules for low-income energy efficiency programs, and coordination of ratepayer-funded low-income programs with WAP services.

Title/Description
American Council for an Energy-Efficient Economy. How High Are Household Energy Burdens? An Assessment of National and Metropolitan Energy Burdens across the U.S. (2020).This report examines how energy burdens and residential energy costs differ for groups based on income, race and ethnicity, age, housing type and age, and tenure. The report looks at the national and regional levels, as well as 25 of the largest metropolitan areas in the United States.
American Council for an Energy-Efficient Economy. Policy Brief: State Energy Efficiency Resource Standards (EERS) (2019). This policy brief explains EERS policies in 27 states across the United States.
American Council for an Energy-Efficient Economy. State and Local Policy Database (n.d.). This database ranks states on energy efficiency policy actions and details each state's policies and accomplishments in sectors such as utilities, transportation, buildings, and appliances.
American Council for an Energy-Efficient Economy. The 2020 State Energy Efficiency Scorecard (2020). This comprehensive tool tracks energy efficiency programs and policies across all 50 states and Washington, DC. It reviews states on 32 metrics and provides roadmaps for possible improvements.
Lawrence Berkeley National Laboratory. The Future of U.S. Electricity Efficiency Programs Funded by Utility Customers: Program Spending and Savings Projections to 2030 (2018). This report reviews state spending and energy savings from energy efficiency programs.
Lawrence Berkeley National Laboratory. What it Costs to Save Energy (n.d.). LBNL reports on the cost of saving energy and other characteristics of efficiency programs in this catalog of publications, which is supported by Berkeley Lab's Cost of Saving Energy Database.
U.S. Department of Energy, State and Local Solution Center. Energy Efficiency Potential Studies Catalog (2020). This catalog provides summaries of over 100 energy efficiency potential studies in various states and includes links to each study.
U.S. Energy Information Administration. Annual Electric Power Industry Report, Form EIA-861 detailed data files (2021). These data files provide information on peak load, generation, electric purchases, sales, revenues, customer counts, energy efficiency, demand response, net metering programs, and distributed generation capacity and include information from 1990 to 2019.

Energy Efficiency Program and EERS Policy Resources

Title/Description
American Council for an Energy-Efficient Economy. A Roadmap for Climate-Forward Efficiency (2022). This report introduces a roadmap of 31 options within 9 high-level strategy categories for aligning utility energy efficiency and deep decarbonization goals. This roadmap offers advice to legislators, utilities, regulators, and others on how to align policy, prepare the market, deliver effective programs, and ensure equity.
American Council for an Energy-Efficient Economy. ACEEE 2019 Next Generation Energy Efficiency Resource Standards (2019). This report shares the progress five states, California, Hawaii, Massachusetts, Minnesota, and New York, are making toward EERS policy. It provides recommendations for policymakers, program administrators, and energy efficiency stakeholder councils to help align energy efficiency targets with other policy priorities.
American Council for an Energy-Efficient Economy. Extending the Benefits of Nonresidential Energy Efficiency to Low-Income Communities (2019). This report examines how energy efficiency programs reach groups in low- and moderate-income areas. The report surveyed 39 groups and analyzed their program designs, delivery, stakeholder engagement, and evaluation.
American Council for an Energy-Efficient Economy. State Policies and Rules to Enable Beneficial Electrification in Buildings through Fuel Switching (2020). This policy brief explores existing state policies on electrifying space and water heating to help decarbonize buildings. It also explores whether fuel switching is beneficial overall.
Institute for Electric Innovation. Rethinking Energy Efficiency as a Carbon Resource (2020). This report describes how efficiency is being called upon to deliver more as states pursue deep carbon reduction and as variable renewable generation increases. To meet these challenges, the paper describes necessary policy and program design, delivery, and evaluation changes.

Title/Description
Massachusetts Energy Efficiency Advisory Council. EEAC Equity Working Group Summary to EEAC on Moderate-Income, Renter and Landlord, Small Business, and Community Partnerships Recommendations. (2021). This report summarizes the work of the Equity Working Group to develop recommendations for the 2022–2024 Statewide Energy Efficiency Plan.
Midwest Energy Efficiency Alliance. Making the Case for Inclusive Industrial Energy Efficiency Policy (2020). This paper explores the energy efficiency portfolios of utility companies in the Midwest and how they have evolved based on state policies.
Midwest Energy Efficiency Alliance. New Research: Industrial Opt-Outs Undermine Energy Savings (2017). This resource explains opt-out policies, the issues with them, and the states that use opt-out.
Mission:Data. Energy Data: Unlocking Innovation with Smart Policy (2017). This report recommends state policies to give electricity customers more control over their data, allowing customers to benefit from distributed energy resources.
National Association of State Energy Officials. NASEO's State Energy Planning Guidelines (2018). This guide includes step-by-step instructions state energy directors can use to develop and maintain energy plans that meet energy needs, reliability, cost-effectiveness, and environmental protection.
National Energy Screening Project. Database of Screening Practices (2021). This database contains detailed information about cost-effectiveness screening practices for ratepayer funded electric and natural gas energy efficiency programs. The database can help states learn about practices in other states and understand policies, processes, and studies that support assumptions used by states in their benefit-cost analyses.
National Energy Screening Project. National Standard Practice Manual for Benefit-Cost Analysis of Distributed Energy Resources (2020). The NSPM for DERs provides methodologies and principles for jurisdictions to assess and compare the cost-effectiveness of energy efficiency and other DERs.
National Governors Association. Governors Staying Ahead of the Innovation Curve: A Policy Roadmap for States (2018). This guide promotes policies that state governors can pursue to ensure a smooth clean energy transition, including a focus on electric utility policy.
Regulatory Assistance Project. The Next Quantum Leap in Efficiency: 30 Percent Electric Savings in Ten Years (2016). This Regulatory Assistance Project (RAP) study concludes that it should be possible to cost-effectively meet 30 percent of forecast electricity needs with new efficiency investments over the next ten years and provides recommendations for achieving 30 percent electric savings in 10 years, such as increasing efficiency program funding to capture all cost-effective efficiency measures and eliminating utilities' financial disincentives to support efficiency.
Regulatory Assistance Project. Use of Cost-Effectiveness Tests for Evaluation of Distributed Energy Resources: A Literature Review (2016). This report summarizes the findings of a literature review by RAP. The review evaluates different cost-effectiveness tests and how these tests should evaluate DERs.
Southeast Energy Efficiency Alliance. State Guides to Utility Energy Efficiency Planning (2020). This set of state reports includes, for each report, the corresponding state's utility regulatory structure and key policies related to energy efficiency.
Southern Alliance for Clean Energy. Energy Efficiency in The Southeast (2021). This report explores energy efficiency across the Southeast and how energy efficiency can reduce carbon emissions.

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