The 2018 State Energy Efficiency Scorecard

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Executive Summary

It has been a dynamic year for energy efficiency, with a mix of often competing forces at the national and state levels. In states including Virginia, New York, and New Jersey, policymakers unveiled plans for increased investment in clean energy and energy efficiency, driven in particular by concerns regarding climate change. Some states, in response to a possible loosening of federal vehicle and appliance standards, worked to keep efficiency standards in place at the state level. Others, like Iowa and Connecticut, saw attacks against efficiency within their states through legislation that results in reduced energy and utility bill savings. Despite a few setbacks, reasons for optimism remained abundant. Across the country, new opportunities for efficiency and distributed resources continued to arise through improved data access, policy innovations, and technological advancements like smart control systems, geographic targeting, electric vehicle grid integration, and energy storage.

States spent approximately $7.9 billion on energy efficiency in the utility sector in 2017 and saved close to 27.3 million megawatt-hours (MWh), a 7.3% increase from 2016. While average national investments and savings have leveled off somewhat in recent years, efficiency continues to make new inroads in the Southeast and in other states where it has been slower to take hold. With many states continuing to strengthen emissions reduction goals, policymakers and utilities are exploring new ways for efficiency to contribute to meeting climate targets. Overall, plenty of signs are pointing to policymakers' growing appreciation of efficiency's economic and environmental benefits and its role in strengthening the grid and transitioning to a clean energy economy.

The 2018 State Energy Efficiency Scorecard, now in its 12th edition, ranks states on their policy and program efforts, not only assessing performance but also documenting best practices and recognizing leadership. The report captures the latest policy developments and state efforts to save energy and highlights opportunities and policy tools available to governors, state legislators, and regulators.

Energy efficiency remains the nation's third-largest electricity resource, employing 2.25 million Americans and typically providing the lowest-cost way to meet customers' energy needs. Other benefits include improving air and water quality, strengthening grid resilience, promoting equity, and improving health and comfort. By calling attention to recent policy and programmatic successes, the *Scorecard* seeks to help states, utilities, and businesses realize all these benefits.

The *Scorecard* is divided into eight chapters. In Chapter 1, we discuss our methodology for scoring states (including changes made this year), present the overall results of our analysis, and provide several strategies states can use to improve their energy efficiency. Chapter 1 also highlights the leading states, most-improved states, and policy trends revealed by the rankings.

The next six chapters examine the policy areas in which states typically pursue energy efficiency:

- Utility and public benefits programs and policies
- Transportation policies
- Building energy codes and compliance
- Combined heat and power (CHP) policies
- State government–led initiatives around energy efficiency
- Appliance and equipment standards

The final chapter summarizes major policy highlights and setbacks occurring since the release of the last *Scorecard* and describes data limitations we encountered in our research. We also discuss developing trends in energy efficiency we hope to address with new metrics in future *Scorecard*s.

KEY FINDINGS

Figure ES1 shows the states' rankings, divided into five tiers for easy comparison. Later in this section, table ES1 provides details of each state's scores.

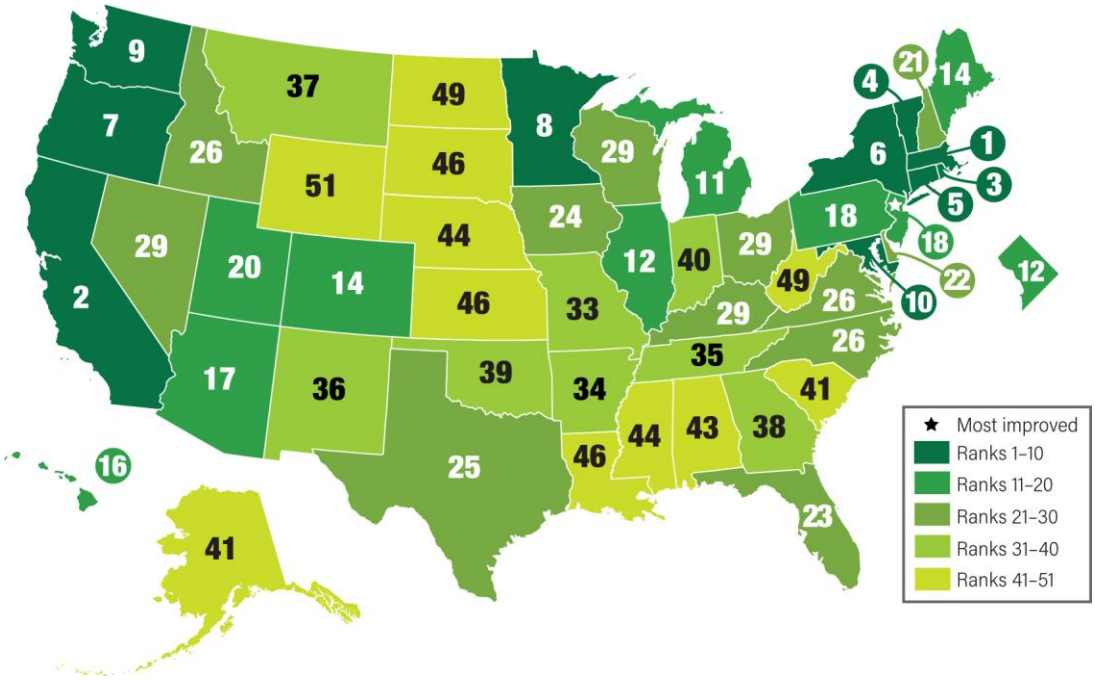

Figure ES1. *2018 State Scorecard* rankings

Massachusetts, California, and Rhode Island continued to set the pace for energy efficiency in 2018, occupying the top three spots thanks to advances on multiple policy fronts.

Massachusetts retained its hold on first place while capping off a busy year. Policymakers launched statewide energy efficiency planning efforts to set new three-year savings targets. The state's Three-Year Energy Efficiency Plan also incorporates a fuel-neutral savings target. This reflects a growing trend among northeastern states to take a holistic approach to energy savings, including not only electricity and natural gas but also nonutility heating fuels. In addition, the state's Department of Public Utilities issued an order in May approving $220 million in utility investment in grid-side modernization technologies over

the next three years to improve efficiency and reliability and to pave the way for smart meter deployment. The state's General Court also passed legislation that authorizes "strategic electrification" and carbon-reducing use of renewable energy through efficiency programs. The new law revitalizes progress toward statewide goals to slash greenhouse gas (GHG) emissions 80% by 2050 per the state's Global Warming Solutions Act of 2008.

Finishing in second place and closing in on the lead was **California**, which passed several regulations to advance energy efficiency over the past year. In late 2017 the state's Public Utilities Commission adopted long-term energy savings goals informed by SB 350 and AB 802. These major pieces of 2015 energy legislation called for doubling electric and natural gas savings by 2030 and shifted the energy use baseline to existing conditions in order to better target below-code savings. In 2018 the California Public Utilities Commission (CPUC) approved the first-ever set of business plans for the state's investor-owned utilities, providing sector-level strategies and metrics to align utility programs with the new savings goals. This spring the state adopted new net-zero electricity building energy codes that will require all new single-family homes and low-rise apartment buildings to use solar and efficiency to zero out the building's electricity demand. California also joined with eight other states in rolling out an updated zero-emissions vehicle (ZEV) action plan. This strategy pushes for the adoption of policies to accelerate the purchase of ZEVs in response to the US Environmental Protection Agency's decision earlier in the year to freeze GHG emission standards for light-duty vehicles.

Rhode Island continued to hold its ground in third place. It achieved electric savings exceeding 3% of sales, among the highest reported levels anywhere in the United States, driven by an ambitious Three-Year Energy Efficiency Procurement Plan. In February the state also adopted a voluntary residential stretch code, based on elements of the US Department of Energy's Zero Energy Ready Home program and the EPA's WaterSense program. The code is intended to support sustainable energy goals described in the Resilient Rhode Island Act of 2014 to cut emissions 45% by 2035. Clean energy advocates ran into roadblocks on other policy fronts, however, with a bill stalling in the General Assembly that would have made the state the first in the nation with a carbon tax. Meeting a similar fate were proposed efficiency standards for lighting, computers, plumbing products, and other appliances. Yet the state continued to perform well in multiple *Scorecard* policy categories to finish in the top three for the second year in a row.

Vermont and **Connecticut** appeared in fourth and fifth place, respectively. Vermont's legislature passed H410 in May, enacting 16 new state appliance efficiency standards for computers and monitors, fluorescent tubes not covered by federal efficiency standards, plumbing fixtures, and other appliances. Among the 16 are three federal standards that were completed in recent years but never implemented. By 2025 the standards are expected to save consumers 435 million gallons of water and 59 million kilowatt-hours (kWh) of electricity annually, equating to roughly $17 million in savings per year.

Also finishing in the top five, **Connecticut** advanced efficiency in the buildings sector earlier this year by adopting the 2015 International Energy Conservation Code® (IECC), the second code update in two years. However ratepayer-funded efficiency programs endured a setback that is sure to adversely impact 2018 reported savings and could jeopardize

Connecticut's standing in next year's *Scorecard*. State lawmakers closed 2017 by cutting the state's energy efficiency funding by a third, redirecting $127 million over two years from the Connecticut Energy Efficiency Fund to make up a budget shortfall and forcing the Energy Efficiency Board to scale back programs. Seeking to lessen the damage, the state legislature acted in May to restore $10 million in efficiency funds for the 2019 budget. It also passed SB 9, expanding the state's renewable portfolio standard and making administrative changes designed to protect energy efficiency funds from future legislative raids.

Also in the top 10 this year were New York, Oregon, Minnesota, Washington, and Maryland. Each of these states has well-established efficiency programs and policies and continues to push the boundaries by refining ways to enable energy savings. New York announced in the spring a plan to reduce energy consumption by 185 trillion Btus from forecast levels by 2025, a 50% increase over prior goals. The governors of Oregon and Washington also both signed major executive orders since the last *Scorecard* to accelerate energy efficiency in the built environment. Enacted last November, Oregon's EO 17-20 lays out an ambitious plan to cut energy use and carbon emissions from state buildings and residential and commercial construction, directing updates to building energy codes to require electric vehicle–ready building construction as well as zero energy–ready homes. Similarly, Washington's EO 18-01 calls on state agencies to prioritize the lease and purchase of low-emission vehicles and construction of zero energy or zero energy–capable state-owned buildings.

States Rising and Falling

The most-improved state this year was New Jersey. Other substantially improved states were Missouri, Colorado, South Dakota, and Connecticut. They posted the largest point increases over their previous year's scores.

New Jersey improved by 4 points this year, the most of any state, and rose in the ranks from 23rd to 18th. Energy efficiency received a huge boost in the Garden State with the passage of Senate Bill 2314, establishing new annual energy savings targets for electricity and natural gas of 2% and 0.75% of sales, respectively, to be achieved within the next five years. The legislation also creates a new energy storage target, strengthens the state's renewable portfolio standard, and sets energy benchmarking requirements for commercial buildings with more than 25,000 square feet of space.

Missouri improved by 2.5 points this year, rising from 37th to 33rd. Following a challenging 2016 in which energy efficiency programs were briefly suspended due to prolonged negotiations between utilities and state regulators, Missouri rebounded in 2017 with annual electric utility savings of 0.78%, the highest it has ever reported. The states' electric utilities seem poised to build on their success, with Ameren Missouri filing plans in June 2018 to invest nearly $92 million annually in energy efficiency over the next six years and develop 15 new programs. The utility also introduced plans in February to incentivize the rollout of electric vehicle charging stations across the state and encourage commercial customers to transition to electric vehicles.

Other states making improvements included **South Dakota** and **Colorado**, which also added 2.5 points each. While South Dakota has long appeared in the bottom tier of the

Scorecard, it rose three positions in this year's ranking thanks to efforts to strengthen efficiency in the buildings sector. While South Dakota's state-adopted building energy codes remain voluntary, many communities within the state have nevertheless updated local codes based on the 2015 IECC. Colorado moved up a spot into 14th place in recognition of the state public utilities commission's raising the bar on utility savings. The commission approved new energy savings goals for Xcel Energy, an increase from 1.3% of electric sales to approximately 1.6%.

Connecticut also added 2.5 points, improving from sixth to fifth place, in part by advancing efficiency in the buildings sector through the adoption of the 2015 IECC. However, as mentioned, a raid of the state's energy efficiency fund in late 2017 could negatively impact Connecticut's standing in future *Scorecard*s.

Not to be overlooked, **Nevada** also showed sizable progress in the wake of major state energy legislation passed in 2017. The law directs the Public Utility Commission to establish utility energy savings goals for NV Energy, allow program approval if the portfolio of utility energy efficiency programs is cost-effective, include nonenergy benefits in benefit–cost analysis, and require a minimum spending level for low-income efficiency programs. While the PUC is still working with stakeholders to establish formal targets, NV Energy's Joint Integrated Resource Plan and three-year Demand Side Management (DSM) Plan submitted earlier this year aim for annual savings of 1.15% in the next three years, a significant improvement on the state's past efficiency efforts. The Silver State has also taken steps to strengthen sustainability in its transportation sector with the implementation of a statewide complete streets policy to design and retrofit streets and highways in a way that improves accessibility for all users, including pedestrians, cyclists, and people with disabilities.

By contrast, 18 states fell in the rankings this year and 19 lost points, because of changes in their performance as well as adjustments in our methodology, the latter including new metrics in the building policies chapter and the shift of 1 point toward appliance standards. **Iowa** fell the farthest, losing 3.5 points. This drop was largely due to the signing earlier this year of bill SF2311, which imposes a restrictive spending cap on efficiency programs, removes efficiency program requirements that had been placed on municipal utilities and co-ops, and allows customers to opt out of paying for efficiency programs that fail to satisfy the ratepayer impact (RIM) test, a cost-effectiveness measure rejected by most states as inequitable. Early indications from utility filings point to a forecast drop in savings of 25–50% for electric programs and 75–80% for gas programs, further jeopardizing Iowa's rank in future *Scorecard*s.

Results by Policy Area

For the fourth year in a row, **Massachusetts**, **Rhode Island,** and **Vermont** were the three leading states in utility-sector energy efficiency programs and policies (see Chapter 2). With long records of success, all three continued to post electric utility savings above 2.5% of retail sales, the highest levels in the nation. As mentioned above, savings from electricity efficiency programs across all states in 2017 totaled approximately 27.3 million MWh, a 7.3% increase from the 2016 savings reported in last year's *State Scorecard*. These savings are equivalent to about 0.72% of total retail electricity sales across the nation.

Total spending for electricity efficiency programs was $6.6 billion in 2017. Adding this to natural gas program spending of $1.3 billion, we estimate total efficiency program expenditures of close to $8.0 billion, a 4.5% increase from the $7.6 billion reported for 2016.

With the signing of SB 2314 in **New Jersey**, the number of states with mandatory energy savings targets increased to 27 this year. **California** revised its utility targets, bringing them in line with long-range goals established in SB 350 to double energy savings by 2030. **New York** also unveiled new savings targets earlier this year, on Earth Day, calling on utilities to achieve annual efficiency savings of 3% of sales by 2025. Meanwhile, **Nevada** continues to work to formalize savings targets under SB 150, which directs the Public Utility Commission to establish utility energy savings goals and set minimum spending levels for low-income efficiency programs.

California, **Massachusetts**, and **New York** continue to lead the way in energy-efficient transportation policies for the third consecutive year (see Chapter 3). California's requirements for reducing GHG emissions have prompted several strategies for smart growth. Massachusetts promoted smart growth development in cities and municipalities through state-delivered financial incentives. New York, Oregon, Washington, and Vermont are among the few states in the nation to have a reduction target for vehicle miles traveled (VMT).

California continued to lead in efficient buildings policies with performance-based energy efficiency standards that have served as models in developing national consensus energy codes. In May California adopted a first-of-its-kind code that will require new single-family homes and low-rise apartment buildings to have solar power—part of a mandate for new homes and commercial buildings to be "net-zero" energy by 2020 and 2030, respectively (see Chapter 4). Other leaders include **Connecticut** and **Pennsylvania**, both of which updated building energy codes to the 2015 IECC this year.

California, Maryland, **Massachusetts**, and **Rhode Island** scored highest for their CHP policies (Chapter 5), while nine states tied for the lead in state government initiatives (Chapter 6): **California**, **Colorado, Connecticut**, **Massachusetts**, **Minnesota**, **Oregon, Rhode Island, Vermont,** and **Washington.** All of these states offer financial incentives to consumers and state and local governments, and they also invest in R&D programs focused on energy efficiency.

California continues to lead the nation in setting appliance standards (Chapter 7), having adopted standards for more than 100 products. In recent years California has established new standards for LEDs, small-diameter directional lamps, computers, and computer monitors; in 2018 the state adopted further standards for portable electric spas and initiated rulemakings for air compressors, hearth products, portable air conditioners, and certain linear fluorescent lamps. **Vermont** adopted new standards for 16 products.

Table ES1 gives an overview of how states performed in each scoring category.

Table ES1. Summary of state scores in the *2018 State Scorecard*

Rank	State	Utility & public benefits programs & policies (20 pts.)	Trans-portation policies (10 pts.)	Building energy efficiency policies (8 pts.)	Combined heat & power (4 pts.)	State government initiatives (5 pts.)	Appliance efficiency standards (3 pts.)	**TOTAL SCORE (50 pts.)**	Change in rank from 2017	Change in score from 2017
1	Massachusetts	20	8.5	6.5	4	5	0	44	0	–0.5
2	California	15	9	7.5	4	5	3	43.5	0	1.5
3	Rhode Island	20	6.5	5.5	4	5	0	41	0	–0.5
4	Vermont	18.5	6.5	6.5	2	5	2	40.5	0	1.5
5	Connecticut	15	7.5	7	2.5	5	1	38	1	2.5
6	New York	12.5	8.5	6.5	3.5	4.5	0	35.5	1	1
7	Oregon	12	8	6.5	2.5	5	1	35	–2	–1.5
8	Minnesota	14.5	4	6	2.5	5	0	32	1	–1
9	Washington	10.5	7	6.5	2.5	5	0	31.5	–2	–3
10	Maryland	8.5	7	6	4	4.5	0	30	0	–1
11	Michigan	13.5	4	5.5	1.5	4	0	28.5	0	1.5
12	District of Columbia	8.5	8	6	1.5	3.5	0	27.5	1	2
12	Illinois	9.5	5	6	3.5	3.5	0	27.5	–1	0.5
14	Colorado	8.5	4.5	5.5	1	5	1	25.5	1	2.5
14	Maine	9.5	5.5	3	3.5	4	0	25.5	–1	0
16	Hawaii	11	4	4.5	1	2.5	0	23	–1	0
17	Arizona	10.5	4.5	3	1.5	2.5	0	22	0	0
18	New Jersey	6.5	6.5	5.5	1.5	1.5	0	21.5	5	4
18	Pennsylvania	3.5	5.5	7	2.5	3	0	21.5	1	1
20	Utah	7.5	3.5	5	1	4	0	21	–3	–1
21	New Hampshire	9	2	3.5	1.5	3.5	0	19.5	0	–0.5
22	Delaware	2.5	5.5	5	1.5	4	0	18.5	2	1.5
23	Florida	2	5.5	5.5	0.5	4	0	17.5	–1	–1
24	Iowa	7	2	5	1.5	1.5	0	17	–5	–3.5
25	Texas	1	3	7	1.5	4	0	16.5	1	0
26	Idaho	5.5	1.5	5.5	0.5	3	0	16	0	–0.5
26	North Carolina	3	3.5	4.5	1.5	3.5	0	16	5	1.5
26	Virginia	0.5	5	6	0	4.5	0	16	3	0.5
29	Kentucky	3.5	1.5	5	1	4.5	0	15.5	–1	–0.5
29	Nevada	5	2.5	3.5	0.5	4	0	15.5	5	1.5
29	Ohio	6	1	3	1.5	4	0	15.5	2	1
29	Wisconsin	7	0.5	3	1.5	3.5	0	15.5	–5	–1.5
33	Missouri	3	2.5	3.5	1.5	4.5	0	15	4	2.5
34	Arkansas	7	1	3	0	3.5	0	14.5	–3	0
35	Tennessee	1.5	3.5	3	1.5	4.5	0	14	–6	–1.5
36	New Mexico	4.5	1.5	2.5	1.5	3.5	0	13.5	–1	0
37	Montana	3.5	0.5	5	1	3	0	13	–1	0
38	Georgia	1.5	4.5	3.5	0.5	2	0	12	0	0
39	Oklahoma	4.5	2	1.5	0	3	0	11	1	1
40	Indiana	3.5	2	2.5	0.5	2	0	10.5	0	0.5
41	Alaska	1	2.5	1.5	1	4	0	10	–2	–1
41	South Carolina	1	2	3	0.5	3.5	0	10	1	0.5
43	Alabama	0	1	5.5	0	3	0	9.5	0	0.5
44	Mississippi	1.5	2	1.5	0.5	2.5	0	8	2	0.5
44	Nebraska	0.5	1	4	0	2.5	0	8	0	–0.5
46	Kansas	0.5	1.5	3.5	0.5	1.5	0	7.5	2	1.5
46	Louisiana	0.5	1.5	2	1	2.5	0	7.5	–2	–1
46	South Dakota	2.5	0.5	3.5	0.5	0.5	0	7.5	3	2.5
49	North Dakota	0	1.5	3	0.5	0.5	0	5.5	2	2
49	West Virginia	–0.5	1.5	3	0.5	1	0	5.5	–2	–1
51	Wyoming	1	1.5	0	0	2	0	4.5	–2	–0.5

STRATEGIES FOR IMPROVING ENERGY EFFICIENCY

A variety of policy tools and program designs are available to state officials to strengthen efforts to save energy across multiple use sectors. The following list highlights examples of best practices by state policymakers seeking to improve energy efficiency performance by energy utilities, in the buildings and transportation sectors, and through appliance standards. We also highlight best practices that reduce legal and market barriers to investing in energy efficiency and expand participation in programs that achieve savings.

Establish and adequately fund an energy efficiency resource standard (EERS) or similar energy savings target. EERS policies set specific energy savings targets that utilities or independent statewide program administrators must meet through customer energy efficiency programs. They serve as an enabling framework for cost-effective investment, savings, and program activity. EERS policies can catalyze increased energy efficiency and its associated economic and environmental benefits.

Examples: Arizona, Arkansas, Massachusetts, Michigan, Minnesota

Adopt policies to encourage and strengthen utility programs designed for low-income customers, and work with utilities and regulators to recognize the nonenergy benefits (NEBs) of such programs. States and public utility commissions (PUCs) can include goals specific to the low-income sector, either within an EERS or as a stand-alone minimum acceptable threshold. PUCs can further strengthen programs serving low-income households by designing cost-effectiveness tests that take into account the NEBs these programs produce.

Examples: Illinois, Nevada, New Hampshire, Pennsylvania

Adopt updated, more stringent building energy codes, improve code compliance, and involve efficiency program administrators in code support. Buildings use more than 40% of the total energy consumed in the United States, making them an essential target for energy savings. Mandatory building energy codes are one way to ensure a minimum level of energy efficiency for new residential and commercial buildings.

Examples: California, Illinois, Maryland, Texas

Adopt California tailpipe emissions standards and set quantitative targets for reducing VMT. Transportation consumes a substantial portion of the total energy used in the United States. At the state level, a comprehensive approach to transportation energy efficiency must address both individual vehicles and the transportation system. While federal fuel economy standards are expected to go a long way toward helping to reduce fuel consumption, standards for model years 2022–2025 are currently under review and face an uncertain future. States that adopt California's tailpipe emissions standards will be critical in maintaining progress toward clean, fuel-efficient vehicles. A variety of state-level policy options are available to address transportation system efficiency. These include codifying targets for reducing VMT and integrating land use and transportation planning to create sustainable communities with access to multiple modes of transportation.

Examples: California, Massachusetts, New York, Oregon

Treat cost-effective and efficient CHP as an energy efficiency resource equivalent to other forms of energy efficiency. Many states list CHP as an eligible technology within their EERS or renewable portfolio standard, but they relegate it to a bottom tier. ACEEE recommends that states give CHP savings equal footing, which requires that they develop a specific methodology for counting energy savings attributed to its utilization. If CHP is allowed as an eligible resource, EERS target levels should be increased to account for CHP potential and to ensure that CHP does not displace traditional energy efficiency measures.

Examples: Maryland, Massachusetts, Ohio, Rhode Island

Expand state-led efforts—and make them visible. Initiatives here might include establishing sustainable funding sources for energy efficiency incentive programs; investing in energy efficiency–related research, development, and demonstration centers; and leading by example by incorporating energy efficiency into government operations. States have many opportunities to lead by example, including reducing energy use in public buildings and fleets, demonstrating the market for energy savings performance contracts (ESPCs) that finance and deliver energy-saving projects, and funding research centers that focus on breakthroughs in energy-efficient technologies. States can also work with utilities and community-based organizations to promote and coordinate energy code compliance training and workforce development programs.

Examples: Alaska, Connecticut, New York

Explore and promote innovative financing mechanisms to leverage private capital and lower the up-front costs of energy efficiency measures. Although utilities in many states offer some form of on-bill financing program to promote energy efficiency in homes and buildings, expanding lender and customer participation has been an ongoing challenge. States can help address this challenge by passing legislation, increasing stakeholder awareness, and addressing legal barriers to the implementation of financing programs. A growing number of states are seeking new ways to maximize the impact of public funds and invigorate energy efficiency by attracting private capital through emerging financing models such as Property Assessed Clean Energy (PACE) programs and green banks.

Examples: Colorado, Connecticut, Missouri, New York, Rhode Island

Chapter 1. Introduction, Methodology, and Results

Author: Weston Berg

It has been a dynamic year for energy efficiency, with a mix of often competing forces at the national and state levels. In states including Virginia, New York, and New Jersey, policymakers unveiled plans for increased investment in clean energy and energy efficiency, driven in particular by concerns regarding climate change. Some states, in response to possible loosening of federal vehicle and appliance standards, worked to keep efficiency standards in place at the state level. Others, like Iowa and Connecticut, saw attacks against efficiency within their states through legislation that results in reduced energy and utility bill savings. Despite a few setbacks, reasons for optimism remained abundant. In states including Virginia, New York, and New Jersey, policymakers unveiled plans for increased investment in clean energy and energy efficiency. Across the country, new opportunities for efficiency and distributed resources continued to arise through improved data access, policy innovations, and technological advancements like smart control systems, geographic targeting, electric vehicle grid integration, and energy storage.

States spent approximately $7.9 billion on energy efficiency in the utility sector in 2017 and saved close to 27.3 million megawatt-hours (MWh), a 7.3% increase from 2016. While average national investments and savings have leveled off somewhat in recent years, efficiency continues to make new inroads in the Southeast and in other states where it has been slower to take hold. With many states continuing to strengthen emissions reduction goals, policymakers and utilities are exploring new ways for efficiency to contribute to meeting climate targets. Overall, plenty of signs are pointing to policymakers' growing appreciation of efficiency's economic and environmental benefits and its role in strengthening the grid and transitioning to a clean energy economy.

The 2018 State Energy Efficiency Scorecard, now in its 12th edition, ranks states on their policy and program efforts, not only assessing performance but also documenting best practices and recognizing leadership. The report captures the latest policy developments and state efforts to save energy and highlights opportunities and policy tools available to governors, state legislators, and regulators.

Energy efficiency remains the nation's third-largest electricity resource, employing 2.25 million Americans and typically providing the lowest-cost way to meet customers' energy needs. Other benefits include improving air and water quality, strengthening grid resilience, promoting equity, and improving health and comfort. By calling attention to recent policy and programmatic successes, the *Scorecard* seeks to help states, utilities, and businesses realize all these benefits.

The *Scorecard* is divided into eight chapters. In Chapter 1, we discuss our methodology for scoring states (including changes made this year), present the overall results of our analysis, and discuss several strategies states can use to improve their energy efficiency. Chapter 1 also highlights the leading states, most-improved states, and policy trends revealed by the rankings.

Subsequent chapters present detailed results for six major policy areas. Chapter 2 covers utility and public benefits programs and policies. Chapter 3 discusses transportation

policies. Chapter 4 deals with building energy code adoption, state code compliance efforts, and building policies. Chapter 5 covers state scores on policies that encourage and enable combined heat and power (CHP) development. Chapter 6 deals with state government initiatives, including financial incentives, lead-by-example policies, and energy efficiency–focused research and development (R&D). Finally, Chapter 7 discusses appliance and equipment efficiency standards.

The final chapter summarizes major policy highlights and setbacks occurring since the release of the last *Scorecard* and describes data limitations we encountered in our research. We also describe developing trends in energy efficiency we hope to address with new metrics in future *Scorecard*s.

SCORING

States are the test beds for policies and regulations, and no two states are the same. To reflect this diversity, we chose metrics flexible enough to capture the range of policy and program options that states use to encourage energy efficiency. The policies and programs evaluated in the *State Scorecard* aim to reduce end-use energy consumption, set long-term commitments for energy efficiency, and establish mandatory performance codes and standards. They also help to accelerate the adoption of the most energy-efficient technologies; reduce market, regulatory, and information barriers to energy efficiency; and provide funding for efficiency programs.

Table 1 outlines the scoring for six primary policy areas in which states have historically pursued energy efficiency:

- Utility and public benefits programs and policies[1]
- Transportation policies
- Building energy efficiency policies
- Policies encouraging CHP systems
- State government–led initiatives around energy efficiency
- Appliance and equipment standards

Table 1. Scoring by policy area and metrics

Policy areas and metrics	Maximum score	% of total points
Utility and public benefits programs and policies	20	40%
Incremental savings from electricity efficiency programs	7	14%
Incremental savings from natural gas and fuels efficiency programs	3	6%
Spending on electricity efficiency programs	2.5	5%
Spending on natural gas efficiency programs	1.5	3%

[1] A public benefits fund provides long-term funding for energy efficiency initiatives, usually through a small surcharge on electricity consumption collected on customers' bills.

Policy areas and metrics	Maximum score	% of total points
Large-customer opt-out programs*	(–1)	NA
Energy efficiency resource standards (EERSs)	3	6%
Performance incentives and fixed cost recovery	2	4%
Support of low-income energy efficiency programs	1	2%
Transportation policies	10	20%
Greenhouse gas (GHG) tailpipe emissions standards	1.5	3%
Electric vehicle (EV) registrations	1	2%
High-efficiency vehicle consumer incentives	0.5	1%
Targets to reduce vehicle miles traveled (VMT)	1	2%
Change in VMT	1	2%
Integration of transportation and land use planning	1	2%
Complete streets policies	0.5	1%
Transit funding	1	2%
Transit legislation	0.5	1%
Freight system efficiency goals	1	2%
Equitable transportation policies	1	2%
Building energy efficiency policies	8	16%
Level of code stringency	4	8%
Code compliance study	1	2%
Code enforcement activities	1.5	3%
Energy transparency policies	1	2%
Residential energy labeling	0.5	1%
Combined heat and power	4	8%
Interconnection standards	0.5	1%
Policies to encourage CHP as a resource	2	4%
Deployment incentives	0.5	1%
Additional supportive policies	1	2%
State government initiatives	5	10%
Financial incentives	2.5	5%
Lead-by-example efforts in state facilities and fleets	2	4%
Research and development	0.5	1%
Appliance and equipment efficiency standards	3	6%
Maximum total score	50	100%

* Large-customer opt-out programs allow a class of customers to withdraw from energy efficiency programs, reducing the potential savings available, so we deduct points for these policies.

We allocated points among the policy areas to reflect the relative magnitude of energy savings possible through the measures scored. We relied on an analysis of scholarly work and the judgment of ACEEE staff and outside experts about the impact of state policies on energy efficiency in the sectors we covered. A variety of cross-sector potential studies have informed our understanding of the energy savings available in each policy area and have led to ongoing refinements in our scoring methodology (Geller et al. 2007; Neubauer et al. 2009, 2011; Eldridge, Elliott, and Vaidyanathan 2010; Molina et al. 2011; Hayes et al. 2014).

Of the 50 total points possible, we allocated 20 points (40%) to utility and public benefits program and policy metrics, 8 points (16%) to building energy efficiency policies, and 4 points (8%) to improved CHP policies. Ten points (20%) went to transportation policies and programs and 3 points (6%) to state appliance and equipment standards. Savings from the policies and programs measured in our chapter on state initiatives are hard to quantify, but we assigned 5 points (10%) to this policy area to reward states that lead by example in making clear and visible commitments to energy efficiency.

Within each policy area, we developed a scoring methodology based on a diverse set of criteria that we detail in each policy chapter. We used these criteria to assign a score to each state. The scores were informed by data requests sent to state energy officials, public utility commission staff, and experts in each policy area. To the best of our knowledge, policy information for *The 2018 State Energy Efficiency Scorecard* is accurate as of July 31, 2018.

The *State Scorecard* is meant to reflect the current policy landscape, incorporating changes from year to year. We do not envision that the allocation of points both across and within sectors will forever remain the same; rather, we will continue to adjust our methodology to reflect the current energy efficiency policy and program landscape. This year we made changes to our scoring methodology in several policy areas. We outline these changes later in this chapter and discuss them in more depth in the relevant policy chapters. Changes in future editions of the *Scorecard* could include revisions to point allocations and the addition or subtraction of entire categories of scoring. In making these changes, we seek to faithfully represent states' evolving efforts to realize the potential for energy efficiency in the systems and sectors of their economies.

STATE DATA COLLECTION AND REVIEW

We continue to improve our outreach to state-level stakeholders to verify the accuracy and comprehensiveness of the policy information that we use to score the states. As in past years, we asked each state utility commission to review statewide data for the customer-funded energy efficiency programs presented in Chapter 2 and the CHP policies detailed in Chapter 5. Forty-three state commissions responded.

We also asked each state energy office to review information on transportation policies (Chapter 3), building energy codes (Chapter 4), CHP (Chapter 5), and state government–led initiatives (Chapter 6). We received responses from energy offices in 37 states. In addition, we gave state energy office and utility commission officials the opportunity to review and submit updates to the material in ACEEE's State and Local Policy Database (ACEEE 2018).[2]

[2] Available at database.aceee.org.

We also asked them to review and provide comments on a draft version of this *Scorecard* prior to publication.

We used publicly available data and responses from prior years to evaluate states that did not respond to this year's data request or request for review. In addition, we convened an expert working group to provide further information on building energy codes in all states.

Best-Practice Policy and Performance Metrics

The scoring framework described above is our best attempt to represent the myriad efficiency metrics as a quantitative score. Converting spending data, energy savings data, and policy adoption metrics spanning six policy areas into one score clearly involves some oversimplification. Quantitative energy savings performance metrics are confined mostly to programs run by utilities and third-party administrators using ratepayer funds. These programs are subject to strict evaluation, measurement, and verification standards. States engage in many other efforts to encourage efficiency, but such efforts are typically not evaluated with the same rigor, so it is difficult to capture comprehensive quantitative data for these programs.

Although our preference is to include metrics based on energy savings achieved in every sector, these data are not widely available. Therefore, with the exception of utility policies, we have not scored the other policy areas on spending data or reported savings attributable to a particular policy action. Instead, given the lack of consistent ex post data, we have developed best-practice metrics for scoring the states. Although these metrics do not score outcomes directly, they credit states that are implementing policies likely to lead to gains in energy efficiency. For example, we give credit for *potential* energy savings from improved building energy codes and appliance efficiency standards since *actual* savings from these policies are rarely evaluated. We have also attempted to reflect outcome metrics to the extent possible; for example, electric vehicle (EV) registrations and reductions in vehicle miles traveled (VMT) both represent positive results of transportation policies. We include full discussions of the policy and performance metrics in each chapter.

AREAS BEYOND OUR SCOPE: LOCAL AND FEDERAL EFFORTS

Energy efficiency initiatives implemented by actors at the federal or local level or in the private sector (with the exception of investor-owned utilities and CHP facilities) generally fall outside the scope of this report. It is important to note that regions, counties, and municipalities have become actively involved in developing energy efficiency programs, a positive development that reinforces state-level efficiency efforts. ACEEE's *City Energy Efficiency Scorecard* (Ribeiro et al. 2017) captures data on these local actions; we do not specifically track them in the *State Scorecard*. However a few *State Scorecard* metrics do capture local-level efforts, including the adoption of building codes and land use policies, as well as state financial incentives for local energy efficiency initiatives. We also include municipal utilities in our data set to the extent that they report energy efficiency data to the US Energy Information Administration (EIA), state public utility commissions, or other state and regional groups. As much as possible, however, we aim to focus specifically on state-level energy efficiency activities.

The *State Scorecard* has not traditionally covered private-sector investments in efficient technologies outside of customer-funded or government-sponsored energy efficiency initiatives, codes, or standards. However we do recognize the need for metrics that capture the rapidly growing role of private financing mechanisms. As Chapter 6 explains, we continue efforts to move the *Scorecard* in that direction by considering Property Assessed Clean Energy (PACE) programs and green banks in the scores for state financial incentives. While utility and public programs are critical to leveraging private capital, we have found it challenging to develop an independent metric that measures the success of private-sector investment, given the absence of protocols for measuring and verifying energy savings. We hope that as the transparency and reliability of savings data from these private initiatives improve, they will play a larger, more quantifiable role in future *State Scorecard*s.

CHANGES IN SCORING METHODOLOGY FROM LAST YEAR

We updated the scoring methodology in four policy areas this year to better reflect potential energy savings and changing policy landscapes. In Chapter 2, "Utility and Public Benefits Programs and Policies," we expanded our natural gas savings category to include savings reported from efficiency programs aimed at unregulated fuels like fuel oil, propane, and kerosene. These remain a significant source of home heating in many northeastern states. While in the past we scored utility-sector *investments* in these programs, efforts to include these *savings* in the *Scorecard* have been an ongoing challenge. The highly fragmented nature of these markets leads to variation in reporting strategies and incomplete data for this sector.

Moving forward, however, we believe it is important to account for efficiency from these sectors and recognize these savings. Many states are increasingly interested in better accounting for consumption and savings in this area. Electrification efforts continue to build momentum as part of broader rollouts of state decarbonization strategies, shifting energy end uses away from high-emissions fossil fuels and onto the electric grid. Some states are beginning to take a fuel-neutral approach to efficiency that allows utilities to count all energy savings toward compliance goals. Examples include New York, which has set a target to reduce energy consumption by 185 trillion British thermal units (Btu) below forecast energy use by 2025, and Massachusetts, which has looked toward an all-in three-year target of 207 trillion Btu savings. We hope our update to the utility efficiency metrics will position the *Scorecard* to better reflect this important policy trend.

In Chapter 4, "Building Energy Codes," we made several significant changes to move our scoring metrics toward a more outcome-based assessment of building energy codes and to better account for efforts to make efficiency visible in the housing market. Last year, to quantify each state's building energy code performance more accurately, we debuted a partnership between ACEEE and the New Buildings Institute (NBI) to preview a metric based on NBI's Zero Energy Performance Index (zEPI) and Pacific Northwest National Laboratory (PNNL) data. For the 2018 *Scorecard* we have formally realigned our building codes metric toward the zEPI scale. We feel this provides a more objective and standardized comparison of the impacts on modeled energy use intensity from each state's codes, relative to net zero, as well as the impacts of state-specific code amendments that can strengthen or

weaken their effectiveness.[3] More information on methodology is available in Chapter 4, as well as on the NBI website.[4]

Chapter 4 also includes changes to metrics related to state efforts to strengthen compliance with building energy codes. First, we retired the scoring category recognizing states that have conducted codes-related gap analyses. While gap analyses play an instrumental role in identifying opportunities to strengthen energy code adoption and policy infrastructure, most of these studies were completed close to 10 years ago through funding from the 2009 American Recovery and Reinvestment Act. Because few of these studies have been completed in recent years, we decided to discontinue using this metric as a basis for our compliance scoring category. Also, in the past our training metric awarded credit to any state in which significant funding or resources had been made available for code-related training and technical assistance. Given that nearly all states provide at least some support in this policy area, we decided to raise the bar this year to award points only to states that have established specific energy code–related training certification requirements for code officials.

Also in Chapter 4, we introduced a new metric aimed at highlighting efforts of states to improve the visibility of energy efficiency in the housing sector through issuance of residential energy labels or support of such labeling initiatives. In order to compare states, we used publicly available 2017 RESNET HERS ratings figures as a foundational data set. We supplemented these data with information regarding other rating and labeling efforts reported through our data request to state energy offices, some of which have adapted the U.S. Department of Energy's Home Energy Score to create state-specific labels (RESNET 2018). We then calculated the number of ratings issued as a percentage of total building permits for residential and multifamily new construction as reported by the US Census Bureau and awarded 0.5 points to states for which this percentage was equal to or higher than the median of all states.

In Chapter 7, "Appliance and Equipment Efficiency Standards," we increased the number of points achievable from 2 to 3 this year in recognition of increased state-level activity toward strengthening efficiency standards for appliances. With leadership on these standards now shifting from the federal to state level in the current regulatory environment, our addition of a point to this category seeks to credit the efforts of states like California and Vermont that continue to push for greater efficiency by passing legislation setting altogether new appliance standards, as well as to safeguard existing federal standards through state-level backstops. To accommodate the addition of a point to Chapter 7, we reduced the number of achievable points in Chapter 6, "State Government–Led Initiatives," from 6 to 5, subtracting 0.5 points each from the financial incentives and R&D categories.

[3] Earlier versions of the *Scorecard* assigned points based on which edition of the ASHRAE Standard 90.1 or International Energy Conservation Code the state had adopted, with some consideration of the impacts of state-specific code amendments. The new methodology is intended to improve transparency by showing the measurable impacts of these amendments.

[4] See newbuildings.org/wp-content/uploads/2015/12/JurisdictionalScoreMethodologyFactsheet_2017.pdf.

We discuss additional details on scoring, including changes to methodology, in each chapter.

2018 STATE ENERGY EFFICIENCY SCORECARD *RESULTS*

We present the results of the *State Scorecard* in figure 1 and describe them more fully in table 2. In this section, we also highlight some key changes in state rankings, discuss which states are making notable new commitments to energy efficiency, and provide recommendations for states wanting to increase their energy efficiency.

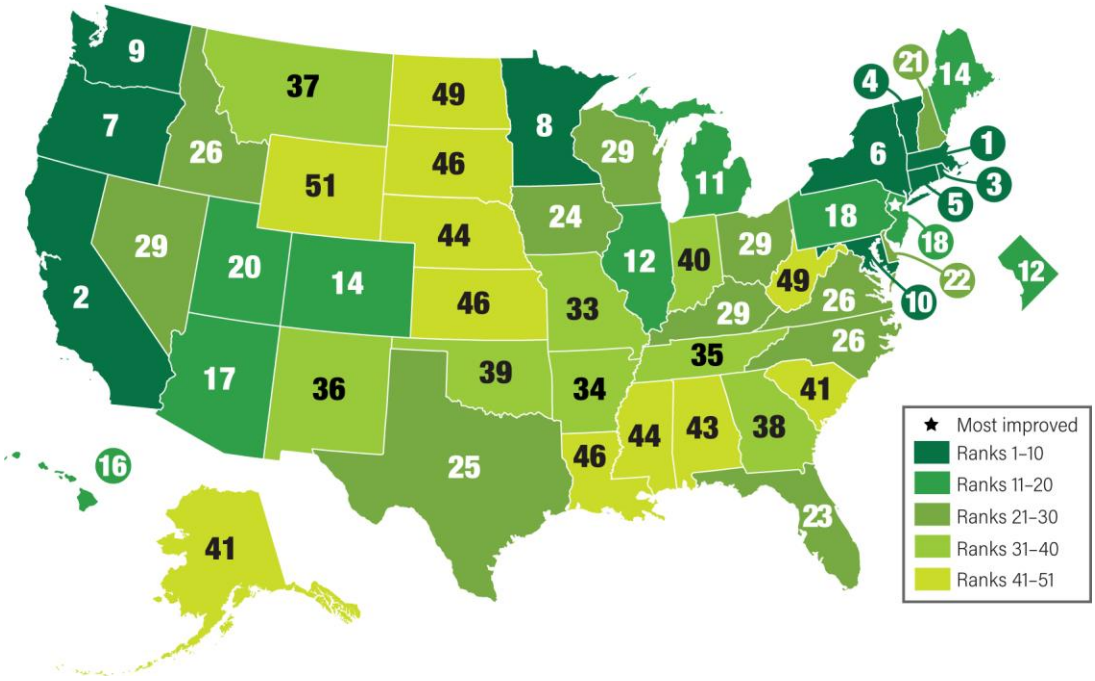

Figure 1. *2018 State Scorecard* rankings

Table 2. Summary of state scores in the *2018 State Scorecard*

Rank	State	Utility & public benefits programs & policies (20 pts.)	Trans-portation policies (10 pts.)	Building energy efficiency policies (8 pts.)	Combined heat & power (4 pts.)	State government initiatives (5 pts.)	Appliance efficiency standards (3 pts.)	**TOTAL SCORE (50 pts.)**	Change in rank from 2017	Change in score from 2017
1	Massachusetts	20	8.5	6.5	4	5	0	44	0	–0.5
2	California	15	9	7.5	4	5	3	43.5	0	1.5
3	Rhode Island	20	6.5	5.5	4	5	0	41	0	–0.5
4	Vermont	18.5	6.5	6.5	2	5	2	40.5	0	1.5
5	Connecticut	15	7.5	7	2.5	5	1	38	1	2.5
6	New York	12.5	8.5	6.5	3.5	4.5	0	35.5	1	1
7	Oregon	12	8	6.5	2.5	5	1	35	–2	–1.5
8	Minnesota	14.5	4	6	2.5	5	0	32	1	–1
9	Washington	10.5	7	6.5	2.5	5	0	31.5	–2	–3
10	Maryland	8.5	7	6	4	4.5	0	30	0	–1
11	Michigan	13.5	4	5.5	1.5	4	0	28.5	0	1.5
12	District of Columbia	8.5	8	6	1.5	3.5	0	27.5	1	2
12	Illinois	9.5	5	6	3.5	3.5	0	27.5	–1	0.5
14	Colorado	8.5	4.5	5.5	1	5	1	25.5	1	2.5
14	Maine	9.5	5.5	3	3.5	4	0	25.5	–1	0
16	Hawaii	11	4	4.5	1	2.5	0	23	–1	0
17	Arizona	10.5	4.5	3	1.5	2.5	0	22	0	0
18	New Jersey	6.5	6.5	5.5	1.5	1.5	0	21.5	5	4
18	Pennsylvania	3.5	5.5	7	2.5	3	0	21.5	1	1
20	Utah	7.5	3.5	5	1	4	0	21	–3	–1
21	New Hampshire	9	2	3.5	1.5	3.5	0	19.5	0	–0.5
22	Delaware	2.5	5.5	5	1.5	4	0	18.5	2	1.5
23	Florida	2	5.5	5.5	0.5	4	0	17.5	–1	–1
24	Iowa	7	2	5	1.5	1.5	0	17	–5	–3.5
25	Texas	1	3	7	1.5	4	0	16.5	1	0
26	Idaho	5.5	1.5	5.5	0.5	3	0	16	0	–0.5
26	North Carolina	3	3.5	4.5	1.5	3.5	0	16	5	1.5
26	Virginia	0.5	5	6	0	4.5	0	16	3	0.5
29	Kentucky	3.5	1.5	5	1	4.5	0	15.5	–1	–0.5
29	Nevada	5	2.5	3.5	0.5	4	0	15.5	5	1.5
29	Ohio	6	1	3	1.5	4	0	15.5	2	1
29	Wisconsin	7	0.5	3	1.5	3.5	0	15.5	–5	–1.5
33	Missouri	3	2.5	3.5	1.5	4.5	0	15	4	2.5
34	Arkansas	7	1	3	0	3.5	0	14.5	–3	0
35	Tennessee	1.5	3.5	3	1.5	4.5	0	14	–6	–1.5
36	New Mexico	4.5	1.5	2.5	1.5	3.5	0	13.5	–1	0
37	Montana	3.5	0.5	5	1	3	0	13	–1	0
38	Georgia	1.5	4.5	3.5	0.5	2	0	12	0	0
39	Oklahoma	4.5	2	1.5	0	3	0	11	1	1
40	Indiana	3.5	2	2.5	0.5	2	0	10.5	0	0.5
41	Alaska	1	2.5	1.5	1	4	0	10	–2	–1
41	South Carolina	1	2	3	0.5	3.5	0	10	1	0.5
43	Alabama	0	1	5.5	0	3	0	9.5	0	0.5
44	Mississippi	1.5	2	1.5	0.5	2.5	0	8	2	0.5
44	Nebraska	0.5	1	4	0	2.5	0	8	0	–0.5
46	Kansas	0.5	1.5	3.5	0.5	1.5	0	7.5	2	1.5
46	Louisiana	0.5	1.5	2	1	2.5	0	7.5	–2	–1
46	South Dakota	2.5	0.5	3.5	0.5	0.5	0	7.5	3	2.5
49	North Dakota	0	1.5	3	0.5	0.5	0	5.5	2	2
49	West Virginia	–0.5	1.5	3	0.5	1	0	5.5	–2	–1
51	Wyoming	1	1.5	0	0	2	0	4.5	–2	–0.5

How to Interpret Results

Although we provide individual state scores and rankings, the differences among states are most instructive in tiers of 10. Relatively few points separate states' total scores in the middle tiers: just 4 points in the third tier and 4.5 points in the fourth. These middle tiers also have a significant number of states tied in the rankings. For example, in the third tier Kentucky, Nevada, Ohio, and Wisconsin are tied for 29th. Small improvements in energy efficiency will likely have a significant effect on the rankings of states in the middle tiers. Conversely, idling states will easily fall behind as other states in this large group ramp up their efficiency efforts.

The top tier exhibits more variation in scoring, with a 14-point range between 1st place and 10th. This represents a little more than a third of the total variation in scoring among all the states. Massachusetts led the top tier of states again this year and was joined by California, Rhode Island, and Vermont as the only states scoring 40 or more points. Other states in the top tier are also well-established high scorers. Generally speaking, the highest-ranking states have all made broad, long-term commitments to energy efficiency, indicated by their staying power at the top of the *State Scorecard* over the past decade. However it is important to note that retaining one's spot in the lead pack is no easy task, and that all of these states must embrace new, cutting-edge strategies and programs to remain at the top. This is seen in some notable reshuffling in the top tier, with Oregon and Washington slipping somewhat in the rankings while Connecticut, New York, and Minnesota each drew ahead.

2018 Leading States

Massachusetts retained its hold on first place while capping off a busy year. Policymakers convened statewide energy efficiency planning efforts to set new three-year savings targets. The state's Three-Year Energy Efficiency Plan incorporates a fuel-neutral savings target. This reflects a growing trend among northeastern states toward a holistic approach to energy savings that includes not only electricity and natural gas but also nonutility heating fuels. In addition, the state's Department of Public Utilities issued an order in May approving $220 million in utility investment in grid-side modernization technologies over the next three years to improve efficiency and reliability and to pave the way for smart meter deployment. The state's General Court also passed legislation that authorizes "strategic electrification" and carbon-reducing use of renewable energy through efficiency programs, revitalizing progress toward statewide goals to slash greenhouse gas (GHG) emissions 80% by 2050 per the state's Global Warming Solutions Act of 2008.

Finishing in second place and closing in on the lead was **California**, which passed several regulations to advance energy efficiency over the past year. In late 2017 the state's Public Utilities Commission adopted long-term energy savings goals informed by SB 350 and AB 802. These major pieces of 2015 energy legislation called for doubling electric and natural gas savings by 2030 and shifted the energy use baseline to existing conditions in order to better target below-code savings. In 2018 the CPUC approved the first-ever set of business plans for the state's investor-owned utilities, providing sector-level strategies and metrics to align utility programs with the new savings goals. This spring the state adopted new net-zero electricity building energy codes that will require all new single-family homes and low-rise apartment buildings to use solar and efficiency to zero out the building's electricity demand. California also joined with eight other states in rolling out an updated zero-

emissions vehicle (ZEV) action plan. This strategy pushes for the adoption of policies to accelerate the purchase of ZEVs in response to the decision by the US Environmental Protection Agency (EPA) decision earlier in the year to freeze GHG emissions standards for light-duty vehicles.

Rhode Island continued to hold its ground in third place. Driven by an ambitious Three-Year Energy Efficiency Procurement Plan, the state achieved electric savings exceeding 3% of sales, among the highest reported levels anywhere in the United States. In February Rhode Island also adopted a voluntary residential stretch code, based on elements of the US Department of Energy's (DOE) Zero Energy Ready Homes Program and US EPA's WaterSense program. The code is intended to support sustainable energy goals described in the Resilient Rhode Island Act of 2014 to cut emissions 45% by 2035. Clean energy advocates ran into roadblocks on other policy fronts, however, with a bill stalling in the General Assembly that would have made the state the first in the nation with a carbon tax. Meeting a similar fate were proposed efficiency standards for lighting, computers, plumbing products, and other appliances. Yet the state continued to perform well in multiple *Scorecard* policy categories to finish in the top three for the second year in a row.

Vermont and **Connecticut** appeared in fourth and fifth place, respectively. Vermont's legislature passed H410 in May, enacting 16 new state appliance efficiency standards for computers and monitors, fluorescent tubes not covered by federal efficiency standards, plumbing fixtures, and other appliances. Among the 16 are three existing federal standards that were completed in recent years but never implemented. By 2025 the standards are expected to save consumers 435 million gallons of water and 59 million kilowatt-hours (kWh) of electricity annually, equating to roughly $17 million in savings per year.

Also finishing in the top five, **Connecticut** advanced efficiency in the buildings sector by adopting the 2015 IECC earlier this year, the second code update in two years. However ratepayer-funded efficiency programs endured a setback that is sure to adversely impact 2018 reported savings and could jeopardize Connecticut's standing in next year's *Scorecard*. State lawmakers closed 2017 by cutting the state's energy efficiency funding by a third, redirecting $127 million over two years from the Connecticut Energy Efficiency Fund to make up a budget shortfall and forcing the Energy Efficiency Board to scale back programs. Seeking to lessen the damage, the state legislature acted in May to restore $10 million in efficiency funds for the 2019 budget. It also passed SB 9, expanding the state's renewable portfolio standard and making administrative changes designed to protect energy efficiency funds from future legislative raids.

Also in the top 10 this year were New York, Oregon, Minnesota, Washington, and Maryland. Each of these states has well-established efficiency programs and policies and continues to push the boundaries by refining the ways to enable energy savings. New York announced in the spring a plan to reduce energy consumption 185 trillion Btus from forecast levels by 2025, a 50% improvement over prior goals. The governors of Oregon and Washington both signed major executive orders since the last Scorecard to accelerate energy efficiency in the built environment. Enacted last November, Oregon's EO 17-20 lays out an ambitious plan to cut energy use and carbon emissions from state buildings and residential and commercial construction, directing updates to building energy codes to require electric

vehicle–ready building construction as well as zero energy–ready homes. Similarly, Washington's EO 18-01 calls on state agencies to prioritize the lease and purchase of low-emission vehicles and construction of zero energy or zero energy–capable state-owned buildings.

Table 3 shows the number of years that states have been in the top 5 and top 10 spots in the *State Scorecard* rankings since 2007.

Table 3. Leading states in the *State Scorecard*, by years at the top

State	Years in top 5	Years in top 10
California	12	12
Massachusetts	11	12
Oregon	10	12
Vermont	10	12
New York	7	12
Connecticut	6	12
Rhode Island	6	11
Washington	1	12
Minnesota	0	11
Maryland	0	8
Illinois	0	2
Maine	0	2
New Jersey	0	2
Wisconsin	0	1

Eight states have occupied the top 5 spots, and 14 have appeared somewhere in the top 10, since the first edition of the *State Scorecard*. California is the only state to have held a spot among the top 5 in all 12 years, followed by Massachusetts for 11 years and Oregon and Vermont, both for 10 years. New Jersey, Wisconsin, Illinois, and Maine have all placed in the top 10 in the past, but none scored high enough to rank in the top tier this year.

Changes in Results Compared with *The 2017 State Energy Efficiency Scorecard*

Overall, 24 states gained points and 19 states lost points this year compared with last year's *Scorecard* rankings. Eight states had no change in score.[5] Table 4 compares the results.

[5] The *State Scorecard* looks at all 50 states and the District of Columbia, which, while not a state, is treated as such under Department of Energy Program Rule 10 CFR Part 420–State Energy Program.

Table 4. Number of states gaining or losing points compared with 2017, by policy area

Policy category	States gaining points		No change		States losing points	
Utility and public benefits	18	35%	24	48%	9	18%
Transportation	27	53%	17	33%	7	14%
Building energy policies	16	31%	15	29%	20	39%
Combined heat and power	8	16%	42	82%	1	2%
State government initiatives	1	2%	22	43%	28*	55%
Appliance standards	4	8%	47	92%	0	0%
Total score	24	47%	8	16%	19	37%

Percentages may not total 100 due to rounding. *Because of an adjustment to the scoring methodology that shifted a point to the appliance standards chapter from state government initiatives, a relatively high number of states lost a point in the latter category this year.

The number of states losing points should not necessarily be interpreted as a sign that they are losing ground. Given the number of metrics in the *State Scorecard* and states' varying efforts, relative movement among the states should be expected. The landscape for energy efficiency is in constant flux, and changes in state scores result from a variety of factors. In some cases they reflect an ever-rising bar for energy efficiency policies and outcomes. In others they stem from changes to our *Scorecard* methodology, such as the addition of a metric last year to consider policies promoting program access to low-income customers, as well as a new metric introduced this year to consider residential energy labeling efforts. The state government initiatives metric lost one of its total achievable points to accommodate the addition of a point to the appliance standards scoring metric. In another area, several states that had previously received credit for training-related efforts for building code officials lost points in this edition due to our transition to a metric rewarding states that have established specific training certification requirements.

Leaving aside methodology, the fact that 19 states lost points this year does not indicate a lack of progress. It is true that several states have backslid in terms of policy; examples include legislation passed earlier this year in Iowa that will severely curtail energy efficiency programs and the decision by Connecticut lawmakers last year to raid the state's energy efficiency funds to make up a budget shortfall. Still, several states, including Arkansas, Colorado, and New York, renewed, extended, or strengthened energy efficiency targets in recent months to help lay the groundwork for future savings. As mentioned earlier, savings from electric efficiency programs in 2017 totaled approximately 27.3 million MWh, a 7.3% increase from the 2016 savings reported in last year's *State Scorecard*. These savings are equivalent to approximately 0.72% of total retail electricity sales in the United States in 2017. More information on state scores for utility programs is included in Chapter 2.

Most-Improved States

Relative to last year, this year's most-improved state was New Jersey. Also showing improvement were Missouri, South Dakota, Colorado, and Connecticut. All of these states added more than 2 points to their scores to move up in the rankings. Table 5 shows changes in points and rank compared with last year for these states.

Table 5. Changes from 2017 for most-improved states

	Change in score	Change in rank	2018 ranking	2017 ranking
New Jersey	+4	+5	18	23
Missouri	+2.5	+4	33	37
South Dakota	+2.5	+3	49	46
Colorado	+2.5	+1	14	15
Connecticut	+2.5	+1	5	6

New Jersey improved by 4 points this year, the most of any state, and rose in the ranks from 23rd to 18th. Energy efficiency received a huge boost in the Garden State with the passage of SB 2314, establishing new annual energy savings targets for electricity and natural gas usage of 2% and 0.75% of sales, respectively, to be achieved within five years. The legislation also establishes a new energy storage target, strengthens the state's renewable portfolio standard, and sets energy benchmarking requirements for commercial buildings with more than 25,000 square feet of space.

Missouri improved by 2.5 points this year, rising from 37th to 33rd. Following a challenging 2016 in which energy efficiency programs were briefly suspended due to prolonged negotiations between utilities and state regulators, Missouri rebounded in 2017 with annual electric utility savings of 0.78%, the highest it has ever reported. The state's electric utilities seem poised to build on their success, with Ameren Missouri filing plans in June 2018 to invest nearly $92 million annually in energy efficiency over the next six years and develop 15 new programs. The utility also introduced plans in February to incentivize the rollout of electric vehicle charging stations across the state and encourage commercial customers to transition to electric vehicles.

Other states making improvements included **South Dakota** and **Colorado**, which also added 2.5 points each. While South Dakota has long appeared in the bottom tier of the *Scorecard*, it rose three positions in this year's ranking thanks to efforts to strengthen efficiency in the buildings sector. While South Dakota's state-adopted building energy codes remain voluntary, many communities within the state have nevertheless updated local codes based on the 2015 IECC. Colorado moved up a spot into 14th place in recognition of the state public utilities commission's raising the bar on utility savings. The commission approved new energy savings goals for Xcel Energy, an increase from 1.3% of electric sales to approximately 1.6%.

Connecticut also added 2.5 points, improving from sixth to fifth place. As mentioned, the state gained in the rankings thanks to a rise in reported electric utility savings—the fifth-highest among all states—as well as the recent adoption of a new state building code that includes the 2015 IECC. The code takes effect in October 2018. However a raid of the state's energy efficiency fund in late 2017 is sure to undermine reported utility savings by the end of the year, likely jeopardizing Connecticut's standing in future *Scorecards*.

Not to be overlooked, **Nevada** also showed sizable progress in the wake of major state energy legislation passed in 2017. The law directs the Public Utilities Commission to establish utility energy savings goals for NV Energy, allow program approval if the portfolio of utility energy efficiency programs is cost effective, include nonenergy benefits in benefit–cost analysis, and require a minimum spending level for low-income efficiency programs. While the PUC is still working with stakeholders to establish formal targets, NV Energy's Joint Integrated Resource Plan and three-year DSM Plan submitted earlier this year aim for annual savings of 1.15% over the next three years, a significant improvement on the state's past efficiency efforts. The Silver State has also taken steps to strengthen sustainability in its transportation sector with the implementation of a statewide complete streets policy to design and retrofit streets and highways in a way that improves accessibility for all users, including pedestrians, cyclists, and people with disabilities.

States Losing Ground

Seventeen states fell in the rankings this year due to several factors, including policy or program rollbacks, greater progress by other states, and changes to the scoring methodology in several categories, including building energy policies and appliance standards. This loss of ground indicates the complex relationship between changes in total score and changes in rank. Of the 19 states that lost points, 12 fell in the rankings and 6 did not change. One state, Minnesota, actually improved its rank despite losing a point. The fall in rank of several states—for example, Wisconsin and Tennessee—might appear incommensurate with their relatively minor loss of points relative to last year. Given the number of metrics covered in the *State Scorecard* and states' differing efforts, relative movement among states should be expected. As mentioned earlier, the difference among states' total scores, particularly in the middle tiers of the *State Scorecard*, is small; as a result, idling states can easily fall behind in the rankings as others ramp up efforts to become more energy efficient.

Iowa lost 3.5 points, posting the largest plunge in points of any state for the second year in a row. The Hawkeye State ranks 24th this year, a long way from its 12th-place finish in the *2015 Scorecard,* due largely to the signing of bill SF2311 earlier this year. The legislation, devastating to efficiency, imposes a debilitating spending cap on programs, removes efficiency program requirements that had been placed on municipal utilities and co-ops, and allows customers to opt out of paying for efficiency programs that fail to satisfy the ratepayer impact (RIM) test, a cost-effectiveness measure rejected by most states as ineffective. Early indications from utility filings point to a forecast drop in savings of 25–50% for electric programs and 75–80% for natural gas programs, further jeopardizing Iowa's rank in future *Scorecard*s.

In general, we see two trends among the states losing ground in the *State Scorecard.* First, many of the states falling behind are not increasing energy savings year after year and are therefore being outpaced as other states ramp up programs to meet higher savings targets. States losing ground also typically have not fully implemented changes to the utility business model that encourage utilities to take full advantage of energy efficiency as a resource, including through decoupling, performance incentives, and energy savings targets.

Second, opt-out provisions have been approved in many of the states falling behind in the *State Scorecard* rankings. These provisions allow large customers to avoid paying into energy efficiency programs, forcing other customers to subsidize them while limiting savings achieved by utilities.

STRATEGIES FOR IMPROVING ENERGY EFFICIENCY

A variety of policy tools and program designs are available to state officials to strengthen efforts to save energy across multiple use sectors. The following list highlights examples of best practices by state policymakers seeking to improve energy efficiency performance by energy utilities, in the buildings and transportation sectors, and through appliance standards. We also highlight best practices that reduce legal and market barriers to investing in energy efficiency and expand participation in programs that achieve savings.

Establish and adequately fund an energy efficiency resource standard (EERS) or similar energy savings target. EERS policies set specific energy savings targets that utilities or independent statewide program administrators must meet through customer energy efficiency programs. They serve as an enabling framework for cost-effective investment, savings, and program activity. EERS policies can catalyze increased energy efficiency and its associated economic and environmental benefits.

Examples: Arizona, Arkansas, Massachusetts, Michigan, Minnesota

Adopt policies to encourage and strengthen utility programs designed for low-income customers, and work with utilities and regulators to recognize the nonenergy benefits (NEBs) of such programs. States and public utility commissions (PUCs) can include goals specific to the low-income sector, either within an EERS or as a stand-alone minimum acceptable threshold. PUCs can further strengthen programs serving low-income households by designing cost-effectiveness tests that take into account the multiple NEBs these programs produce.

Examples: Illinois, Nevada, New Hampshire, Pennsylvania

Adopt updated, more stringent building energy codes, improve code compliance, and involve efficiency program administrators in code support. Buildings use more than 40% of the total energy consumed in the United States, making them an essential target for energy savings. Mandatory building energy codes are one way to ensure a minimum level of energy efficiency for new residential and commercial buildings.

Examples: California, Illinois, Maryland, Texas

Adopt California tailpipe emissions standards and set quantitative targets for reducing VMT. Transportation consumes a substantial portion of the total energy used in the United States. At the state level, a comprehensive approach to transportation energy efficiency must address both individual vehicles and the transportation system. While federal fuel economy standards are expected to go a long way toward helping to reduce fuel consumption, standards for model years 2022–2025 are currently under review and face an uncertain future. States that adopt California's tailpipe emissions standards will be critical in maintaining progress toward clean, fuel-efficient vehicles. A variety of state-level policy

options are available to address transportation system efficiency. These include codifying targets for reducing VMT and integrating land use and transportation planning to create sustainable communities with access to multiple modes of transportation.

Examples: California, Massachusetts, New York, Oregon

Treat cost-effective and efficient CHP as an energy efficiency resource equivalent to other forms of energy efficiency. Many states list CHP as an eligible technology within their EERS or renewable portfolio standard, but they relegate it to a bottom tier. ACEEE recommends that states give CHP savings equal footing, which requires that they develop a specific methodology for counting energy savings attributed to its utilization. If CHP is allowed as an eligible resource, EERS target levels should be increased to account for CHP potential and to ensure that CHP does not displace traditional energy efficiency measures.

Examples: Maryland, Massachusetts, Ohio, Rhode Island

Expand state-led efforts—and make them visible. Initiatives here might include establishing sustainable funding sources for energy efficiency incentive programs; investing in energy efficiency–related research, development, and demonstration centers; and leading by example by incorporating energy efficiency into government operations. States have many opportunities to lead by example, including reducing energy use in public buildings and fleets, demonstrating the market for energy savings performance contracts (ESPCs) that finance and deliver energy-saving projects, and funding research centers that focus on breakthroughs in energy-efficient technologies. States can also work with utilities and community-based organizations to promote and coordinate energy code compliance training and workforce development programs.

Examples: Alaska, Connecticut, New York

Explore and promote innovative financing mechanisms to leverage private capital and lower the up-front costs of energy efficiency measures. Although utilities in many states offer some form of on-bill financing program to promote energy efficiency in homes and buildings, expanding lender and customer participation has been an ongoing challenge. States can help address this challenge by passing legislation, increasing stakeholder awareness, and addressing legal barriers to the implementation of financing programs. A growing number of states are seeking new ways to maximize the impact of public funds and invigorate energy efficiency by attracting private capital through emerging financing models such as Property Assessed Clean Energy (PACE) programs and green banks.

Examples: Colorado, Connecticut, Missouri, New York, Rhode Island

Chapter 2. Utility and Public Benefits Programs and Policies

Authors: Grace Relf and Seth Nowak

INTRODUCTION

The utility sector is critical to implementing energy efficiency. Electric and natural gas utilities and independent statewide program administrators deliver a substantial share of electricity and natural gas efficiency programs in the United States.[6] These programs, funded by utility customers through utility rates and statewide public benefits funds, encourage customers to use efficient technologies and thereby reduce their energy waste. Energy efficiency is a resource—just as power plants, wind turbines, and solar panels are. Driven by regulation from state utility commissions, utilities and administrators in some states have for decades been delivering energy efficiency programs and market transformation initiatives for residential, commercial, industrial, and low-income customers.[7]

Utilities and administrators implement energy efficiency programs in all 50 states and the District of Columbia. Program approaches include financial incentives, such as rebates and loans; technical services, such as audits, retrofits, and training for architects, engineers, and building owners; behavioral strategies; and educational campaigns about the benefits of energy efficiency improvements. Utilities and administrators also continue to develop new and creative ways of delivering energy efficiency to their customers, including some customer segments that have been more difficult to serve, such as small businesses and multifamily housing.

METHODOLOGY

For this chapter, we gathered statewide data on the following:

- Utility energy sales (electricity and natural gas) to customers in 2016 and 2017
- Utility revenues from retail energy sales in 2016 and 2017
- Number of residential natural gas customers in 2016
- Budgets for electricity and natural gas energy efficiency programs in 2017 and 2018
- Actual spending for electricity and natural gas energy efficiency programs in 2016 and 2017
- Incremental net and gross electricity and natural gas energy efficiency program savings in 2016 and 2017[8]
- Incremental net and gross energy savings of unregulated fuels including fuel oil, kerosene, wood, and propane, where available, in 2016 and 2017

[6] Other major programs, run by state governments, are discussed in Chapter 6.

[7] For more information on the historical growth of utility energy efficiency programs, see York et al. (2012).

[8] Gross savings are those expected from an energy efficiency program, crediting all installed efficiency measures, including those that would have been installed in the absence of the program. Net savings are those attributable to the program, typically estimated by subtracting savings from free riders (program participants who would have implemented or installed the measures without the incentive, or with a lesser incentive), and adding in estimates of savings from free drivers (nonparticipants who implemented or installed the measures due to the program). States differ in how they define, measure, and account for free-ridership and other components of the net savings calculation (Haeri and Khawaja 2012).

- Policies and regulations to encourage utility investment in energy efficiency
- Utility policies and programs related to large customers, including self-direct and opt-out provisions
- Policies and levels of spending related to utility investment in low-income energy efficiency programs
- Data access policies and provisions[9]

Our data sources included information requests completed by state utility commissions, the Consortium for Energy Efficiency (CEE 2012–2018), EIA (EIA 2016b, 2017a, 2017b, 2017c), and regional efficiency groups.[10,11] We sent the data we gathered, along with last year's *State Scorecard* data, to state utility commissions and independent administrators for review. Table 6 shows overall scores for utility programs and policies. Tables 8, 10, 12, and 14 provide data on electricity and natural gas efficiency program savings and spending in the most recent years for which data are available.

SCORING AND RESULTS

This chapter reviews and ranks the states on the basis of their performance in implementing utility-sector efficiency programs and enabling policies that are evidence of a commitment to energy efficiency. The eight utility scoring metrics are

- Incremental electricity program savings as a percentage of retail sales (7 points)[12]
- Incremental natural gas and unregulated fuels program savings as a percentage of residential and commercial sales (3 points)[13]
- Electricity program spending as a percentage of statewide electric utility revenues (2.5 points)
- Natural gas program spending per residential gas customer (1.5 points)
- Opt-out provisions for large customers (–1 point)
- EERS for utilities and statewide program administrators (3 points)

[9] We used this information from state responses to present best practices, not to develop scores.

[10] The Consortium for Energy Efficiency (CEE) surveys administrators of public benefits programs annually to capture trends in aggregated budgets and expenditures. CEE granted ACEEE permission to reference survey results as of a point in time for the purpose of capturing trends in aggregate budget, expenditure, and impacts data, while acknowledging the difficulty of meaningful state-by-state comparison. The full report is at www.cee1.org/annual-industry-reports.

[11] The six regional energy efficiency organizations (REEOs) include the Midwest Energy Efficiency Alliance (MEEA), Northeast Energy Efficiency Partnerships (NEEP), Northwest Energy Efficiency Alliance (NEEA), Southeast Energy Efficiency Alliance (SEEA), South-Central Partnership for Energy Efficiency as a Resource (SPEER), and Southwest Energy Efficiency Project (SWEEP). The REEOs work through funded partnerships with the US Department of Energy and with various stakeholders, such as utilities and advocacy groups, to provide technical assistance to states and municipalities in support of efficiency policy development and program design and implementation.

[12] ACEEE defines incremental savings as new savings from programs implemented in a given year. Incremental savings are distinct from cumulative savings, which are the savings in a given program year from all the measures implemented under the programs in that year and in prior years that are still saving energy.

[13] This year we have incorporated savings from unregulated fuels (including heating oil, propane, and others) in the natural gas savings metric.

- Utility business models that encourage energy efficiency, including performance incentives and revenue decoupling (2 points)
- Policies and utility funding in support of low-income energy efficiency programs (1 point)

In this category, a state could earn up to 20 points, or 40% of the 50 total points possible in the *State Scorecard*. We set this point allocation because the savings potential of utility and public benefits programs is approximately 40% of the total energy savings potential of all policy areas scored. Studies suggest that electricity programs typically achieve at least three times the primary energy savings of natural gas programs (Eldridge et al. 2009; Geller et al. 2007; Elliott et al. 2007a; Elliott et al. 2007b). Utility-sector potential studies generally indicate significant untapped potential for natural gas efficiency programs (Neubauer 2011; PG&E 2006; Mosenthal et al. 2014; GDS 2013; Cadmus 2010). Therefore we allocated 9.5 points to metrics for electricity programs measuring annual savings and spending and 4.5 points to metrics for natural gas and unregulated fuels programs measuring annual savings and spending. In an effort to recognize state policies and programs aimed at strengthening energy efficiency among low-income households—a historically underserved segment of the population—we created a 1-point scoring category to capture these state efforts in the 2017 *State Scorecard*. At that time, we shifted 0.5 points each away from utility spending on electricity and natural gas efficiency programs.

Hawaii consumes almost no natural gas (EIA 2016a), so it aims energy efficiency efforts at electricity only. To address this, we awarded Hawaii points for natural gas efficiency spending, savings, and regulatory structures equivalent to the proportion of points it earned for corresponding electricity programs and policies.

We continue our practice of reporting programs' incremental energy savings (new savings from programs in each program cycle) rather than their total annual—or cumulative—energy savings (savings in a given year from all current and previously implemented energy efficiency measures that are still saving energy under applicable programs). We report incremental savings in the *State Scorecard* for two reasons. First, basing our scoring on total annual savings or cumulative energy savings would involve levels of complexity that are beyond the scope of the *State Scorecard*, including identifying the start year for the cumulative series and accurately accounting for the life of energy efficiency measures and the persistence of savings. Second, the *State Scorecard* aims to provide a snapshot of states' current energy efficiency programs, and incremental savings give a clearer picture of recent efforts.

This year, we requested that our contacts at state utility commissions provide both lifetime savings and cumulative savings from electric and gas energy efficiency programs. Lifetime savings look ahead to the expected energy savings over the lifetime of a given installed measure, calculated by multiplying the incremental MWh or therm reduction associated with that measure by its expected lifetime.[14] Life-cycle savings have the potential to serve as a forward-looking alternative to our current scoring methodology, and we may use life-cycle

[14] EIA refers to this type of data as incremental life-cycle savings.

savings in the future. However we did not use these metrics this year because we lacked data from many states.

There are some other possible metrics we did not use for scoring. For instance, we did not attempt to include program cost effectiveness or level of spending per unit of energy savings. All states have cost-effectiveness requirements for energy efficiency programs. However the wide diversity of measurement approaches across states makes comparison less than straightforward. Also, several states require program administrators to pursue all cost-effective efficiency. Although some states have prioritized low acquisition costs and encouraged maximizing the *degree* of cost effectiveness, promoting larger *amounts* of marginally cost-effective energy savings is another valid approach. We also did not adjust savings for variations in avoided costs of energy across states, as there are examples of achieving deep energy savings in both high- and low-cost states.

Note that scores are for states as a whole and therefore may not be representative of the specific efforts of each utility within the state. Within the *State Scorecard*, a single utility or a small set of utilities may do very well in terms of energy efficiency programs and associated metrics (spending and savings), but when viewed in combination with all utilities in that state, such efforts can be masked by other utilities with lower performance. For more information on the energy savings performance of individual utilities, refer to *The 2017 Utility Energy Efficiency Scorecard* (Relf, Baatz, and Nowak 2017), published by ACEEE.

Table 6 lists states' overall utility scores. Explanations of each metric follow.

Table 6. Summary of state scores for utility and public benefits programs and policies

State	2017 electricity program savings (7 pts.)	2017 natural gas & fuels program savings (3 pts.)	2017 electricity EE spending (2.5 pts.)	2017 gas program spending (1.5 pts.)	2018 opt-out provision (–1 pt.)	2018 energy efficiency resource standard (3 pts.)	2018 performance incentives & fixed cost recovery (2 pts.)	2018 low-income energy efficiency programs (1 pt.)	2018 total score (20 pts.)
Massachusetts	7	3	2.5	1.5	0	3	2	1	20
Rhode Island	7	3	2.5	1.5	0	3	2	1	20
Vermont	7	2	2.5	1.5	0	2.5	2	1	18.5
California	6.5	2	1.5	0.5	0	1.5	2	1	15
Connecticut	5.5	1.5	1.5	1.5	0	2	2	1	15
Minnesota	4.5	3	1	1	0	2	2	1	14.5
Michigan	5	3	1	0.5	0	1.5	1.5	1	13.5
New York	4	1	1	1	0	2.5	2	1	12.5
Oregon	4	2	1.5	1	0	1.5	1	1	12
Hawaii	5	2	0.5	0.5	0	1	2	0	11
Arizona	4.5	1	0.5	0	0	3	1	0.5	10.5
Washington	4.5	0.5	2	0.5	0	1.5	1	0.5	10.5
Illinois	4.5	0.5	1	0.5	–1	2	1	1	9.5
Maine	2.5	1.5	1	1.5	–1	2.5	0.5	1	9.5
New Hampshire	2	1	0.5	1.5	0	1.5	1.5	1	9
District of Columbia	2.5	2	0.5	1	0	0	1.5	1	8.5
Maryland	3	0	1	0.5	0	2	1	1	8.5
Colorado	3	0.5	0.5	0.5	0	2	1.5	0.5	8.5
Utah	2.5	2	1	0.5	0	0	1	0.5	7.5
Iowa	2.5	1.5	1	1.5	–1	1	0	0.5	7
Wisconsin	2	1	0.5	0.5	0	1	1	1	7
Arkansas	2	1.5	0.5	0.5	–1	1.5	1.5	0.5	7
New Jersey	1.5	0.5	0.5	1	0	2	0	1	6.5
Ohio	3	0	0.5	0.5	–1	1	1.5	0.5	6
Idaho	3	0	1.5	0	0	0	0.5	0.5	5.5
Nevada	2	0	0.5	0	0	1	0.5	1	5
New Mexico	1.5	0	0.5	0.5	0	0.5	0.5	1	4.5
Oklahoma	1	1	0.5	0.5	–1	0	1.5	1	4.5
Indiana	1	1	0.5	0.5	–1	0	1	0.5	3.5

State	2017 electricity program savings (7 pts.)	2017 natural gas & fuels program savings (3 pts.)	2017 electricity EE spending (2.5 pts.)	2017 gas program spending (1.5 pts.)	2018 opt-out provision (–1 pt.)	2018 energy efficiency resource standard (3 pts.)	2018 performance incentives & fixed cost recovery (2 pts.)	2018 low-income energy efficiency programs (1 pt.)	2018 total score (20 pts.)
Kentucky	1	1	0.5	0	–1	0	1.5	0.5	3.5
Montana	1.5	0	0.5	0.5	0	0	0	1	3.5
Pennsylvania	1.5	0	0.5	0	0	0.5	0	1	3.5
Missouri	2.5	0	0.5	0	–1	0	0.5	0.5	3
North Carolina	2	0	0.5	0	–1	0	1	0.5	3
Delaware	0	0	0.5	1	0	0	0	1	2.5
South Dakota	0.5	0	0	0.5	0	0	1.5	0	2.5
Florida	0	0	0.5	1	0	0	0	0.5	2
Georgia	0.5	0	0	0	0	0	1	0	1.5
Mississippi	0.5	0	0	0	0	0	0.5	0.5	1.5
Tennessee	0.5	0	0	0	0	0	0.5	0.5	1.5
Alaska	0	0	0	0	0	0	0	1	1
South Carolina	1	0	0	0	–1	0	0.5	0.5	1
Texas	0.5	0	0	0	–1	0	0.5	1	1
Wyoming	0.5	0	0	0	0	0	0.5	0	1
Kansas	0	0	0	0	0	0	0	0.5	0.5
Louisiana	0	0	0	0	0	0	0.5	0	0.5
Nebraska	0.5	0	0	0	0	0	0	0	0.5
Virginia	0	0	0	0	–1	0	0.5	1	0.5
Alabama	0	0	0	0	0	0	0	0	0
North Dakota	0	0	0	0	0	0	0	0	0
West Virginia	0.5	0	0	0	–1	0	0	0	-0.5

DISCUSSION

History of Utility and Public Benefits Programs and Policies

The structure and delivery of customer-funded electric energy efficiency programs have changed dramatically over the past three decades, mostly in conjunction with electric industry restructuring efforts.[15] In the 1980s and 1990s, such programs were almost exclusively the domain of utilities, but efforts in the mid-1990s to restructure and deregulate the electric utilities led numerous states to implement public benefits charges as a new source of funding for efficiency. These public benefits approaches established new structures under which utilities—or, in some states, separate efficiency utilities or other third parties—were tasked with administering and delivering energy efficiency, renewable energy, and low-income programs.[16]

Despite such public benefits programs, restructuring still resulted in a precipitous decline in funding for customer-funded electricity energy efficiency programs in the late 1990s, primarily due to regulatory uncertainty and the expected loss of cost-recovery mechanisms for those programs.[17] Generally, utilities did not see customer-funded energy efficiency programs as being compatible with competitive retail markets.

After restructuring efforts slowed in some states, utility commissions placed renewed focus and importance on energy efficiency programs. From their low point in 1998, investments in electricity programs had increased more than fourfold by 2010, from approximately $900 million to $3.9 billion. More recently, growth in annual investments in energy efficiency has slowed, then leveled. In 2017 total spending for electricity efficiency programs was roughly $6.6 billion. Adding natural gas program spending of $1.3 billion, we estimate total efficiency program spending of approximately $7.9 billion in 2017 (see figure 2), up from the $7.6 billion that was reported for 2016.

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[15] By *customer-funded energy efficiency programs*—also known as *ratepayer-funded energy efficiency programs*—we mean energy efficiency programs funded through charges wrapped into customer rates or appearing as some type of charge on customer utility bills. This includes both utility-administered programs and public benefits programs administered by other entities. We do not include data on separately funded low-income programs, load management programs, or energy efficiency R&D.

[16] States that have established nonutility administration of efficiency programs include Delaware, District of Columbia, Hawaii, Maine, New Jersey, New York, Oregon, Vermont, and Wisconsin.

[17] Under traditional regulatory structures, utilities do not have an economic incentive to help their customers become more energy efficient because their revenues and profits decline in line with falling energy sales resulting from energy efficiency programs. To address this disincentive, state regulators allow utilities to recover, at a minimum, the costs of running energy efficiency programs through charges on customer bills. For more on this issue, see York and Kushler (2011).

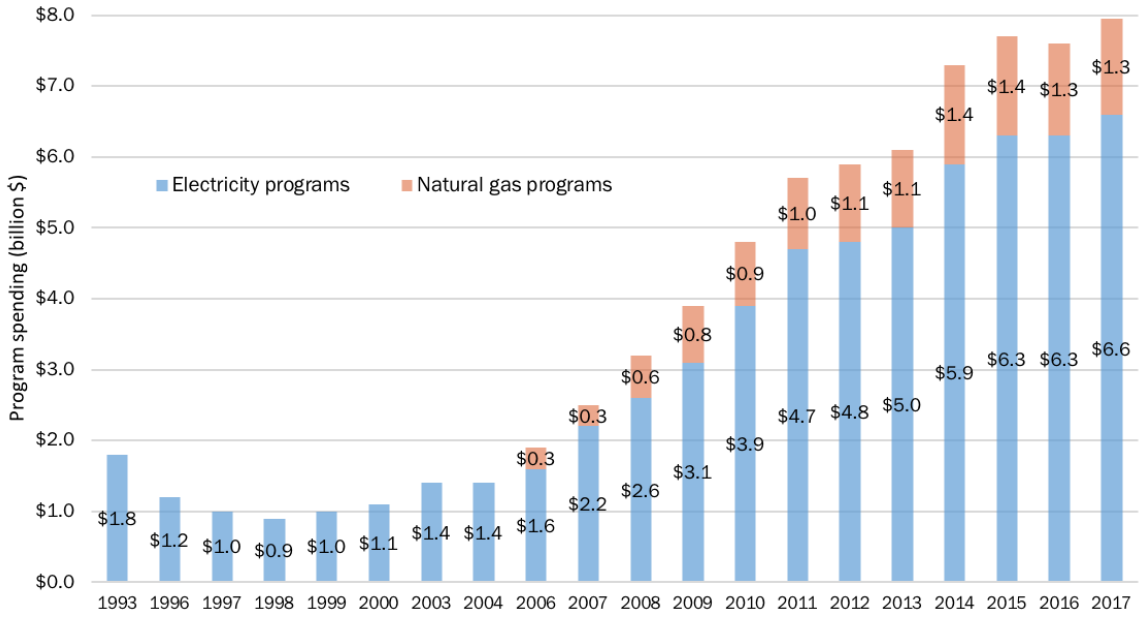

Figure 2. Annual electric and natural gas energy efficiency program spending. Natural gas spending is not available for the years 1993–2004. *Sources:* Nadel, Kubo, and Geller 2000; York and Kushler 2002, 2005; Eldridge et al. 2007, 2008, 2009; CEE 2012, 2013, 2014, 2015, 2016; Gilleo et al. 2015b; Berg et al. 2016; Berg et al. 2017.

Nationwide reported savings from utility and public benefits electricity programs in 2017 totaled 27.3 million MWh, equivalent to 0.72% of sales, up by 0.04% percentage points relative to last year.

Factors contributing to the leveling of incremental savings varied, although there are some common themes. In some cases, a state's decrease in savings was a direct reflection of decisions in recent years to reduce efficiency budgets. Other states described impacts related to asymmetrical administration of budgets and the reporting of savings across multiyear program cycles, such that expenditures and savings may decrease in a single year but nonetheless remain on target with multiyear goals.

The total annual impact of efficiency programs continues to grow, since most efficiency measures continue to generate savings for residents and businesses for years after they are installed. As figure 3 shows, ratepayer-funded energy efficiency programs saved more than 242 million MWh in 2017, including the 27.3 million MWh of incremental savings. These large-scale savings are equivalent to approximately 6.4% of electricity consumption in 2017.

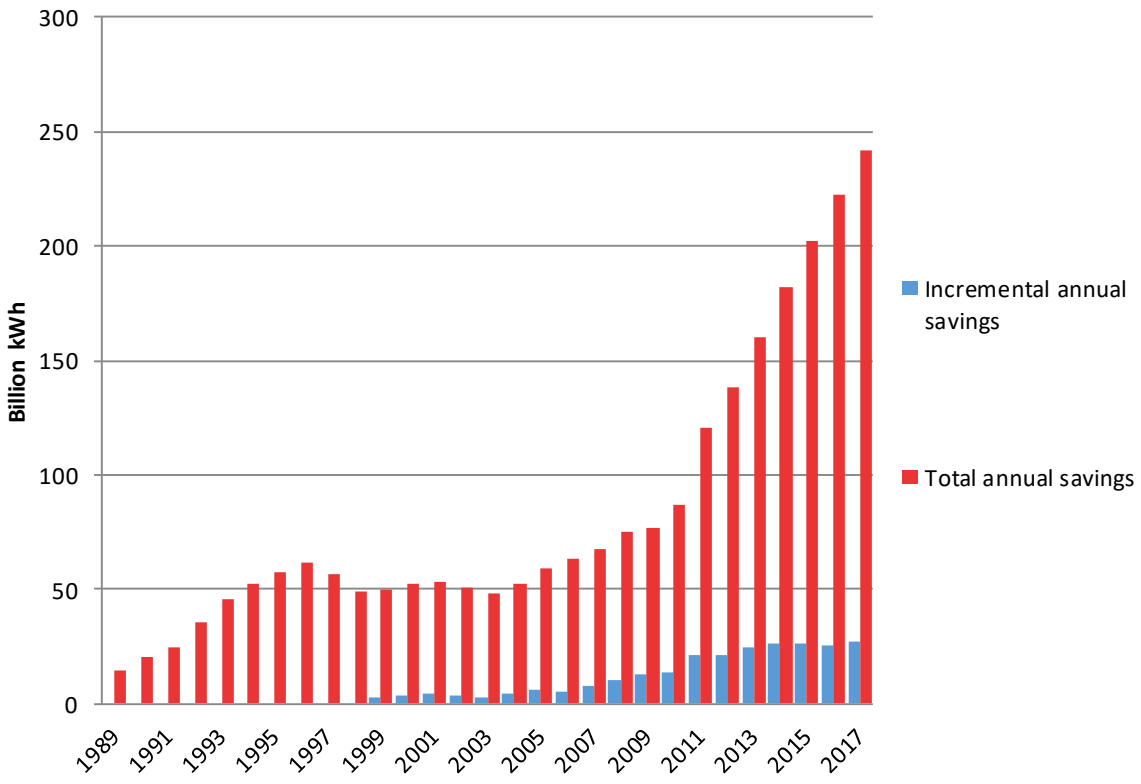

Figure 3. Electric savings from utility-sector energy efficiency programs by year. Incremental annual savings are savings from measures installed that year; total annual savings are those achieved in a year from measures installed that year and in prior years.

Savings from Electricity and Natural Gas Efficiency Programs

We assess the overall performance of electricity and natural gas energy efficiency programs by the amount of energy saved. Utilities and nonutility program administrators pursue numerous strategies to achieve energy efficiency savings. Program portfolios may initially concentrate on the most cost-effective and easily accessible measure types, such as energy-efficient lighting and appliances. As utilities gain experience, as technologies mature, and as customers become aware of the benefits of energy efficiency, the number of approaches increases. Utilities estimate program energy savings, which are then subject to internal or third-party evaluation, measurement, and verification (EM&V) and are typically reported to the public utility commission on a semiannual or annual basis.

In states ramping up funding in response to aggressive EERS policies, programs typically shift focus from widget-based approaches (e.g., installing new, more-efficient water heaters) to comprehensive deep-savings approaches that seek to generate greater energy efficiency savings per program participant by conducting whole-building or system retrofits. Some deep-savings approaches also draw on complementary efficiency efforts, such as utility support for full implementation of building energy codes.[18] Deep-savings approaches may

[18] See Nowak et al. (2011) for a full discussion of this topic.

also promote whole-building retrofits and comprehensive changes in systems and operations by including behavioral elements that empower customers.

SCORES FOR INCREMENTAL SAVINGS IN 2017 FROM ELECTRIC EFFICIENCY PROGRAMS

We report 2017 statewide net energy efficiency savings as a percentage of 2016 retail electricity sales, scoring the states on a scale of 0 to 7, as we did last year. We relied primarily on states to provide these data. Thirty-six states and the District of Columbia completed some or all of our data request form. Where no data for 2017 were available, we used the most recent savings data obtainable, whether from state-reported 2016 savings from the *2017 State Scorecard* or from EIA (2018).

As in 2015 and 2016, states that achieved savings of at least 2% of electricity sales earned full points. We continue to see examples of states exceeding the 2% mark. Table 7 lists the scoring for each level of savings.

Table 7. Scoring of utility and public benefits electricity savings

2017 savings as % of sales	Score
2% or greater	7
1.86–1.99%	6.5
1.72–1.85%	6
1.58–1.71%	5.5
1.44–1.57%	5
1.30–1.43%	4.5
1.16–1.29%	4
1.02–1.15%	3.5
0.88–1.01%	3
0.74–0.87%	2.5
0.60–0.73%	2
0.46–0.59%	1.5
0.32–0.45%	1
0.18–0.31%	0.5
Less than 0.18%	0

Table 8 shows state results and scores. Nationwide reported savings from utility and public benefits electricity programs in 2017 totaled 27.18 million MWh, equivalent to 0.72% of sales. This is 6.9% more than the 25.42 million MWh (0.68% of sales) reported last year.

Table 8. 2017 net incremental electricity savings by state

State	2017 net incremental savings (MWh)	% of 2016 retail sales	Score (7 pts.)
Vermont	183,722	3.33%	7
Rhode Island	232,032	3.08%	7
Massachusetts	1,374,066	2.57%	7
California†	5,062,747	1.97%	6.5
Connecticut	469,822	1.62%	5.5
Michigan	1,545,158	1.48%	5
Hawaii†	136,847	1.45%	5
Washington†	1,195,606	1.35%	4.5
Illinois	1,885,000	1.34%	4.5
Arizona†	1,040,031	1.33%	4.5
Minnesota†	868,973	1.31%	4.5
Oregon†	574,167	1.21%	4
New York	1,722,962	1.17%	4
Maryland	594,234	0.97%	3
Idaho†	222,307	0.96%	3
Ohio†	1,448,198	0.96%	3
Colorado	483,500	0.88%	3
Iowa†	421,963	0.87%	2.5
Maine†	97,322	0.85%	2.5
Utah	254,907	0.84%	2.5
Missouri	615,564	0.78%	2.5
District of Columbia	85,613	0.75%	2.5
New Hampshire†	77,740	0.71%	2
Arkansas	319,788	0.69%	2
North Carolina†	928,922	0.69%	2
Wisconsin	460,743	0.66%	2
Nevada†	217,014	0.60%	2
Pennsylvania	797,448	0.55%	1.5
New Jersey	413,344	0.55%	1.5
New Mexico	120,404	0.52%	1.5
Montana†	71,689	0.51%	1.5
Kentucky†	311,552	0.42%	1
Oklahoma	254,425	0.41%	1
Indiana*†	424,127	0.41%	1
South Carolina*†	304,919	0.38%	1
Wyoming†	46,274	0.28%	0.5
Nebraska†	75,953	0.25%	0.5
South Dakota	29,937	0.25%	0.5
Georgia†	328,147	0.24%	0.5
West Virginia	69,770	0.22%	0.5
Mississippi†	99,873	0.20%	0.5
Texas†	800,893	0.20%	0.5
Tennessee*	189,930	0.19%	0.5
Delaware	12,564	0.11%	0
Virginia*†	99,557	0.09%	0
Florida†	207,106	0.09%	0
Alabama*	49,988	0.06%	0
Louisiana	45,514	0.05%	0
North Dakota*†	1,761	0.01%	0
Alaska*	346	0.01%	0
Kansas*†	440	0.00%	0
US total	**27,274,908**	**0.72%**	
Median	**254,907**	**0.66%**	

Savings data are from public service commission staff as listed in Appendix A, unless noted otherwise. Sales data are from EIA Form 861M (2017b).
* States for which we did not have 2017 savings data were scored on 2016 state-reported savings or EIA-reported 2016 savings. † At least a portion of savings reported as gross. We adjusted the gross portion by a net-to-gross factor of 0.856 to make it comparable with net savings figures reported by other states.

States use different methodologies for estimating energy savings, and this can produce inequities when making comparisons.[19] A state's EM&V process plays a key role in determining how savings are quantified. This is particularly true of a state's treatment of free-ridership (savings attributed to a program that would have occurred even in the absence of the program) and spillover (savings *not* attributed to a program that would *not* have occurred without it). States report energy savings as either net or gross, with net savings accounting for free riders and free drivers, and gross savings not accounting for these.[20] The *State Scorecard* specifically focuses on net savings.

In a national survey of evaluation practices, ACEEE researchers found that, of the 45 jurisdictions at the time with formally approved customer-funded energy efficiency programs, 21 jurisdictions reported net savings, 12 reported gross savings, and 9 reported both (Kushler, Nowak, and Witte 2012).[21] This finding points to several important caveats regarding the electric program savings data. First, a number of states do not estimate or report net savings. In these cases, we have applied a standard factor of 0.856 to convert gross savings to net savings (a net-to-gross ratio). [22] Doing so allows a more straightforward comparison with states that report net electricity savings. Savings (or some portion of savings) reported as gross are marked by a dagger (†) in table 8.[23] Although Arizona, Minnesota, New Hampshire, and Iowa report gross savings as net to state regulators, we applied the conversion factor to these states because the studies they reference in setting net savings equal to gross savings are outdated or unavailable.

SCORES FOR INCREMENTAL SAVINGS IN 2017 FROM NATURAL GAS AND UNREGULATED FUELS EFFICIENCY PROGRAMS

Utilities are increasing the number and size of natural gas programs in their portfolios. However data on savings resulting from these programs are still limited. In this category, we awarded points to states that were able to track savings from their natural gas and unregulated fuels efficiency programs and that realized savings of at least 0.17% as a percentage of sales in the residential and commercial sectors. We relied on data from state utility commissions. Table 9 lists scoring criteria for natural gas and fuels program savings. We awarded a maximum of 3 points to states reporting savings of 1.00% of sales or greater.

This year we combined the most widely used unregulated fuels' energy savings and consumption data with natural gas data into a single thermal fuels energy savings metric. This is a more consistent way to measure energy efficiency efforts and performance across states with different fuel mixes and policies. Previously, direct comparison of natural gas

[19] See Sciortino et al. (2011).

[20] Free drivers are utility customers who install energy efficiency measures as a result of a program but are not themselves participants in the energy efficiency program.

[21] The 45 jurisdictions included 44 states and the District of Columbia. Three states did not respond to this question.

[22] We based the 0.856 net-to-gross factor used this year on the median net-to-gross ratio calculated from those states that reported figures for both net and gross savings in this year's data request. These included Connecticut, Delaware, District of Columbia, Maryland, Massachusetts, Missouri, Montana, New Hampshire, New York, North Carolina, Oklahoma, Oregon, Pennsylvania, Utah, West Virginia, and Wisconsin. We applied this conversion factor to all states reporting only gross savings.

[23] We determined savings to be gross on the basis of Kushler, Nowak, and Witte (2012) as well as on responses to our survey of public utility commissions.

savings as a percentage of sales across states was complicated by the varying percentage of customers with access to natural gas, incomplete data on unregulated fuels, and varying levels of energy efficiency program funding based on regulated energy sources. These issues are most common in the Northeast, where some states have a relatively larger share of residential and commercial customers using fuel oil and other unregulated fuels

To integrate unregulated fuels, we collected 2017 savings data on fuel oil, kerosene, propane, and wood from public service commissions and added these to the natural gas savings reported for each state. Similarly, we obtained consumption data by state for each fuel type from EIA and added this to the natural gas energy sales for residential and commercial customers. We converted all energy units to million Btu (MMBtu) and divided savings by sales to create the common metric.

Table 9. Scoring of natural gas and unregulated fuel program savings

Savings as % of sales	Score
1.00% or greater	3
0.84–0.99%	2.5
0.67–0.83%	2.0
0.50–0.66%	1.5
0.34–0.49%	1
0.17–0.33%	0.5
Less than 0.17%	0

Table 10 shows states' scores for natural gas and fuel program savings.[24]

[24] As we did with electric savings, we applied a net-to-gross (NTG) factor to all states reporting only gross natural gas savings. In this case, the NTG factor was 0.897 based on states that reported figures for both net and gross natural gas savings in this year's data request. These included Connecticut, Delaware, District of Columbia, Maryland, Massachusetts, Montana, New Mexico, New York, Oklahoma, Oregon, Vermont, and Wisconsin.

Table 10. State scores for 2017 natural gas and fuels efficiency program savings

State	2017 net incremental fuel savings (MMBtu)*	% of commercial and residential retail sales**	Score (3 pts.)
Minnesota†	3,688,462	1.35%	3
Massachusetts	3,438,733	1.08%	3
Rhode Island	460,000	1.02%	3
Michigan	5,500,000	1.01%	3
Utah	890,000	0.78%	2
California	6,040,000	0.78%	2
Oregon	680,000	0.73%	2
District of Columbia	210,000	0.73%	2
Vermont	287,410	0.68%	2
Hawaii**	—	0.00%	2
Iowa†	924,359	0.64%	1.5
Arkansas	520,000	0.56%	1.5
Maine†	430,194	0.53%	1.5
Connecticut	884,494	0.52%	1.5
Wisconsin	1,360,000	0.49%	1
Arizona†	365,224	0.44%	1
Oklahoma	476,500	0.43%	1
New York	3,939,729	0.42%	1
Indiana*	1,006,810	0.42%	1
Kentucky*	430,000	0.39%	1
New Hampshire	237,186	0.35%	1
Colorado*	696,491	0.33%	0.5
Illinois	2,150,000	0.32%	0.5
Washington†	503,462	0.29%	0.5
New Jersey	919,703	0.21%	0.5
Mississippi†	86,154	0.15%	0
Montana	80,000	0.15%	0
Ohio*	711,355	0.15%	0
Delaware	40,000	0.13%	0
South Dakota†	35,897	0.12%	0
New Mexico	80,000	0.11%	0
Maryland	147,932	0.08%	0
North Carolina†	125,641	0.07%	0
Idaho†	26,923	0.05%	0
North Dakota*	10,000	0.03%	0
Pennsylvania†	80,707	0.02%	0
Nevada	—	0.00%	0
Alabama*	—	0.00%	0
Alaska*	—	0.00%	0
Florida	—	0.00%	0
Georgia	—	0.00%	0
Kansas*	—	0.00%	0
Louisiana*	—	0.00%	0
Missouri	—	0.00%	0
Nebraska*	—	0.00%	0
South Carolina*	—	0.00%	0
Tennessee*	—	0.00%	0
Texas*	—	0.00%	0
Virginia*	—	0.00%	0
West Virginia	—	0.00%	0
Wyoming*	—	0.00%	0
US total	**37,463,365**	**0.39%**	
Median	**147,932**	**0.15%**	

Savings data were reported by contacts at public utility commissions as listed in Appendix A, unless otherwise noted. All sales data are from EIA Form 176 (2016).
* These states did not report 2017 savings and were scored on 2016 savings as reported by public utility commission contacts. ** Hawaii uses limited natural gas and therefore earned points commensurate with electric efficiency savings scores. † At least a portion of savings reported as gross; we adjusted the gross portion by a net-to-gross factor of 0.897 to make it comparable to net savings figures reported by other states.

Electricity and Natural Gas Efficiency Program Funding

In this category, we scored states on 2017 electricity and natural gas efficiency program spending for customer-funded energy efficiency programs. These programs are funded through charges included on utility customers' bills. Some of these programs target unregulated fuels or are fuel blind to household heating sources, and spending for this type of program is typically captured in our electric efficiency spending metric. Our data include spending by investor-owned, municipal, and cooperative utilities; public power companies or authorities; and public benefits program administrators. We did not collect data on federal grant allocations received by states through the DOE's Weatherization Assistance Program. We did include revenues from the Regional Greenhouse Gas Initiative (RGGI), which contributes to customer-funded energy efficiency program portfolios of member states and to energy efficiency programs funded through AB 32 and Proposition 39 in California.[25] Where RGGI funds were channeled to energy efficiency initiatives implemented by state governments, we included them in Chapter 6, "State Government–Led Initiatives."

For states that did not provide data for 2017 spending on energy efficiency programs for electric or natural gas utilities, we used 2016 spending data from CEE (2018) or information supplied by our state contacts in their 2017 utility data request responses.

Please note that spending data are subject to variation across states, and this poses an ongoing challenge to our efforts to equitably score states based on a common and reliable metric. Several states report performance incentives paid to utilities or other program administrators as part of utility efficiency program spending, resulting in higher spending numbers. While most performance incentives are based on shared net benefits—viewed as an expense—the relative amounts of the incentives are in the range of 5–15% of program spending (Nowak et al. 2015). For this reason we asked states to disaggregate program spending from these incentives. We did not credit this spending in our scoring this year in an effort to more accurately reflect funds directly dedicated to energy efficiency measures. As in past years, we sent spending data gathered from the above sources to state utility commissions for review. Tables 12 and 14 below report electricity and natural gas efficiency program spending, respectively.

SCORES FOR ELECTRIC PROGRAM SPENDING

States could receive up to 2.5 points for their energy efficiency spending as a percentage of 2016 electric utility revenues.[26] Formerly a 3-point category, this metric, as well as the natural gas program spending metric, was previously decreased by 0.5 points in order to accommodate the addition of 1 point to be earned for utility support of low-income energy

[25] AB 32 is California's GHG reduction bill that resulted in a cap-and-trade program. Proposition 39 grants significant funding to energy efficiency programs targeting schools. Both programs are subject to evaluation, measurement, and verification at least as stringent as the EM&V for utility programs.

[26] Statewide revenues are from EIA Form 861M (EIA 2018c). We measure spending as a percentage of revenues to normalize the level of energy efficiency spending. Blending utility revenues from all customer classes gives a more accurate measure of utilities' overall spending on energy efficiency than does expressing budgets per capita, which might skew the data for utilities that have a few very large customers. An alternative metric, statewide electric energy efficiency spending per capita, is presented in Appendix B.

efficiency programs (described later in this chapter). In addition, the threshold savings for the top scoring category was raised last year, from 4.0% to 5.0% of revenues, to recognize the efforts of states making high levels of investment in efficiency. At the same time, we slightly decreased the threshold savings required for the 0.5-point scoring category, from 1.0% to 0.80%, to more appropriately acknowledge states that may place toward the bottom in terms of performance but are nonetheless making significant efforts to achieve savings. For every 1.05 percentage points less than 5%, a state's score decreased by 0.5 points. Table 11 lists the scoring bins for each spending level.

Table 11. Scoring of electric efficiency program spending

2017 spending as % of revenues	Score
5.00% or greater	2.5
3.95–4.99%	2
2.90–3.94%	1.5
1.85–2.89%	1
0.80–1.84%	0.5
Less than 0.80%	0

Table 12 shows state-by-state results and scores for this category.

Table 12. 2017 electric efficiency program spending by state

State	2017 elec. spending ($ million)	% of statewide elec. revenues	Score (2.5 pts.)
Vermont	64.0	8.02%	2.5
Massachusetts	620.6	7.04%	2.5
Rhode Island	83.4	6.81%	2.5
Washington	281.8	4.13%	2
Oregon	158.6	3.79%	1.5
California	1,412.1	3.61%	1.5
Idaho	64.6	3.46%	1.5
Connecticut	153.9	3.08%	1.5
Iowa	112.3	2.71%	1
Maryland	201.5	2.69%	1
Illinois	349.1	2.64%	1
Minnesota	165.0	2.48%	1
Maine	31.1	2.12%	1
New York	450.1	2.10%	1
Utah	51.4	1.95%	1
Michigan	220.4	1.91%	1
New Mexico	38.7	1.84%	0.5
Arkansas	68.6	1.83%	0.5
Colorado	96.2	1.79%	0.5
Nevada	51.0	1.68%	0.5
New Hampshire	26.1	1.53%	0.5
North Carolina	180.9	1.46%	0.5
Delaware	18.2	1.45%	0.5
Arizona	105.0	1.31%	0.5
Oklahoma	66.0	1.37%	0.5
Kentucky	84.7	1.35%	0.5
Missouri	100.0	1.31%	0.5
Ohio	186.9	1.26%	0.5
New Jersey	113.5	1.13%	0.5
Pennsylvania	164.1	1.11%	0.5
District of Columbia	13.9	1.04%	0.5
Montana	13.0	1.04%	0.5
Wisconsin	70.6	0.95%	0.5
Hawaii	20.8	0.92%	0.5
Indiana*	87.0	0.91%	0.5
Florida	190.3	0.82%	0.5
Wyoming	10.5	0.77%	0
Texas	257.7	0.77%	0
Mississippi	27.6	0.65%	0
Tennessee	59.6	0.64%	0
South Carolina*	43.1	0.55%	0
West Virginia	14.2	0.49%	0
Georgia	55.5	0.42%	0
Nebraska	10.2	0.37%	0
South Dakota	4.4	0.37%	0
Alabama*	16.2	0.19%	0
Louisiana	7.3	0.11%	0
Virginia*	0.5	0.00%	0
Alaska*	—	0.00%	0
Kansas*	—	0.00%	0
North Dakota*	—	0.00%	0
US Total	**6,632.4**	**1.72%**	
Median	**66.0**	**1.35%**	

Statewide revenues are from EIA Form 826 (EIA 2018c). Spending data are from public service commission staff as listed in Appendix A.
* Where 2017 spending was not available, we substituted 2016 spending as reported by states.

SCORES FOR NATURAL GAS PROGRAM SPENDING

We scored states on natural gas efficiency program spending by awarding up to 1.5 points based on 2017 program spending data gathered from CEE (2018) and a survey of state utility commissions and independent statewide administrators. Previously a 2-point category, this metric received a 0.5-point decrease last year to help accommodate the addition of a 1-point category for utility support of low-income energy efficiency programs. To directly compare spending data among the states, we normalized spending by the number of residential natural gas customers in each state in 2017, as reported by the state. When this figure was not available, we relied on 2016 figures from EIA (2017).[27] Table 13 shows scoring bins for natural gas program spending. As in last year's *State Scorecard*, states posting spending levels of at least $50 per customer were awarded the maximum number of points.

Table 13. Scoring of natural gas utility and public benefits spending

2017 gas spending per customer	Score
$50 or greater	1.5
$27.50–49.99	1
$5.00–27.49	0.5
Less than $5.00	0

After a significant uptick in 2014, natural gas program spending levels have remained relatively flat in recent years. In 2017, spending was slightly below the $1.34 billion reported in 2016, at $1.35 billion. Natural gas efficiency spending remains significantly lower than spending for electricity energy efficiency programs. Table 14 shows states' scores.

[27] We used spending per residential customer for natural gas because reliable natural gas revenue data are sparse, and use of per capita data unfairly penalizes states that offer natural gas service to only a portion of their population (such as Vermont). State data on the number of residential customers are from EIA (2017).

Table 14. 2017 natural gas efficiency program spending by state

State	2017 gas spending ($ million)	$ per 2016 residential customer	Score (1.5 pts.)
Massachusetts	215.6	$144.26	1.5
Rhode Island	26.8	$112.12	1.5
Connecticut	44.4	$81.97	1.5
Vermont	2.9	$65.33	1.5
Iowa	56.4	$61.61	1.5
New Hampshire	5.9	$56.47	1.5
Maine	1.7	$53.05	1.5
Minnesota	58.1	$38.57	1
Delaware	6.1	$36.32	1
District of Columbia	5.3	$35.68	1
Florida	24.2	$33.07	1
Oregon	23.8	$32.70	1
New York	140.5	$31.45	1
New Jersey	79.4	$28.84	1
Michigan	88.1	$27.19	0.5
Arkansas	14.4	$26.06	0.5
California	282.0	$25.83	0.5
Utah	22.4	$24.73	0.5
Washington	24.5	$21.25	0.5
Oklahoma	16.3	$17.38	0.5
Maryland	17.1	$15.25	0.5
Illinois	55.4	$14.22	0.5
Ohio*	47.1	$14.16	0.5
Wisconsin	17.7	$10.18	0.5
Colorado	17.3	$9.97	0.5
Montana	2.7	$9.91	0.5
Indiana*	15.0	$8.71	0.5
New Mexico	4.4	$7.55	0.5
South Dakota	1.0	$5.41	0.5
Hawaii**	—	$0.00	0.5
Mississippi	2.0	$4.50	0
Arizona	5.1	$4.22	0
Missouri	4.9	$3.57	0
Idaho	1.1	$2.88	0
Pennsylvania	5.2	$1.89	0
North Carolina	2.0	$1.62	0
Kentucky*	1.1	$1.44	0
Virginia*	1.7	$1.41	0
Wyoming*	0.2	$1.22	0
North Dakota*	0.1	$0.98	0
Texas*	4.2	$0.92	0
South Carolina*	0.3	$0.52	0
Nevada	0.3	$0.36	0
Alabama*	—	$0.00	0
Alaska*	—	$0.00	0
Georgia	—	$0.00	0
Kansas*	—	$0.00	0
Louisiana*	—	$0.00	0
Nebraska*	—	$0.00	0
Tennessee*	—	$0.00	0
West Virginia	—	$0.00	0
US total	**1,344.8**		
Median	**5.1**		

Spending data are from public service commission staff as listed in Appendix A, unless noted otherwise. * Where 2017 spending data were not available, we substituted 2016 spending as reported by CEE 2018 or by public service commission staff. ** Hawaii was awarded points commensurate with points received for electricity spending.

Opt-Out Provisions for Large Customers

As we have since the *2014 State Scorecard*, we also provide an assessment of opt-out and self-direct provisions for large customers. Increasingly, large customers are seeking to opt out of

utility energy efficiency programs, asserting that they have already captured all the energy efficiency that is cost effective. However this is seldom the case (Chittum 2011). Opt-out differs from self-direct in that those customers who opt out do not have to pay into energy efficiency funds at all; self-direct allows some customers to spend their efficiency fees internally, within their own business operations. Some state policies go beyond opt-out to fully exempt customers from participating in utility energy efficiency programs. In these cases, the customers are excluded and may not opt in.

Opt-out and exemption policies have several negative consequences. Failure to include large-customer programs in an energy efficiency portfolio increases the cost of energy savings for all customers and reduces the benefits (Baatz, Relf, and Kelly 2017). In effect, allowing large customers to opt out forces other consumers to indirectly subsidize them: Those who have opted out share some of the system benefits, but only the smaller customers are paying to support energy efficiency programs. It also prevents utilities from capturing all highly cost-effective energy savings; this can contribute to higher overall system costs through the use of more expensive supply resources. While the ideal solution is for utilities to offer programs that respond to the needs of these large consumers, ACEEE's research suggests that this does not always happen (Chittum 2011). When it does not, we suggest giving these customers the option of self-directing their energy efficiency program dollars.[28] This option provides a path for including large-customer energy efficiency in the state's portfolio of savings. We provide examples of self-direct programs in Appendix C.

SCORES FOR LARGE-CUSTOMER OPT-OUT PROVISIONS

We include opt-out as a category in which states may lose rather than gain points. We subtracted 1 point for states that allow electric or natural gas customers, or both, to opt out of energy efficiency programs.[29] Opt-out policies vary in terms of eligibility requirements and impacts; in Indiana, for example, 40% or more of load is eligible to opt out.

We did not subtract points for self-direct programs. When implemented properly, these programs can effectively meet the needs of large customers. Self-direct programs vary from state to state, with some requiring more stringent measurement and verification of energy savings than others (Chittum 2011). In the future, we may examine these programs with a more critical eye and subtract points from states that lack strong evaluation and measurement. Table 15 shows states with opt-out programs.

[28] Self-direct programs allow some customers, usually large industrial or commercial ones, to channel energy efficiency fees usually paid on utility bills directly into energy efficiency investments in their own facilities instead of into a broader, aggregated pool of funds. These programs should be designed to include comparable methods to verify and measure investments and energy savings. For more information, see aceee.org/sector/state-policy/toolkit/industrial-self-direct.

[29] By default, most large gas customers already are opted out because they take wholesale delivery (frequently directly from transmission) and are thus outside the purview of state government. We did not subtract points in these cases.

Table 15. States allowing large customers to opt out of energy efficiency programs

State	Opt-out description	Score
Arkansas	Under Act 253, passed in 2013, customers with more than 1 MW or 700,000 MMBtu in monthly demand may opt out. Large manufacturers that file under Act 253 do not have to offer documentation of planned or achieved savings. However large commercial and industrial customers not meeting the definition of manufacturing and customers that have filed under Section 11 of the state's Rules for Conservation and Energy Efficiency Programs must file an application showing how savings have been or will be achieved. More than 50 large customers have opted out, constituting a significant share of overall sales that varies by utility. In 2017, HB 1421 added state-supported higher-education institutions to the list of customers eligible to opt out.	–1
Illinois	Illinois specifically exempts large customers under recent electric savings targets passed in SB 2814. These exemptions remove an estimated 10% of ComEd's and 25% of Ameren's load from programs. The exemption weakens participation even more than an opt-out policy in that these electric utility customers cannot participate in programs even if they wish to.	–1
Indiana	Opt-out applies to the five investor-owned electric utilities. Eligible customers are those that operate a single site with at least one meter constituting more than 1 MW demand for any one billing period within the previous 12 months. Documentation is not required. No evaluation is conducted. Approximately 70–80% of eligible load has opted out.	–1
Iowa	Iowa enacted Senate File 2311 in May 2018, allowing any customer of any rate-regulated utility to request an exemption from participation in the five-year energy efficiency plan if the cumulative cost-effectiveness of the plan overall does not pass the Ratepayer Impact Measure test. This applies to all customers, not only large ones. Utilities must allow the exemption (opt-out) beginning in the year following the year in which the request was made. Utilities may request modifications of their energy efficiency plans due to reductions in funding resulting from customer exemptions.*	–1
Kentucky	Opt-out is statewide for the industrial rate class. Documentation is not required. Approximately 80% of eligible load has opted out, with the remaining 20% made up primarily of TVA customers.	–1
Maine	Large customers that take transmission and subtransmission service are automatically opted out of Maine's efficiency programming. These customers do not pay into Maine's cost-recovery mechanism. However federal stimulus funds and money collected from the RGGI have allowed Efficiency Maine to offer energy efficiency programming to the state's largest industrial customers.	–1
Missouri	Opt-out is statewide only for investor-owned electric utilities. Eligibility requires one account greater than 5 MW, or aggregate accounts greater than 2.5 MW and demonstration of the customer's own demand-side savings. Also, interstate pipeline pumping stations of any size are eligible. To maintain opt-out status, documentation is required for customers whose aggregate accounts are greater than 2.5 MW. The staff of the Missouri Public Service Commission perform a desk audit of all claimed savings and may perform a field audit. No additional EM&V is required.	–1

State	Opt-out description	Score
North Carolina	All industrial-class electric customers are eligible to opt out. Also, by Commission Rule R8-68 (d), large commercial-class operations with 1 million kWh of annual energy consumption are eligible to opt out. Customers electing to opt out must notify utilities that they have implemented or plan to implement energy efficiency. Opted-out load represents approximately 40–45% of industrial and large commercial load.	–1
Ohio	As of January 2015, Ohio Senate Bill 310 allows certain customers to opt out of energy efficiency programs entirely. Large customers may opt out of a utility's energy efficiency provisions if they receive service above the primary voltage level (e.g., subtransmission and transmission rate schedules). They may opt out if they are a commercial or industrial customer with more than 45 million kWh usage through a meter, or through more than one meter at a single location, for the preceding calendar year. A written request is required to register as a self-assessing purchaser pursuant to section 5727.81 of the Revised Code.	–1
Oklahoma	All transportation-only gas customers are eligible to opt out. For electric utilities, all customers whose aggregate usage (which may include multiple accounts) is at least 15 million kWh annually may opt out. Some 90% of eligible customers opt out.	–1
South Carolina	Industrial, manufacturing, and retail commercial customers with at least 1 million kWh annual usage are eligible to opt out. Only self-certification is required. Approximately 50% of eligible companies opt out, representing roughly 50% of the eligible load.	–1
Texas	In Texas, for-profit customers that take electric service at the transmission level are not allowed to participate in utilities' energy efficiency programs and therefore do not contribute to them. Manufacturers that qualify for a tax exemption under Tax Code §151.317 may also apply to opt out for three years, and opt-out status can be renewed.	–1
Virginia	Certain large customers are exempt from paying for the costs of new energy efficiency programs. Dominion Power customers may qualify by having average demands between 500 kW and 10 MW; customers with more than 10 MW do not participate in the state's energy efficiency programming by law. Once customers opt out, they cannot take advantage of existing programming nor be charged for it. Customers must show that they have already made energy efficiency investments or plan to in the future. Customers must submit measurement and verification reports yearly in support of their opting out of programs funded by a cost-recovery mechanism.	–1
West Virginia	Opt-out is developed individually by utilities. Customers with demand of 1 MW or greater may opt out. Participants must document that they have achieved similar/equivalent savings on their own to retain opt-out status. Claims of energy and/or demand reduction are certified to utilities, with future evaluation by the Public Service Commission to take place in a later proceeding. The method has not been specified. Twenty large customers have opted out.	–1

* The RIM test treats reduced energy sales as a cost, which means that the more energy a measure saves, the less cost effective it is. It is likely that the plans will not meet this impact measure, raising the possibility that many customers will opt out and thereby reduce efficiency funding by the amount they otherwise would have paid.

Energy Efficiency Resource Standards

Energy efficiency targets for utilities, often called EERSs, are critical to encouraging savings over the near and long terms. States with an EERS policy in place have shown average energy efficiency spending and savings levels more than three times as high as those in states without an EERS policy (Molina and Kushler 2015). Twenty-seven states now have EERS policies establishing specific energy savings targets that utilities and program administrators must meet through customer energy efficiency programs. These policies set multiyear targets for electricity or natural gas savings, such as 1% or 2% incremental savings per year or 20% cumulative savings by 2025.[30]

EERS policies differ from state to state, but each is intended to establish a sustainable, long-term role for energy efficiency in the state's overall energy portfolio. ACEEE considers a state to have an EERS if it has a policy in place that

1. Sets clear, long-term (3+ years) targets for electricity or natural gas savings
2. Makes targets mandatory
3. Includes sufficient funding for full implementation of programs necessary to meet targets

Several states mandate all cost-effective efficiency, requiring utilities and program administrators to determine and invest in the maximum amount of cost-effective efficiency feasible.[31] ACEEE considers states with such requirements to have EERS policies in place once these policies have met all the criteria listed above.

EERS policies aim explicitly for quantifiable energy savings, reinforcing the idea that energy efficiency is a utility system resource on par with supply-side resources. These standards help utility system planners more clearly anticipate and project the impact of energy efficiency programs on utility system loads and resource needs. Energy savings targets are generally set at levels that push efficiency program administrators to achieve higher savings than they otherwise would, with goals typically based on analysis of the energy efficiency savings potential in the state to ensure that the targets are realistic and achievable. EERS policies maintain strict requirements for cost effectiveness so that efficiency programs are guaranteed to provide overall benefits to customers. These standards help to ensure a long-term commitment to energy efficiency as a resource, building essential customer engagement as well as the workforce and market infrastructure necessary to sustain the high savings levels.[32]

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[30] *Multiyear* is defined as spanning three or more years. EERS policies may set specific targets as a percentage of sales, as specific gigawatt-hour energy savings targets without reference to sales in previous years, or as a percentage of load growth.

[31] The seven states that require all cost-effective efficiency are California, Connecticut, Maine, Massachusetts, Rhode Island, Vermont, and Washington. Connecticut sets budgets first, then achieves all cost-effective efficiency within that limit, which is a lower savings target. In addition, New Hampshire's EERS has set forth a long-term goal of achieving all cost-effective efficiency, which is anticipated to be met through planning and goal-setting in future implementation cycles.

[32] The ACEEE report *Energy Efficiency Resource Standards: A New Progress Report on State Experience* analyzed current trends in EERS implementation and found that most states were meeting, or were on track to meet, energy savings targets (Downs and Cui 2014).

SCORES FOR ENERGY EFFICIENCY RESOURCE STANDARDS

In this category we credited states that had mandatory savings targets codified in EERS policies. Our research relied on legislation and utility commission dockets.

A state could earn up to 3 points for its EERS policy. As table 16 shows, we scored states according to their electricity savings targets. States could earn an additional 0.5 points if natural gas was included in the savings goals.

Some EERS policies contain cost caps that limit spending, thereby reducing the policy's effectiveness. This year, we did not subtract points for the existence of a cost cap, although we do note whether a cost cap is in place in the results table below. Most of the states with these policies in place have found themselves constrained. As a result, regulators have approved lower energy savings targets. In these cases, we score states on the lower savings targets approved by regulators that take the cost cap into account, rather than on the higher legislative targets.

In an effort to distinguish states pushing the boundaries of innovation in energy efficiency with ambitious goals, last year we raised the threshold for the top level of points to energy savings targets of 2.5% of sales or greater. Multiple states have proved that long-term savings of more than 2% are feasible and cost effective.

Table 16. Scoring of energy savings targets

Electricity savings target	Score
2.5% or greater	2.5
2–2.49%	2
1.5–1.99%	1.5
1–1.49%	1
0.5–0.99%	0.5
Less than 0.5%	0

Other considerations	Score
EERS includes natural gas	+0.5

To aid in comparing states, we estimated an average annual savings target over the period specified in the policy. For example, Arizona plans to achieve 22% cumulative savings by 2020, so the average incremental savings target is 2.5% per year.

States with pending targets had to be on a clear path toward establishing a binding mechanism to earn points in this category. Examples of a clear path include draft decisions by commissions awaiting approval within six months, and agreements among major stakeholders on targets. Although Nevada passed legislation in 2017 to raise efficiency goals, there were no specific annual targets until the draft integrated resource plan was filed in June 2018 (Nevada PUC 2018). Delaware has also passed EERS legislation, but final implementation rules are still pending. Although the California legislature passed legislation to double utility energy efficiency, the CPUC has deferred adoption of cumulative goals until staff assess methods for calculating savings persistence, to be developed by the California Energy Commission. The current average electric savings target of 1% per year through 2030

is based on the most recent CPUC order approving goals for the three major investor-owned utilities (CPUC 2017).

Leadership, sustainable funding sources, and institutional support are required for states to achieve their long-term energy savings targets. Several states currently have (or in the past have had) EERS-like structures in place but have lacked one or more of these enabling elements and thus have undercut the achievement of their savings goals. One state in this situation is Florida, which did not earn points in this category this year.[33] Most states with EERS policies or other energy savings targets have met their goals and are on track to meet future goals (Downs and Cui 2014).

At the same time, several states including Arizona, Maine, and Colorado have fallen short of EERS targets. We have scored these states on the basis of their policies, not on current performance, because they are losing points in other metrics such as spending and savings. We may change the scoring methodology in the future to reduce points allocated if a state does not hit savings targets. Table 17 lists scores, and Appendix D includes full policy details.

Table 17. State scores for energy efficiency resource standards

State	Approximate average annual electric savings target	Cost cap	Natural gas	Score (3 pts.)
Massachusetts	2.9%		•	3
Rhode Island	2.6%		•	3
Arizona	2.5%		•	3
Maine	2.4%		•	2.5
Vermont	2.1%		•	2.5
New York	2.0%		•	2.5
Maryland	2.0%			2
Illinois	1.7%	•	•	2
Colorado	1.6%		•	2
Connecticut	1.5%		•	2
Minnesota	1.5%		•	2
New Jersey	1.5%		•	2
Washington	1.5%			1.5
Oregon	1.3%		•	1.5
California	1.0%		•	1.5

[33] In 2014 Florida utilities proposed reducing efficiency efforts from 2010 levels by at least 80%. The Florida Public Service Commission approved this proposal.

State	Approximate average annual electric savings target	Cost cap	Natural gas	Score (3 pts.)
Michigan	1.0%		•	1.5
New Hampshire	1.0%		•	1.5
Hawaii	1.4%			1
Nevada	1.1%			1
Ohio	1.0%			1
Arkansas	1.2%		•	1.5
Wisconsin	0.8%	•	•	1
Iowa	0.6%	•	•	1
Pennsylvania	0.8%	•		0.5
New Mexico	0.6%			0.5
North Carolina	0.4%			0
Texas	0.2%	•		0

States with voluntary targets are not listed in this table. Targets in states with cost caps reflect the most recent approved savings levels under budget constraints. See Appendix D for details and sources.

Major Updates for State Utility Policies and Programs

With a few notable exceptions, much of the utility sector enjoyed a strong year in achieving energy efficiency savings. We have seen some instances of states raiding or weakening efficiency funding, but others continue to make progress. Several states have established and expanded utility savings targets since the release of the 2017 *Scorecard*. States that had recently reaffirmed or strengthened EERS policies are writing regulations, and in some cases the utilities are now filing efficiency portfolio plans. Several East Coast states in particular made significant advances in efficiency target-setting for utilities.

On Earth Day, the New York governor announced 3% annual targets by 2025 for the electric utility sector, moving the state into competition with Massachusetts and Rhode Island for national leadership in annual savings target levels. The targets are part of a larger statewide goal of savings 185 trillion British thermal units (TBtu) of cumulative annual energy savings relative to forecast use in 2025 (NYSERDA and New York DPS 2018). The governor also directed the Public Service Commission to increase energy efficiency programs serving low- to moderate-income people (New York 2018). However the New York PSC has yet to establish specific incremental annual energy savings targets for each utility.

In May, New Jersey's governor signed a clean energy bill (A3723) that features 2% electric and 0.75% gas savings goals (New Jersey 2018). However the legislature approved a raid on the Clean Energy Fund this year, so progress toward the higher targets may not accelerate until funding is increased (Johnson 2018). The New Jersey Board of Public Utilities will launch a proceeding this year to determine how the utilities will meet the new 2% and 0.75% minimum

annual savings targets within five years. An update to the state's energy master plan is due next June, guided by new clean energy priorities from a recent executive order.

The new goals established by both New York and New Jersey allow utilities to count toward the achievement of EERS a portion of energy savings resulting from activities that support building energy codes. Savings from codes could potentially constitute a large share of the savings, but how much remains to be seen.

Virginia also adopted new efficiency legislation earlier this year with the signing of the Grid Transformation and Security Act of 2018 (HB 1558/SB 966). The law requires regulated utilities to spend $1.3 billion on energy efficiency over the next 10 years, more than tripling efficiency budgets. However the law does not set specific or binding annual targets (Pierobon 2018).

In the West, Nevada has made progress on utility-sector efficiency policy with the filing of an integrated resource plan for the NV Energy utilities, placing the state on a path to 1.15% incremental electric savings targets (Nevada PUC 2018). The previous average target was 0.4% per year, calculated as a fraction of the state renewable portfolio standards which the utility may achieve through energy efficiency. The new EERS currently in development is based on 2017 legislation, SB 150, requiring that the PUC set energy efficiency savings targets. The Colorado PUC approved new energy savings goals for Xcel Energy Colorado, increasing the goals starting in 2019 to 500 GWh, net savings at generator, approximately 1.6% of sales. The previous goal was 400 GWh, or about 1.3% of sales (Colorado PUC 2018).

Midwest states Illinois, Michigan, and Ohio have all strengthened or reaffirmed their savings targets and related policies within the past two years. For example, Michigan utilities recently filed plans under the state's new targets. However the region has also seen some significant setbacks. Last year ACEEE recognized Illinois in the *State Scorecard* for a strengthening of EERS targets under the Future Energy Jobs Act. Yet soon afterward, the Illinois Commerce Commission approved lower energy savings goals for the second-largest utility in the state, Ameren Illinois, than the act initially called for (ICC 2017). Iowa suffered the largest backslide on efficiency with the passage of SF 2311 this year. The law removes the requirements for municipal utilities and rural electric cooperatives to have energy efficiency programs, places a cap on efficiency spending by investor-owned utilities, and has one of the broadest opt-out provisions of any state. It also permits utilities to file scaled-back efficiency plans due to lower funding resulting from the opt-out provisions, further eroding opportunities for efficiency (Iowa 2018).

In the Southeast, Arkansas continued to build on the success of its efficiency efforts in July when the state's public service commission approved new energy savings targets of 1.2% of utility sales for program years 2020–2022. The news was less encouraging in Kentucky, however, where the state's public service commission eliminated all of Kentucky Power's demand-side management funding with the exception of low-income programs. The January 2018 order in the utility's rate case reduced the DSM budget from $6 million to $2 million (Kentucky PSC 2018).

Other setbacks to efficiency included a raid by Connecticut lawmakers on the state's energy efficiency fund, cutting investments in efficiency by 33% over the two-year cycle in order to plug a budget deficit (Connecticut EEB 2018). Also in the Northeast, the New Hampshire Senate voted down an effort to commit RGGI funds to energy efficiency that had previously passed the House. On the bright side, the state Public Utilities Commission approved natural gas decoupling for Liberty Utilities, a first for a New Hampshire gas utility (New Hampshire PUC 2018).

Utility Business Model and Energy Efficiency: Earning a Return and Fixed Cost Recovery

Under traditional regulatory structures, utilities do not have an economic incentive to promote energy efficiency. They typically have a disincentive because falling energy sales from energy efficiency programs reduce utilities' revenues and profits—an effect referred to as *lost revenues* or *lost sales*. Because utilities' earnings are usually based on the total amount of capital invested in certain asset categories—such as transmission and distribution infrastructure and power plants—and the amount of electricity sold, the financial incentives are very much tilted in favor of increased electricity sales and expanding supply-side systems.

This dynamic has led industry experts to devise ways of addressing the possible loss of earnings and profit from customer energy efficiency programs and thereby removing utilities' financial disincentive to promote energy efficiency. Three key policy approaches properly align utility incentives and remove barriers to energy efficiency. The first is to ensure that utilities can recover the direct costs associated with implementing energy efficiency programs. This is a minimum threshold requirement for utilities and related organizations to fund and offer efficiency programs; every state meets it in some form. Given the wide acceptance of program cost recovery, we do not address it in the *State Scorecard*.

The other two mechanisms are fixed cost recovery (which comes in two general forms: full revenue decoupling and lost revenue adjustment mechanisms) and performance incentives. Revenue decoupling—the disassociation of a utility's revenues from its sales—aims to make the utility indifferent to decreases or increases in sales, removing what is known as the *throughput incentive*. Although decoupling does not necessarily make the utility more likely to promote efficiency programs, it removes or reduces the disincentive for it to do so.[34] Additional mechanisms for addressing lost revenues include modifications to customers' rates that permit utilities to collect these revenues, either through a lost-revenue adjustment mechanism (LRAM) or other ratemaking approach. LRAM allows the utility to recover lost revenues from savings resulting from energy efficiency programs while simultaneously increasing sales overall. LRAM does not eliminate the throughput incentive. ACEEE prefers the decoupling approach for addressing the throughput incentive and considers LRAM appropriate only as a short-term solution.

[34] Straight fixed variable (SFV) rate design is sometimes considered a simple form of decoupling that collects all costs considered fixed in a fixed monthly charge and collects all variable costs in volumetric rates. However SFV collects the same monthly charge (and fixed costs) for all customers within a class, regardless of customer size. ACEEE discourages the use of SFV as it is not cost-based and sends poor price signals to customers to conserve electricity. For this reason, the *Scorecard* does not recognize SFV in its scoring methodology in this section.

Performance incentives are financial incentives that reward utilities (and in some cases nonutility program administrators) for reaching or exceeding specified program goals. These may be performance incentives based on achievement of energy savings targets, or incentives based on spending goals. Of the two, ACEEE recommends incentives based on achievement of energy savings targets. As table 19 shows, a number of states have enacted mechanisms that align utility incentives with energy efficiency.[35]

SCORES FOR UTILITY BUSINESS MODEL AND ENERGY EFFICIENCY

A state could earn up to 2 points in this category: up to 1 point for implementing performance incentive mechanisms and up to 1 point for implementing full revenue decoupling for its electric and natural gas utilities. We give only partial credit to LRAM policies for the reasons described above. Table 18 describes the scoring methodology. Information about individual state decoupling policies and financial incentive mechanisms is available in ACEEE's State and Local Policy Database (ACEEE 2018).

Table 18. Scoring of utility financial incentives

Decoupling	Score
Decoupling is in place for at least one major utility for both electric and natural gas.	1
Decoupling is in place for at least one major utility, either electric *or* natural gas. There is an LRAM or ratemaking approach for recovery of lost revenues for at least one major utility for both electric and natural gas.	0.5
No decoupling policy has been implemented, although the legislature or commission may have authorized one. An LRAM or ratemaking approach for recovery of lost revenues has been established for a major utility for either electric or natural gas.	0
Performance incentives	**Score**
Performance incentives have been established for a major utility (or statewide independent administrator) for both electric and natural gas.	1
Performance incentives have been established for a major utility (or statewide independent administrator) for either electric or natural gas.	0.5
No incentive mechanism has been implemented, although the legislature or commission may have authorized or recommended one.	0

This year, 29 states offer a performance incentive for at least one major electric utility, and 17 states have incentives for natural gas energy efficiency programs. Some states with third-party program administrators have performance incentives for the administrator rather than for the utilities. Thirty states have addressed disincentives for investment in energy efficiency for

[35] For a detailed analysis of performance incentives, see Nowak et al. (2015). For a detailed analysis of LRAM, see Gilleo et al. (2015a).

electric utilities. Of these, 15 have a lost revenue adjustment mechanism and 16 have implemented decoupling. For natural gas utilities, 7 states have implemented an LRAM and 23 have a decoupling mechanism. Table 19 outlines these policies.

Table 19. Utility efforts to address lost revenues and financial incentives

	Decoupling (or LRAM†)			Performance incentives			
State	Electric	Natural gas	Score (1 pt.)	Electric	Natural gas	Score (1 pt.)	Total score (2 pts.)
California	Yes	Yes	1	Yes	Yes	1	2
Connecticut	Yes	Yes	1	Yes	Yes	1	2
Hawaii[1]	Yes	—	1	Yes	—	1	2
Massachusetts	Yes	Yes	1	Yes	Yes	1	2
Minnesota	Yes	Yes	1	Yes	Yes	1	2
New York	Yes	Yes	1	Yes	Yes	1	2
Rhode Island	Yes	Yes	1	Yes	Yes	1	2
Vermont	Yes	Yes	1	Yes	Yes	1	2
Arkansas	Yes†	Yes†	0.5	Yes	Yes	1	1.5
Colorado	Yes	Yes†	0.5	Yes	Yes	1	1.5
District of Columbia	Yes	No	0.5	Yes	Yes	1	1.5
Kentucky	Yes†	Yes†	0.5	Yes	Yes	1	1.5
Michigan	No	Yes	0.5	Yes	Yes	1	1.5
New Hampshire	Yes†	Yes*	0.5	Yes	Yes	1	1.5
Ohio	Yes*	No	0.5	Yes	Yes	1	1.5
Oklahoma	Yes†	Yes	0.5	Yes	Yes	1	1.5
South Dakota	Yes†	Yes†	0.5	Yes	Yes	1	1.5
Arizona	Yes†	Yes*	0.5	Yes	No	0.5	1
Georgia	No	Yes	0.5	Yes	No	0.5	1
Illinois	No	Yes	0.5	Yes	No	0.5	1
Indiana	Yes†	Yes	0.5	Yes	No	0.5	1
Maryland	Yes	Yes	1	No	No	0	1
North Carolina	Yes†	Yes	0.5	Yes	No	0.5	1
Oregon	Yes	Yes	1	No	No	0	1
Utah	No	Yes	0.5	Yes	No	0.5	1
Washington	Yes	Yes	1	No	No	0	1
Wisconsin	No	No	0	Yes	Yes	1	1
Idaho	Yes	No	0.5	No	No	0	0.5
Louisiana	Yes†	No	0	Yes	No	0.5	0.5
Maine	Yes	No	0.5	No	No	0	0.5
Mississippi	Yes†	Yes†	0.5	No	No	0	0.5
Missouri	Yes†	No	0	Yes	No	0.5	0.5
Nevada	Yes†	Yes	0.5	No	No	0	0.5

State	Decoupling (or LRAM†) Electric	Natural gas	Score (1 pt.)	Performance incentives Electric	Natural gas	Score (1 pt.)	Total score (2 pts.)
New Mexico	No	No	0	Yes	No	0.5	0.5
South Carolina	Yes†	No	0	Yes	No	0.5	0.5
Tennessee	No	Yes	0.5	No	No	0	0.5
Texas	No	No	0	Yes	No	0.5	0.5
Virginia	No	Yes	0.5	No	No	0	0.5
Wyoming	No	Yes	0.5	No	No	0	0.5
Alabama	No	No	0	No	No	0	0
Alaska	No	No	0	No	No	0	0
Delaware	No	No	0	No	No	0	0
Florida	No	No	0	No	No	0	0
Iowa	No	No	0	No	No	0	0
Kansas	Yes†	No	0	No	No	0	0
Montana	No	No	0	No	No	0	0
Nebraska	No	No	0	No	No	0	0
New Jersey	No	No	0	No	No	0	0
North Dakota	No	No	0	No	No	0	0
Pennsylvania	No	No	0	No	No	0	0
West Virginia	No	No	0	No	No	0	0

* Both decoupling and lost revenue adjustment mechanism in place. † No decoupling, but lost revenue adjustment mechanism in place. A yes with neither asterisk nor dagger indicates that only decoupling is in place. [1] Hawaii received full points for both gas and electric because it uses minimal amounts of natural gas.

Support of Low-Income Energy Efficiency Programs

It is well documented that low-income households live in less-efficient housing and devote a greater proportion of their income to utility bills than do higher-income households. ACEEE research has found that in low-income, African-American, Latino, and renter households, the percentage of income spent on home energy is up to three times that of an average household. Some low-income households spend nearly 20% of their income on their utility bills (Drehobl and Ross 2016).

A variety of factors contribute to this disparity, exacerbating the home energy burden faced by these households. Many residents live in older, poorly insulated homes with inefficient heating systems. In addition, people living in rental households may lack control over heating and/or cooling systems and appliances, which makes it difficult to influence decisions that might improve the efficiency of their homes. ACEEE research has found that for low-income households, including those in multifamily buildings, bringing their housing stock up to the efficiency level of the median household would eliminate 35% of their excess energy burden, dropping it to 13% of income (Drehobl and Ross 2016). Beyond simply lowering energy bills, efficiency upgrades can also improve health and comfort and provide families with more disposable income for other necessities beyond energy. In fact, in its evaluation of the

Weatherization Assistance Program, DOE found that the value of nonenergy benefits greatly exceeded the value of energy savings.

Efforts to improve the reach of energy efficiency programs that serve low-income customers face several unique challenges. Among them are the relatively prohibitive up-front costs of such programs and the split incentive between renters and landlords—that is, the lack of motivation for landlords to invest in efficiency upgrades when they do not themselves pay for utilities. To help overcome these challenges, regulators can play a key role in encouraging utilities to carefully consider and expand the role of low-income energy efficiency programs within their portfolios.

In recognition of the efforts undertaken by states to strengthen low-income energy efficiency programs offered by utilities, we added an additional scoring metric to last year's *State Scorecard* to highlight examples of effective policy drivers that we continue to score, including

- The adoption of state legislation, regulations, or commission orders establishing a savings goal or minimum required level of spending on low-income energy efficiency programs
- The development of cost-effectiveness rules that account for the additional benefits that energy efficiency delivers to low-income customers, such as NEB quantification, adders, or exemption of these programs from cost-effectiveness testing.

States can utilize a variety of policy mechanisms to ensure that levels of investment in or savings from energy efficiency programs for low-income customers meet a minimum threshold. In the case of Pennsylvania, the Public Utility Commission has incorporated a savings target specific to low-income programs within the state's EERS. It requires each utility to obtain a minimum of 5.5% of its total consumption reduction target from the low-income sector.

In most cases, however, low-income program requirements take the form of some sort of legislative spending set-aside, through either the creation of a separate fund that receives a minimum annual contribution from ratepayers or a requirement that utilities spend a minimum amount or percentage of their revenues on low-income programs. For example, the Future Energy Jobs Bill (SB 2814) passed in Illinois in December 2016 directed ComEd and Ameren Illinois to invest $25 million and $8.35 million per year, respectively, on low-income energy efficiency measures. Similarly, in August 2016, the New Hampshire Public Utilities Commission, in an approved settlement agreement establishing a statewide EERS, increased the minimum low-income share of the overall energy efficiency budget from 15.5% to 17%. Minnesota legislation requires municipal gas and electric utilities to spend at least 0.2% of their gross operating revenue from residential customers on low-income programs, and investor-owned natural gas utilities must spend 0.4% of their gross operating revenue from residential customers on such programs. In other states, such as Connecticut and Michigan, utilities are simply required to see that budgets allocated to low-income programs are distributed at levels proportional to the revenues that are expected to be collected from that sector. Descriptions of state rules and regulations establishing minimum levels of investment in low-income energy efficiency can be found in Appendix K.

Our scoring metric also recognizes several methods through which public utility commissions can encourage investment in low-income energy efficiency programs by adapting cost-effectiveness screening and testing to give added consideration to the multiple important nonenergy benefits these programs produce, such as health and safety improvements. In some states, such as Illinois, Iowa, and Michigan, regulations clearly state that low-income programs are exempt from cost-effectiveness tests; in other states these exemptions may be granted in practice but are not necessarily clearly stated or codified. Given the variation in policies and practices treating the cost effectiveness of low-income programs, some of which are established implicitly rather than explicitly within commission orders, we have tried to exercise flexibility in assigning points within this category.

Other approaches taken by program administrators to accommodate the higher costs and unique benefits of low-income programs include lowering the cost-effectiveness threshold for such programs or incorporating a percentage adder to approximate the nonenergy benefits that may otherwise be lost in a given cost–benefit calculation (as in Colorado and Vermont). In other cases, states have established methods to measure and calculate specific nonenergy benefits for inclusion in program screening. Others take a hybrid approach, utilizing an adder in addition to incorporating NEBs that are easy to measure. Descriptions of each state's utility cost-effectiveness rules specific to low-income programs can be found in Appendix L.

SCORES FOR SUPPORT OF LOW-INCOME ENERGY EFFICIENCY PROGRAMS

In this year's data request to states and utility commissions, ACEEE asked for information about the policy instruments discussed above. We also asked for specific levels of spending on low-income energy efficiency programs by states and utilities. This is distinct from funding provided by federal sources, such as DOE grant allocations for the Weatherization Assistance Program.

A state could earn up to 1 point in this category. To earn full credit, a state must have a legislative or regulatory requirement establishing minimum spending and/or savings levels for efficiency programs aimed specifically at low-income households, as well as established cost-effectiveness screening practices that accommodate or recognize the multiple nonenergy benefits of low-income energy efficiency programs. Alternatively, a state could earn full credit by demonstrating that utility spending for such programs equaled or exceeded $13 per low-income resident, based on the number of state residents below 200% of the federal poverty level according to the US Census Bureau and Bureau of Labor Statistics.

States could earn 0.5 points if they had in place at least one of the two aforementioned policy instruments, or if they demonstrated that spending on low-income programs equaled or exceeded $6.50 per low-income resident.

Table 20 describes the scoring methodology. Information about individual state low-income energy efficiency programs is available in Appendixes K and L and in ACEEE's State and Local Policy Database (ACEEE 2018).

Table 20. Scoring of support of low-income energy efficiency programs

Scoring criteria for low-income energy efficiency programs	Score
Legislative/regulatory requirements have established minimum spending or savings levels for low-income energy efficiency programs, *and* utility cost-effectiveness rules or exceptions have been established to provide flexibility for low-income programs. or Levels of spending on low-income energy efficiency equal or exceed $13 per low-income resident.	1
Legislative/regulatory requirements have established minimum spending or savings levels for low-income energy efficiency programs, *or* utility cost-effectiveness rules or exceptions have been established to provide flexibility for low-income programs. or Levels of spending on low-income energy efficiency equal or exceed $6.50 per low-income resident.	0.5

Table 21 shows the results of ACEEE's analysis, including levels of ratepayer-funded spending on low-income energy efficiency programs for states that provided this information through the *Scorecard* data request. These amounts are distinct from bill assistance programs and refer specifically to programs designed to improve energy efficiency through measures such as home energy assessments, insulation, and air sealing. These amounts are also separate from federal funding, such as federal Weatherization Assistance Program (WAP) grant allocations. However, where utility or state funds have been deployed to support or supplement WAP programs or projects, we do include these in table 21.

It is important to note that states rely on a variety of funding sources to support energy efficiency measures in low-income households; these include both ratepayer dollars and general funds. For example, although Alaska reports little utility funding for low-income programs, state investment in weatherization on a per-capita basis is among the highest in the nation, thanks to appropriations by the state legislature administered through the Alaska Housing Finance Corporation. In order to credit these efforts within the *State Scorecard* and avoid penalizing states that draw from diverse funding streams, any state-subsidized low-income funds reported by state energy offices in their data request have been combined with ratepayer funding for low-income programs and annotated in table 21.

Table 21. State scores for support of low-income energy efficiency programs

State	Requirements for minimum level of state or utility support of low-income energy efficiency programs	Special cost-effectiveness screening provisions or exceptions for low-income energy efficiency programs	2017 utility spending on low-income energy efficiency programs	2017 state spending on low-income energy efficiency programs per low-income resident*	Score (1 pt.)
Alaska	No	No	$4,950,000†	$26	1
California‡	Yes[c]	Yes[f]	$422,500,000†	$34	1
Connecticut	Yes[abc]	Yes[e]	$33,439,825	$43	1
Delaware	Yes[a]	Yes[d]	$2,737,880	$11	1
District of Columbia	Yes[a]	Yes[g]	$4,748,481	$22	1
Illinois	Yes[a]	Yes[e]	$73,500,000	$22	1
Maine	Yes[a]	Yes[d]	$3,635,275	$9	1
Maryland	No	Yes[e]	$20,989,946†	$16	1
Massachusetts	Yes[a]	Yes[d]	$109,693,523	$74	1
Michigan	Yes[a]	Yes[e]	$26,470,052	$10	1
Minnesota	Yes[a]	Yes[e]	$12,753,000	$12	1
Montana	Yes[a]	Yes[e]	$3,504,151†	$11	1
Nevada	Yes[a]	Yes[e]	—	—	1
New Hampshire	Yes[a]	Yes[e]	$4,998,360	$21	1
New Jersey	No	Yes[e]	$28,865,149	$13	1
New Mexico	Yes[a]	Yes[g]	$1,677,950	$2	1
New York	Yes[a]	Yes[e]	$55,517,919	$10	1
Oklahoma	Yes[a]	Yes[f]	$9,966,652	$8	1
Oregon‡	Yes[a]	Yes[e]	$12,727,646	$10	1
Pennsylvania	Yes[bc]	Yes[e]	$77,067,696	$24	1
Rhode Island	No	Yes[d]	$16,961,439†	$63	1
Texas	Yes[a]	Yes[e]	—	—	1
Vermont	Yes[a]	Yes[f]	$8,100,000	$53	1
Virginia	Yes[a]	Yes[e]	—	—	1
Wisconsin	Yes[a]	Yes[e]	—	—	1
Arkansas	No	Yes[e]	—	—	0.5
Arizona	No	Yes[e]	$4,213,451	$2	0.5
Colorado	No	Yes[g]	$9,778,532†	$8	0.5
Florida	No	Yes[e]	$8,054,647	$1	0.5

State	Requirements for minimum level of state or utility support of low-income energy efficiency programs	Special cost-effectiveness screening provisions or exceptions for low-income energy efficiency programs	2017 utility spending on low-income energy efficiency programs	2017 state spending on low-income energy efficiency programs per low-income resident*	Score (1 pt.)
Idaho	No	Yes[g]	$2,250,000	$4	0.5
Indiana	No	Yes[e]	—	—	0.5
Iowa	No	Yes[e]	$9,598,588	$12	0.5
Kansas	No	Yes[e]	—	—	0.5
Kentucky	No	Yes[e]	—	—	0.5
Mississippi‡	No	Yes[e]	$3,188,507	$3	0.5
Missouri	No	Yes[e]	$7,562,669	$4	0.5
North Carolina	No	Yes[e]	$5,572,570	$2	0.5
Ohio‡	No	Yes[e]	$32,880,000	$10	0.5
South Carolina	No	Yes[e]	—	—	0.5
Tennessee‡	No	Yes[e]	$15,013,215	$7	0.5
Utah	No	Yes[g]	$3,987,150†	$5	0.5
Washington	No	Yes[e]	$7,786,002	$4	0.5
Alabama‡	No	No	$7,188,231	$4	0
Georgia	No	No	$2,500,744	$1	0
Hawaii	No	No	—	—	0
Louisiana	No	No	$616,649	$0	0
Nebraska	No	No	$462,162	$1	0
North Dakota	No	No	—	—	0
South Dakota	No	No	—	—	0
West Virginia	No	No	$1,371,009	$2	0
Wyoming	No	No	$4,418	$0	0

* 2016 low-income population based on number of residents below 200% of the federal poverty level according to US Census Bureau and Bureau of Labor Statistics 2016 Current Population Survey (CPS) Annual Social and Economic (ASEC) Supplement. † At least a portion of spending includes non-ratepayer/state-subsidized program funds. ‡ 2016 ratepayer funds. [a] A required level of spending on low-income energy efficiency has been established. [b] A required savings goal for low-income energy efficiency has been established. [c] A customer participation goal has been established. [d] Quantifiable low-income NEBs included within cost–benefit calculations. [e] Low-income programs not required to pass, or exempted from passing, cost-effectiveness test. [f] Cost-effectiveness threshold lowered to accommodate low-income programs. [g] Multiplicative adder applied to approximate low-income NEBs.

Leading and Trending States: Low-Income Energy Efficiency Programs

New York. Under its Reforming the Energy Vision (REV) initiative, New York is striving to expand energy efficiency and clean energy solutions to low-income customers. Such efforts include EmPower NY, administered by the New York State Energy Research & Development Authority, which provides income-eligible customers with a range of no-cost energy efficiency solutions, including home energy assessments and replacement of old appliances. The Clean Energy Fund, a key strategic pillar of REV, is investing $234.5 million in programs specifically benefiting low-income customers over the first three years of the fund. New York has also established a goal to lower the energy burden of low-income customers to 6%, prompting the state's utilities to file low-income program implementation plans in 2016 specifying time lines for new programs and operational changes to bill discount programs and customer outreach and education.

Illinois. In late 2016 Illinois passed the Future Energy Jobs Bill (SB 2814) with bipartisan support. This raised overall utility energy efficiency targets and effectively doubled the required annual amount of utility investment in low-income energy efficiency programs to at least $25 million for ComEd and $8.35 million for Ameren Illinois. Also, these two utilities have committed to spend nearly double the amount required by legislation. In 2018 Illinois's electric utilities took over delivery of low-income programs currently administered by the state Department of Commerce and Economic Opportunity. Per SB 2814, they will convene advisory committees to help inform the design and delivery of low-income programs.

New Jersey. Since its launch in 2001 by the New Jersey Board of Public Utilities, the state's Comfort Partners Program has helped more than 112,000 income-qualifying families save energy and money by making their homes more energy efficient. Improvements include adding insulation, caulking, weather stripping, energy-saving showerheads and light bulbs, and more, all at no cost to the customer. Prior to Comfort Partners, utilities offered their own separate low-income energy efficiency programs that varied widely in terms of budget levels and types of services offered. By transitioning to a single statewide program model administered cooperatively by seven utility partners, Comfort Partners has helped to establish consistency in service across the state and reduce administrative costs.

Pennsylvania. Phase III of Act 129's Energy Efficiency and Conservation Program, approved in 2015, increased the state's commitment to energy efficiency in low-income households. In addition to establishing a cumulative five-year utility energy consumption reduction target of 5.7 million MWh, the order requires that utilities obtain 5.5% of the reduction target from low-income programs. Thanks to this improved mandate, the electric utilities' budget for energy efficiency measures for low-income multifamily housing and other low-income households has increased to more than $32 million and $150 million, respectively, over the next five years. In addition, in March 2017 the PUC announced plans to undertake a study regarding affordable home energy burdens for low-income Pennsylvanians. The study will provide a starting point for evaluating the effectiveness of the state's Customer Assistance Program and other Universal Service programs.

Massachusetts. According to Massachusetts's 2008 Green Communities Act, a minimum of 10% of electric utility budgets and 20% of gas utility budgets are required to serve low-income residents. These programs are delivered by the Low-Income Energy Affordability Network (LEAN), an association of community action agencies (CAAs). LEAN coordinates administration of government- and utility-funded energy efficiency services to income-qualified customers, leveraging multiple funding sources and standardizing different program rules and eligibility requirements. LEAN also regularly hosts Best Practices Working Group meetings in which utilities and nonprofit agencies discuss program and funding consistency and review potential new measures. In 2017, LEAN was expected to oversee the delivery of approximately $120 million in ratepayer and federal funds for low-income weatherization and energy efficiency programs.

ADDITIONAL POLICIES

Data Access

The scope of energy usage data that utilities make available to customers and third parties is an area of growing interest first introduced to the *State Scorecard* in 2015. Data access can help customers save energy in homes, large buildings, and communities. Giving customers and building owners access to utility consumption information can provide a baseline for comparing future performance and help inform their decisions about investing in energy efficiency. Utilities, public utility commissions, or state legislators can advance access to utility consumption information for customers, building owners, and authorized third parties by providing recommended guidelines or requirements that standardize and streamline data access electronically across a utility territory or state. These guidelines and regulations can also facilitate or require data transmission directly from utilities to third parties with customer permission, while also addressing privacy concerns that may pose barriers to data sharing.

Beyond providing individual customer data to consumers, building owners, and authorized third-party service providers, multiple other use cases exist for which state and local governments should facilitate data sharing by working with utilities to clarify conditions and guidelines for aggregated energy data or related information. For example, a California Public Utilities Commission rulemaking recognizes specific use cases for local governments seeking access to aggregate data in creating climate action plans; for research institutions seeking anonymous energy consumption data to evaluate energy policies; and for environmental groups seeking customer data regarding energy efficiency measures pre- and post-retrofit (California PUC 2014).

Although state policies can encourage data sharing, the absence of explicit state policies does not mean utilities cannot act. After all, some utilities consider it simply a customer-service obligation to empower consumers to access and share their own energy data in a digital world. Even without an overt policy mandate, utilities in several states give customers access to their own energy use data through an online portal, offering them the option of electronically and automatically releasing it to third parties for greater analysis.

The data requests we distributed to utility commission contacts posed the following questions.

Do utilities provide energy usage data for customers to download in an electronic format such as Green Button? Are they required to do so? Here we identify those states in which utilities let customers download and access their energy use data in an electronic format, giving them usage information that is often a prerequisite to their investing in energy efficiency. We also identify those states in which utility commissions are going a step further and explicitly requiring utilities to provide energy use data to customers in a standardized electronic format. Doing so helps to facilitate sharing with third-party energy management services. For example, utilities are increasingly supporting Green Button, a technical standard for

exchanging energy usage data that, as the name suggests, enables customers to download energy usage data by simply clicking on a green button.[36]

Are guidelines or requirements in place regarding the process for third-party access to customer energy use data? Such policies remove perceived technical and policy barriers to third-party access, specifically by addressing privacy concerns among consumers and liability concerns among utilities.

Are utilities required to provide aggregated energy use data to owners of separately metered commercial or multifamily properties, or to public agencies? If so, what are the terms and details of the requirements? Separately metered buildings make up a significant portion of the built environment in many cities and thus represent a significant opportunity to promote energy efficiency. By having access to whole-building energy data, building owners can benchmark energy consumption and identify opportunities to improve energy efficiency. Unfortunately, when attempting to track energy use data within buildings, owners and operators often encounter privacy-related obstacles related to tenant-occupied spaces, where the tenant is the utility customer of record. Clarifying privacy protection and information-sharing practices through data aggregation requirements can help address these concerns.

Table 22 summarizes the responses to these questions. We did not score states on their responses this year, although we will likely score this metric in the future.[37]

Table 22. Guidelines and requirements for provision of energy usage data

State	Guidelines established regarding process for third-party access to customer energy data	Requirement for provision of individual energy use data to customers in a common electronic format (e.g., Green Button)	Requirement for provision of individual energy use data to third parties upon authorization by the customer	Utilities provide energy usage data for customers to download in an electronic format	Requirement for provision of aggregate data to owners of multitenant buildings	Requirement for provision of aggregate data to public agencies
Alabama				•		
California	•	•	•	•	•	•
Connecticut	•	•	•	•		•
District of Columbia	•	•	•	•	•	•
Georgia	•	•		•	•	
Idaho			•	•		
Illinois	•	•	•	•		•
Maine	•	•	•	•		•

[36] Green Button comes in two varieties: Green Button Download My Data, which allows customers to download their energy use data (and upload it to a third-party application), and Green Button Connect My Data, which allows customers to automate the secure transfer of their usage data to third parties.

[37] Complete information on data access as reported by states can be found at database.aceee.org.

State	Guidelines established regarding process for third-party access to customer energy data	Requirement for provision of individual energy use data to customers in a common electronic format (e.g., Green Button)	Requirement for provision of individual energy use data to third parties upon authorization by the customer	Utilities provide energy usage data for customers to download in an electronic format	Requirement for provision of aggregate data to owners of multitenant buildings	Requirement for provision of aggregate data to public agencies
Maryland	•	•		•		
Massachusetts	•			•		
Minnesota	•		•	•		
Nebraska	•		•	•	•	•
Nevada				•		
New Hampshire	•	•	•	•	•	•
New Jersey	•		•	•		•
New York					•	•
North Carolina	•			•		
North Dakota				•		
Oklahoma	•	•	•	•		
Pennsylvania	•		•	•		
Rhode Island				•		
South Dakota	•			•		
Texas	•			•		
Utah				•		
Vermont				•		
Washington	•					

States that have no policies in place or that did not provide responses are not included in this table. Complete information on data access policies can be found in the ACEEE State and Local Policy Database (ACEEE 2018).

States that have taken notable steps toward clarifying guidelines for the provision of customer energy usage data are described below.

Leading and Trending States: Data Access

Ohio. In April 2017, the Public Utilities Commission of Ohio (PUCO) kicked off PowerForward, a review of the latest technological and regulatory innovations to create paths for future grid modernization projects. The current phase of the initiative covers data access. In March 2018, the PUCO hosted a day of discussions with national and state energy experts regarding data access in Ohio. Speakers covered the current state of data access policies and programs, cybersecurity issues, and future needs. For example, presenters discussed Ohio's Electronic Data Interchange (EDI) working group, which manages electronic data interchange in the state. Stakeholders from the PUCO, energy companies, and an Ohio utility recognized the need for a data access policy including market standards, PUCO enforcement, and streamlined and automated systems for advanced metering infrastructure (AMI) data. These and future discussions will help to make smart grid technologies available throughout Ohio while providing a road map for innovation.

North Carolina. Duke Energy has begun a rollout of advanced meter infrastructure based on its 2016 Smart Grid Technology Plans (SGTPs) and its Power/Forward Carolinas initiative. The North Carolina Sustainable Energy Association had previously expressed concern that Duke had not adequately addressed data access issues in its plans. With the approval of the plans, the utilities commission required additional information and action from the utility. Duke Energy convened stakeholders in May 2018 to discuss issues such as customer privacy, liability, and third-party and affiliate data transactions. A report on the meeting will be released and the commission may open a formal rulemaking procedure on the topic.

New York. As part of the state's Reforming the Energy Vision (REV) goal to create a more distributed and responsive grid, the public service commission approved the development of NYSERDA's Utility Energy Registry (UER) in April 2018. The UER will launch in 2018, providing public access to aggregated community-level utility energy data and aiming to balance customer data privacy with such access. Every six months, utilities will upload data including customer count, installed capacity, and total load segmented by customer type and municipality. The program will promote and facilitate community energy planning and energy use management. The UER will work in tandem with other grid management tools like distribution forecasts and hosting capacity analyses to assist third-party developers in their market research and to inform the effective placement of distributed resources on the grid. Additionally, National Grid in New York uses a 4/50% aggregation standard to ensure customer confidentiality. This means that the utility will not provide data unless there are at least four meters in a building, and no single meter can represent more than 50% of the aggregated consumption total.

Texas. Texas was one of the first states to deploy advanced meter technology and a statewide data portal. Smart Meter Texas (SMT) allows customers to access their data and share them with third parties. However few customers have taken advantage of this difficult-to-use platform. In May 2018, regulators approved improvements to the SMT that will be available early in 2020. The changes will streamline the data portal to improve customer experience (e.g., easier sign-up) and increase the number of participants. The updates will make it easier for customers to choose third-party energy service providers and will facilitate the use of services like energy management and energy efficiency. They will also align the portal's design with the national Green Button interface, which supports large data sets.

Washington. Utilities in Washington will begin a large-scale rollout of advanced metering infrastructure in 2018. In April the Washington Utilities and Transportation Commission issued a policy statement on residential customer choice for advanced meter installation. The statement was developed following a review of existing practices, a period for stakeholder comment, and a workshop. It guides the state's investor-owned utilities to allow customers to opt out of advanced meter technologies and to keep their existing meters. According to the commission, opt-in programs could be detrimental to utility grid modernization strategies and result in slow and noncontiguous acceptance of AMI. Opt-out policies, on the other hand, respect customer concerns around data privacy while maintaining many of the benefits of large-scale AMI programs to utilities and the grid. The commission intends to initiate a formal rulemaking on advanced meter investments data privacy.

Chapter 3. Transportation Policies

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INTRODUCTION

Transportation energy use accounts for approximately 28% of overall energy consumption in the United States and is the biggest consumer of energy economy-wide (EIA 2018a). At the federal, state, and local levels, a comprehensive approach to transportation energy efficiency must address both individual vehicles and the transportation system as a whole, including its interrelationship with land use policies. Starting with EISA 2007, the federal government has addressed vehicle energy use through joint GHG and fuel economy standards for light- and heavy-duty vehicles. The federal government recently proposed freezing the federal standards, putting a spotlight on the role of states in maintaining progress on fuel efficiency. States and local governments continue to lead the way in creating policies for other aspects of transportation efficiency.

The energy efficiency score for the transportation category reflects state actions that go beyond federal policies to achieve a more energy-efficient transportation sector. These may be measures to improve the efficiency of vehicles purchased or operated in the state, policies to promote more-efficient modes of transportation, or the integration of land use and transportation planning to reduce the need to drive.

SCORING AND RESULTS

Standards requiring 4–5% improvement annually in fuel economy and GHG emissions for light-duty vehicles are in place at the national level through 2025. Any weakening of these standards would make the states' role in ensuring continuing progress toward high-efficiency vehicles all the more critical.[38] We awarded states that have adopted California's GHG vehicle emissions standards 1 point. Colorado is the most recent state to adopt these standards, but the regulation will not be finalized until later in 2018. Given the efficiency gains achievable through vehicle electrification, we gave states that also adopted California's Zero Emission Vehicle (ZEV) program 0.5 points. States with more than 30 registered EVs per 100,000 people qualified for an additional 0.5 points, and those with more than 70 EVs per 100,000 earned a full additional point. We awarded 0.5 points to states with consumer incentives for the purchase of high-efficiency vehicles.

States can lead the way in improving not only vehicle fuel efficiency but also the efficiency of transportation systems more broadly. This includes steps to promote the use of less energy-intensive transportation modes. States that have a dedicated revenue stream for public transit earned 0.5 points in this year's *State Scorecard*. Twenty-four states have statutes in place that provide sustainable funding sources for transit-related capital and/or operating expenses. For details, see Appendix G. States also received points based on the magnitude of their transit spending: Per capita spending of $100 or more received 1 point, while expenditures of $20 to $100 per capita received 0.5 points.

[38] Fuel economy standards adopted for model years 2022–2025 were provisional, and both fuel economy and GHG emissions standards for these model years, as well as for MY 2021, are currently under review.

Policies that promote compact development and ensure the accessibility of major destinations are essential to reducing transportation energy use in the long term. States with smart growth statutes earned 1 point. Twenty-five states earned points in this category. These statutes include the creation of zoning overlay districts such as the Massachusetts Chapter 40R program, as well as various other incentives to encourage development patterns that reduce the need to drive. See the ACEEE State and Local Policy Database for further details (ACEEE 2018).

States that adopted reduction targets for vehicle miles traveled (VMT) or transportation-specific GHG reduction goals statewide were also eligible for 1 point. Only six states earned points in this category. Among them is Rhode Island, which earned a point for the VMT goals outlined in Rhode Island Greenhouse Gas Emissions Reduction Plan released in 2016. This document calls for a 2% reduction in passenger car and truck VMT by 2035 and a 10% reduction by 2050, relative to 2014 levels. We awarded an additional point to states whose average 10-year VMT per capita figure fell by 5% or more between 2014 and 2016. A reduction of 1% to 5% earned 0.5 points. Eighteen states earned the full point for this metric. We also awarded 0.5 points to states with complete streets statutes, which ensure proper attention to the needs of pedestrians and cyclists in all road projects.

Regarding freight system efficiency, we changed our methodology in 2017 so that states could earn 0.5 points if their freight plans addressed multimodal freight strategies and another 0.5 points if their freight plans included an energy intensity or GHG reduction goal. We continued that practice this year.

We also evaluated state policies that encourage equitable access to efficient transportation options. States earned 0.5 points if they have policies in place to encourage inclusion of low-income housing in transit-oriented neighborhoods and an additional 0.5 points if they use distance from transit facilities as a criterion for awarding federal low-income tax credits to qualifying property owners.

Table 23 shows state scores for transportation policies. ACEEE recognizes that due to variations in states' geography and urban/rural composition, some states cannot feasibly implement some of the policies mentioned in this chapter. Nevertheless, every state can make additional efforts to reduce its transportation energy use, and this chapter illustrates a number of approaches. Additional details on state transit funding, transportation policies, and incentives for the purchase of high-efficiency vehicles are included in Appendixes E, F, and G.

Table 23. State scores for transportation policies

State	GHG tailpipe emissions standards and ZEV program (1.5 pts.)[1]	EV registrations per 100,000 people (1 pt.)[2]	High-efficiency vehicle consumer incentives (0.5 pts.)[3]	VMT targets/GHG reduction goals (1 pt.)[4]	Average % change in VMT per capita (1 pt.) [5]	Integration of transportation and land use planning (1 pt.)[6]	Complete streets legislation (0.5 pt.)[7]	Transit funding (1 pt.)[8]	Dedicated transit revenue stream statutes (0.5 pts.)[9]	Freight system efficiency goals (1 pt.)[10]	Equitable access to transportation policies (1 pt.) [11]	Total score (10 pts.)
California	1.5	1	0.5	1	0.5	1	0.5	0.5	0.5	1	1	9
Massachusetts	1.5	1	0.5	1	0	1	0.5	1	0.5	0.5	1	8.5
New York	1.5	1	0.5	1	1	1	0.5	1	0.5	0	0.5	8.5
District of Columbia	1.5	1	0.5	0	1	1	0.5	1	0	0.5	1	8
Oregon	1.5	1	0.5	1	1	1	0.5	0	0.5	0.5	0.5	8
Connecticut	1.5	1	0.5	0	0.5	1	0.5	1	0	0.5	1	7.5
Maryland	1.5	1	0.5	0	0.5	1	0.5	1	0	0.5	0.5	7
Washington	1	1	0.5	1	1	1	0.5	0	0.5	0.5	0	7
New Jersey	1.5	1	0.5	0	0.5	1	0.5	0.5	0	0.5	0.5	6.5
Rhode Island	1.5	0.5	0	0	1	1	0.5	0.5	0	0.5	1	6.5
Vermont	1.5	1	0	1	1	1	0.5	0	0	0.5	0	6.5
Delaware	1	1	0.5	0	0.5	1	0.5	1	0	0	0	5.5
Florida	0	1	0	0	1	1	0.5	0	0.5	0.5	1	5.5
Maine	1.5	0.5	0	0	0.5	1	0.5	0	0.5	0.5	0.5	5.5
Pennsylvania	1	0.5	0.5	0	1	0	0.5	1	0.5	0.5	0	5.5
Illinois	0	0.5	0	0	0.5	1	0.5	1	0.5	0.5	0.5	5
Virginia	0	0.5	0	0	1	1	0.5	0.5	0.5	0.5	0.5	5
Arizona	0	1	0.5	0	1	1	0	0	0	0.5	0.5	4.5
Colorado	0.5	1	0.5	0	1	0	0.5	0	0.5	0	0.5	4.5
Georgia	0	1	0.5	0	1	0	0.5	0	0.5	0.5	0.5	4.5
Hawaii	0	1	0	0	0.5	1	0.5	0	0.5	0	0.5	4
Michigan	0	0	0	0	0.5	1	0.5	0.5	0.5	0.5	0.5	4
Minnesota	0	0.5	0	0	0.5	0	0.5	0.5	0.5	0.5	1	4
North Carolina	0	0.5	0	0	0.5	1	0.5	0	0.5	0.5	0	3.5

State	GHG tailpipe emissions standards and ZEV program (1.5 pts.)[1]	EV registrations per 100,000 people (1 pt.)[2]	High-efficiency vehicle consumer incentives (0.5 pts.)[3]	VMT targets/GHG reduction goals (1 pt.)[4]	Average % change in VMT per capita (1 pt.) [5]	Integration of transportation and land use planning (1 pt.)[6]	Complete streets legislation (0.5 pt.)[7]	Transit funding (1 pt.)[8]	Dedicated transit revenue stream statutes (0.5 pts.)[9]	Freight system efficiency goals (1 pt.)[10]	Equitable access to transportation policies (1 pt.) [11]	Total score (10 pts.)
Utah	0	1	0.5	0	0.5	0	0.5	0	0.5	0.5	0	3.5
Tennessee	0	0.5	0	0	0	1	0.5	0	0.5	0.5	0.5	3.5
Texas	0	0.5	0.5	0	1	0	0.5	0	0	0.5	0	3
Alaska	0	0.5	0	0	1	0	0	1	0	0	0	2.5
Missouri	0	0.5	0	0	0	0	0.5	0	0	0.5	1	2.5
Nevada	0	1	0	0	0	0	0.5	0	0	0.5	0.5	2.5
Indiana	0	0	0	0	0	0	0.5	0	0.5	0.5	0.5	2
Iowa	0	0	0	0	0	1	0	0	0.5	0.5	0	2
Mississippi	0	0	0	0	1	0	0.5	0	0	0.5	0	2
New Hampshire	0	0.5	0	0	0.5	1	0	0	0	0	0	2
Oklahoma	0	0.5	0	0	1	0	0	0	0	0.5	0	2
South Carolina	0	0	0	0	1	0	0.5	0	0	0.5	0	2
Idaho	0	0.5	0	0	0.5	0	0	0	0	0.5	0	1.5
Kansas	0	0.5	0	0	0	0	0	0	0.5	0.5	0	1.5
Kentucky	0	0	0	0	0.5	0	0	0	0	0	1	1.5
Louisiana	0	0	0.5	0	0	0	0.5	0	0	0.5	0	1.5
New Mexico	0	0.5	0	0	0	0	0	0	0	0.5	0.5	1.5
North Dakota	0	0	0	0	0	1	0	0	0	0.5	0	1.5
West Virginia	0	0	0	0	0.5	0	0.5	0	0.5	0	0	1.5
Wyoming	0	0	0	0	1	0	0	0	0	0.5	0	1.5
Alabama	0	0	0	0	0	0	0	0	0.5	0.5	0	1
Arkansas	0	0	0	0	0	0	0	0	0.5	0.5	0	1
Nebraska	0	0	0	0	0.5	0	0	0	0	0.5	0	1
Ohio	0	0.5	0	0	0	0	0	0	0	0.5	0	1
Montana	0	0.5	0	0	0	0	0	0	0	0	0	0.5

State	GHG tailpipe emissions standards and ZEV program (1.5 pts.)[1]	EV registrations per 100,000 people (1 pt.)[2]	High-efficiency vehicle consumer incentives (0.5 pts.)[3]	VMT targets/GHG reduction goals (1 pt.)[4]	Average % change in VMT per capita (1 pt.) [5]	Integration of transportation and land use planning (1 pt.)[6]	Complete streets legislation (0.5 pt.)[7]	Transit funding (1 pt.)[8]	Dedicated transit revenue stream statutes (0.5 pts.)[9]	Freight system efficiency goals (1 pt.)[10]	Equitable access to transportation policies (1 pt.) [11]	Total score (10 pts.)
South Dakota	0	0	0	0	0.5	0	0	0	0	0	0	0.5
Wisconsin	0	0.5	0	0	0	0	0	0	0	0	0	0.5

[1] Clean Cars Campaign 2018; C2ES 2013. [2] IHS Automotive Polk 2018; state data requests. [3] DOE 2018a. [4] State legislation. [5] FHWA 2018b. [6] State legislation. [7] NCSC 2018. [8] AASHTO 2017. [9] State legislation. [10] State freight plans. [11] State legislation.

DISCUSSION

Tailpipe Emissions Standards and the Zero Emission Vehicle Program

The US Department of Transportation (DOT) has regulated the fuel economy of automobiles since Corporate Average Fuel Economy (CAFE) standards were adopted in 1975. States are not permitted to adopt fuel efficiency standards per se. As a longtime leader in vehicle emissions reduction, however, California has authority to set its own vehicle emissions standards, including for GHG emissions. Other states may choose to follow federal or California standards. In 2002, California passed the Pavley Bill (AB 1493), the first law in the United States to address GHG emissions from vehicles. The GHG reductions from this law were expected to be achieved largely through improved fuel efficiency, making these standards, to a large degree, energy efficiency policies. Given auto manufacturers' preference for regulatory regimes that allow them to offer identical vehicles in every state, California's program has been instrumental in prodding the federal government to continue to increase the stringency of vehicle standards, drawing new efficiency technologies into the market.

Pursuant to the *Massachusetts v. Environmental Protection Agency* court decision in 2007, the EPA began regulating vehicle GHG emissions as well. Starting in model year 2012, the EPA, DOT, and the California Air Resources Board (CARB) have had harmonized standards for fuel economy and GHG emissions. In 2010 the agencies set new GHG and fuel economy standards for model years 2012 through 2016. In 2012 the agencies extended the standards to model years 2017–2025, projecting a fleetwide GHG emissions average of 54.5 mpg by 2025. The DOT standards for model years 2022–2025 were provisional, and all three programs were to participate in a midterm review of the appropriateness of the final four years of the standards. In early 2017, EPA and CARB determined that these standards remained appropriate.

The Trump administration reopened EPA's midterm review shortly after the inauguration in 2017, and in April 2018 the EPA released a new determination that these future standards were no longer appropriate. The federal standards for model years 2020 onward are at risk of being frozen, so the commitment of all states that have adopted California's standards will be critical in maintaining progress toward clean, fuel-efficient vehicles. California has also updated its ZEV program, requiring an increase in sales of plug-in hybrid, battery electric, and fuel-cell vehicles from 2018–2025, in order to reduce GHG and criteria pollutant emissions. Manufacturers of passenger cars and light trucks (up to 8,500 pounds) must earn a certain number of ZEV credits by meeting state requirements regarding the number of ZEVs that they must produce and deliver for sale (C2ES 2017).

Fifteen states and the District of Columbia have adopted California's GHG regulations, but Arizona and Florida repealed their programs in 2012. The jurisdictions that now use the California standards are Connecticut, Delaware, the District of Columbia, Maine, Maryland, Massachusetts, New Jersey, New York, Oregon, Pennsylvania, Rhode Island, Vermont, and Washington (Clean Cars Campaign 2018). Colorado will be finalizing the adoption of the California GHG program in November 2018. Nine of these states and the District of Columbia have adopted California's ZEV requirements as well (C2ES 2013).

Electric Vehicle Registrations

As more EVs become available to drivers, states can help remove the barriers to their widespread adoption. In addition to reducing the higher up-front costs of these vehicles, states can provide incentives for the construction of the required fueling infrastructure. Additionally, nonfinancial benefits—such as emissions testing exemptions—make it more convenient to own an EV. The total number of EV registrations in a given state is indicative of the success of the state's policies to increase the uptake of electric vehicles.

Incentives for High-Efficiency Vehicles

When fuel-efficient vehicles contain new, advanced technologies, high purchase cost is a barrier to their entry into the marketplace. To encourage consumers to purchase fuel-efficient vehicles, states may offer a number of financial incentives, including tax credits, rebates, and sales tax exemptions. Several states offer tax incentives to purchasers of alternative-fuel vehicles—including those that run on compressed natural gas, ethanol, propane, or electricity—and in some cases to purchasers of hybrid vehicles (electric or hydraulic). Although alternative-fuel vehicles can provide environmental benefits by reducing pollution, they are not necessarily more fuel efficient, and we did not include policies to promote their purchase in the *State Scorecard*. However we did include incentives for plug-in vehicles and hybrids, which do generally have high fuel efficiency. With the arrival of a wide range of hybrid and plug-in vehicles in recent years, tax credits are playing an important role in spurring their adoption.

We did not give credit for incentives for the use of high-occupancy vehicle lanes and preferred parking programs for high-efficiency vehicles, as they promote increased vehicle use and consequently may not deliver net energy benefits.

Vehicle Miles Traveled (VMT) Growth and VMT Reduction Targets

Improved vehicle fuel economy will not adequately address energy use in the transportation sector in the long term if growth in total VMT goes unchecked. EIA predicts an 18% increase in light-duty VMT between now and 2050, due to rising incomes and population growth (EIA 2018a). VMT for all vehicle types is expected to increase by 1.2% annually over the next 20 years (FHWA 2018). Reducing VMT growth is key to managing transportation energy use, and several states have taken on this challenge by setting VMT reduction targets.

Integration of Land Use and Transportation Planning

Success in achieving VMT reduction targets requires the coordination of transportation and land use planning. Successful strategies vary among states due to differences in their infrastructure, geography, and political environment; however all states benefit from adopting core principles of smart growth and integrating transportation and land use planning in order to increase transportation system efficiency. Integrated approaches include measures that encourage

- Transit-oriented development, including mixed land use (combination of jobs, stores, and housing) and good street connectivity to make neighborhoods friendly to all modes of transportation
- Areas of compact development

- Convenient modes of transportation that provide alternatives to driving
- Centers of activity where popular destinations are close together and accessible by multiple transportation modes

Complete Streets Policies

Complete streets policies focus on street connectivity and aim to create safe, easy access to roads for all pedestrians, bicyclists, motorists, and public transportation users. Such policies foster increased use of alternatives to driving and thus can contribute to reducing fuel consumption. According to the National Complete Streets Coalition, modest increases in biking and walking could save 2.4 billion gallons of fuel annually across the country (NCSC 2012). A complete streets policy directs states' transportation agencies to evaluate and incorporate complete streets principles and tasks transportation planners with ensuring that all roadway infrastructure projects allow for equitable access to and use of those roadways.

State Transit Funding

While states receive some federal funds for public transit, a significant proportion of transit funding comes from state budgets. A state's investment in public transit is a key indicator of its interest in promoting energy-efficient modes of transportation, although realizing the potential for energy savings through transit typically requires land use changes that promote ridership growth by creating denser, more mixed-use communities as well.

Dedicated Transit Revenue Streams

As states face increasingly uncertain federal funding streams and federal transportation policies that remain highway-focused, many have taken the lead in finding dedicated funding sources for long-term public transit expenditures. To generate a sustainable stream of capital and operating funds, a number of states have adopted legislation that identifies specific sources of funding for public transit. For instance, in 2018 Alabama established a trust fund under the Alabama Public Transportation Act to increase public transportation options in the state.

Freight

Many states have freight transportation plans in place. Adopted in 2015, the Fixing America's Surface Transportation (FAST) Act superseded the Moving Ahead for Progress in the 21st Century (MAP-21) Act. FAST requires states to develop short- and long-range freight plans in order to receive federal funds for freight projects. Final plans were required by December 2017. Additionally, FAST creates a separate pot of money for intermodal and rail freight projects. Each state is allowed to set aside up to 10% of federally awarded funds for eligible non-highway projects (FAST 2015). Pursuant to FAST, states must include multimodal strategies in their freight plans, but these did not need to be finalized by the December 2017 deadline. Still, many states have already incorporated multimodalism into their freight plans.

These freight plans can be strengthened by adopting concrete targets or performance measures that establish energy efficiency as a priority for goods movement. Such measures will involve tracking and reporting the fuel used for freight movement in the state as a whole, and they will encourage the use of energy efficiency as a criterion for selecting or evaluating freight projects. States could formulate these performance targets in terms of

gallons per ton-mile of freight moved, for example, or grams of GHG emitted per ton-mile of freight, and targets should reflect performance across all freight modes.

Equitable Access to Transportation

As cities have sprawled and jobs have moved away from urban cores in the United States, many low-income communities have become geographically more isolated and inadequately served by affordable, efficient transportation. As a result, household transportation costs as a percentage of total income are higher than average for these communities as personal vehicles become the only option for travel (Pew Charitable Trusts 2016). Expenditures for vehicles, including fuel, insurance, and maintenance, can be large and unpredictable.

States can use policy levers to ensure fair and equitable access to public transportation and newer shared-use services in a number of ways. Providing incentives to developers who set aside a fixed percentage of low-income housing in transit-served areas helps align housing and transportation choices. Similarly, many states use nearness to transit services as a key criterion for disbursing federal low-income tax credits to qualifying property owners, ensuring that low-income communities are served by a variety of transportation alternatives.

Leading and Trending States: Transportation Policies

California. California is the clear leader in the transportation sector. The state has played a central role in driving ambitious greenhouse gas standards for new passenger and heavy-duty vehicles. Additionally, as part of its plans to implement AB 32 (which calls for the state to reduce global warming pollution to 1990 levels by 2020), California has identified several strategies for smart growth and VMT reduction. In 2016, SB 32 and AB 197 were passed, requiring a 40% greenhouse gas reduction below 1990 levels by 2030, necessitating even further reductions in emissions from the transportation sector. In 2008, the state passed SB 375, which requires the California Air Resources Board to develop regional transportation-specific GHG reduction goals in collaboration with metropolitan planning organizations. The board finalized targets in 2011, recommending a 5–8% reduction in vehicle-associated GHG emissions by 2020 for the state's four largest metropolitan planning organizations. These goals must be reflected in regional transportation plans that create compact, sustainable development across the state and thus reduce VMT growth.

California has also been a leader in providing equitable access to transportation services. The Affordable Housing and Sustainable Communities Program provides funding to incentivize the creation of low-income housing near transit facilities. In addition, the state considers proximity to transit facilities when distributing federal Low-Income Housing Tax Credits to qualifying property owners.

Between 2005 and 2007, California adopted the Goods Management Action Plan (GMAP), which emphasizes energy efficiency in goods movement. In 2014 the state created the California Freight Mobility Plan (CFMP), which is structured to address all of the MAP-21 national goals including GHG emissions reductions. On the vehicle efficiency side, California passed AB 118 in 2009, providing a voucher program for the incremental cost of purchasing hybrid medium- and heavy-duty trucks. Vouchers range from $6,000 to $45,000. The state also offers tax rebates of up to $2,500 for light-duty ZEVs and plug-in hybrid EVs on a first-come, first-served basis, effective until 2023.

Massachusetts. Like California, Massachusetts has long been a leader on the transportation front. The state is dedicated to encouraging compact, transit-oriented development through a number of measures. The Massachusetts 40R program provides financial incentives for the use of zoning overlays that promote smart growth development in cities and municipalities. The state also has a GHG reduction target that aims to cut transportation emissions by 2 million tons by 2020, as well as a comprehensive complete streets statute that incorporates pedestrian and bicycle travel in all road construction projects.

To continue curbing emissions and energy consumption in the transportation sector, Massachusetts adopted the California ZEV program to encourage the adoption of electric vehicles. With approximately 95 electric vehicles registered per 100,000 residents, the state is making steady progress in promoting EVs as a viable option for drivers.

(continued)

Leading and Trending States: Transportation Policies (continued)

New York. New York has steadily moved up the ranks in recent years through its strong efforts in transportation efficiency. On the vehicle efficiency side, New York signed a 2013 memorandum of understanding with seven other states to put a combined 3.3 million ZEVs on the road by 2025. This action supplements the California low-emission vehicle emissions standards that New York adopted in 2005.

The state has also made a number of changes to improve system efficiency. New York is one of the few states in the nation to have a concrete VMT reduction target. A goal set in 2008 calls for a 10% reduction in 10 years. With one of the highest transit ridership rates in the country, the state passed AB 8180 in 2010, directing a portion of vehicle registration and license renewal fees to public transportation. The bill also created the Metropolitan Transit Authority Financial Assistance Fund to support subway, bus, and rail services and capital improvements. In 2011 New York adopted a new complete streets policy aimed at providing accessibility for multiple modes of transport.

Oregon. Oregon has made steady progress toward cutting its transportation fuel consumption and VMT in recent years. In 2011 the state adopted transportation-specific GHG reduction goals for six of its largest metropolitan areas; the goals call for a 17–21% drop from 2005 levels by 2035. In combination with a stringent growth management act, these new goals have helped move Oregon toward the top of the rankings in this policy area.

The state also passed HB 2186 in 2009, calling for all metropolitan planning organizations to create a GHG emissions task force. These task forces look for alternative land use and transportation planning scenarios to meet community growth needs while reducing GHG emissions. Oregon is also one of the first states to pass legislation for a VMT fee program. In an effort to reduce the overall number of miles driven, this voluntary program charges drivers a fee of 1.7 cents per mile in lieu of the state's 30 cent-per-gallon gas tax.

Washington. Washington has long been a leader in integrating land use and transportation planning to reduce fuel consumption and VMT. The state introduced the Growth Management Act in 1990 in an early attempt to curb suburban sprawl amid rapid population growth. Washington also has an aggressive VMT reduction target, which calls for a 50% cut in VMT per capita by 2050 relative to 1990 levels. In 2011 the state passed a complete streets law to encourage walkable, multimodal communities. The following year, the state legislature adopted HB 2660, providing grants to public transit agencies to preserve transit service in the state.

Chapter 4. Building Energy Efficiency Policies

Author: Weston Berg

INTRODUCTION

Buildings consume 74% of the electricity and 41% of the total energy used in the United States and account for 40% of US carbon dioxide emissions (DOE 2012). This makes buildings an essential target for energy savings. Because buildings have long life spans and retrofits are often difficult or costly, encouraging building efficiency measures during design and construction is one of the most effective ways to reduce building energy consumption. Mandatory building energy codes require a minimum level of energy efficiency for new residential and commercial buildings in addition to specifying aspects of health and safety. Benchmarking and transparency policies also promote efficiency by informing building owners about their energy consumption. Policies encouraging energy rating and labeling of homes can help to further transform the market by enabling prospective buyers to make informed decisions about the true long-term energy costs of homes.

Building Energy Code Adoption

In 1978, California enacted the first statewide building energy code in its Title 24 Building Standard. Several states (including Florida, New York, Minnesota, Oregon, and Washington) followed with their own codes in the 1980s. During the 1980s and 1990s, the International Code Council® (ICC) and the regional code development organizations that preceded it developed the Model Energy Code (MEC), later renamed the International Energy Conservation Code® (IECC). Today most states use a version of the IECC for their residential buildings.

Most commercial building codes are based on ASHRAE 90.1 standards, jointly developed by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) and the Illuminating Engineering Society (IES). The IECC commercial building code tends to include many of the prescriptive and performance requirements of the ASHRAE 90.1 code.

With the publication of each new edition of the IECC and ASHRAE standards, DOE issues determinations on the codes that ascertain their relative impact compared with older standards and establish, if justified, the latest iteration as the commercial base code that all states must comply with. Within two years of the final determination, states are required to send letters certifying their adoption, requesting an extension, or explaining their decision not to comply. Several states, such as Maryland, Massachusetts, and Illinois, are required by statute to adopt the most recent version of the IECC within one year of publication.

On July 25, 2017, DOE released its most recent commercial code determination showing that ASHRAE Standard 90.1-2016, which includes changes to the building envelope and lighting and mechanical standards, will lead to 6.7% greater site energy savings than the 2013 edition.[39] Later that year, the ICC published the 2018 IECC referencing the ASHRAE 90.1-2016 standard. Participation in the 2018 ICC code development process was diverse and

[39] For details see www.energycodes.gov/development/determinations.

broader than in prior years, though it produced only modest improvements in energy efficiency compared with the 2015 IECC, placing stricter requirements on windows and clarifying minimum levels of efficiency for homes using onsite renewable energy. States reviewing the 2018 IECC this year for potential adoption include Delaware, Florida, Illinois, Indiana, Maryland, Nevada, New Jersey, New Hampshire, New York, Ohio, Vermont, and Washington.

Stimulus funding provided through the DOE State Energy Program under the American Recovery and Reinvestment Act (ARRA) spurred the majority of states to adopt at least the 2009 IECC and ASHRAE 90.1-2007 standards. ARRA required that each state accepting stimulus funding for code implementation and compliance have a plan to achieve compliance with these codes in 90% of new and renovated residential and commercial building space by 2017. While these federal efforts were successful in leading states to update to 2009 model codes in the years after ARRA, more recent adoption efforts have been the result of direct state leadership.

Building energy codes have traditionally taken a prescriptive approach, requiring compliance with a specific portfolio of building specifications and efficiency measures. However recent years have seen codes become increasingly performance based, allowing builders flexibility to chart their own course as long as the building meets a minimum standard of modeled energy performance. At the same time, a number of states and communities have taken steps to move toward net-zero energy standards for new and existing construction. A zero energy (ZE) building is a home or commercial building that produces as much energy as it uses, usually measured over the course of a year. This performance is achieved through energy efficiency and renewable energy technologies.

In recent years, the concept of ZE has increasingly taken hold among building designers and clean energy communities, prompting a growing pursuit of ZE-related targets and certifications, such as the American Institute of Architects' 2030 Challenge, the International Living Future Institute's Living Building Challenge, and DOE's Zero Energy Ready Homes Program. States and localities have also developed more stringent building energy codes, such as California and its mandate for all new homes and commercial buildings to be net-zero energy by 2020 and 2030, respectively (CPUC 2018). Other examples include the District of Columbia's proposed net-zero energy code path; Delaware's legislated requirement that all new residential and commercial building construction be net zero energy-capable by 2025 and 2030, respectively; and city- and county-led efforts in Idaho and Colorado. Other active ZE plans are in place in Vermont, Rhode Island, and Massachusetts. As building energy codes are amended to deepen energy savings and move states closer to ZE goals, interest is growing regarding outcome-based codes and the importance of calculating building energy savings.

Building Energy Code Compliance

Robust implementation and enforcement are necessary to ensure that states will reap the benefits of adopted codes. A support network that includes DOE, the Pacific Northwest National Laboratory (PNNL), regional energy efficiency organizations (REEOs), the Building Codes Assistance Program (BCAP), and a variety of other local, regional, and

national stakeholder groups provides advocacy, technical training, and educational resources to help states and communities reach their compliance goals.

DOE provides many resources to help guide states in code compliance. In addition to funding compliance activities through grants, DOE provides technical assistance—such as model adoption policies, compliance software, and training modules—through its Building Energy Codes Program. Among its most recent efforts is an ongoing three-year residential energy code field study in eight states that seeks to establish baseline energy use and determine the degree to which investment in building energy code education, training, and outreach programs can produce a significant, measurable change in residential building energy savings. Also ongoing is a DOE-led multifamily residential energy code field study that will develop an approach to better assess energy code compliance in multifamily buildings (DOE 2017).

REEOs work closely and collaboratively within their regions and with each other to coordinate code-related activities that support adoption and compliance. These include Northeast Energy Efficiency Partnerships (NEEP), the Southeast Energy Efficiency Alliance (SEEA), the Midwest Energy Efficiency Alliance (MEEA), the South-Central Partnership for Energy Efficiency as a Resource (SPEER), the Southwest Energy Efficiency Project (SWEEP), and the Northwest Energy Efficiency Alliance (NEEA).[40] The REEOs have served a vital role in providing technical policy information and analysis regarding cost effectiveness and potential energy savings of energy codes to help inform code adoption efforts. Other pivotal REEO-led initiatives include increasing access to energy code training for builders, code officials, and architects; and overseeing energy code stakeholder groups and collaboratives. The REEOs have also been key contributors to DOE's ongoing residential energy code field studies in states such as Kentucky, Arkansas, Texas, and Georgia.

Other important stakeholders providing leadership and technical expertise on code adoption and enforcement include the National Association of State Energy Officials (NASEO), and the Responsible Energy Codes Alliance, among others.

In addition to these regional and national efforts, states can take other measures to support code compliance. These include the following:

- Conducting a study—preferably every three to five years—to determine actual rates of energy code compliance, identify compliance patterns, and create protocols for measuring compliance and developing best-practice training programs
- Establishing a system, including programs and an evaluation methodology, that encourages utilities and other stakeholders to support code compliance and claim savings from doing so
- Offering training programs and/or adopting policies establishing minimum certification requirements for code enforcement officials in order to increase the number and effectiveness of contractors and officials who implement the code and monitor and evaluate compliance. These are most effective when based on data collected in compliance field studies.

[40] These organizations cover all states except California, Hawaii, and Alaska.

Utilities can promote compliance with state and local building codes in a number of ways (Misuriello et al. 2012). Many utilities across the country offer energy efficiency programs that target new construction. Several states with EERS policies, including California, Massachusetts, and Arizona, have established programs that allow utilities to claim savings for code enhancement activities, both for adoption and for compliance. Utilities can fund and administer training and certification programs, assist local jurisdictions with implementing tools that streamline enforcement, provide funding for purchasing diagnostic equipment, and help with compliance evaluation. They also can combine code compliance efforts with initiatives to improve energy efficiency beyond code requirements. To encourage utilities to participate, prudent regulatory mechanisms, such as program cost recovery or shared savings policies, must be in place to compensate them for their efforts.

Building Energy Use Transparency and Home Energy Labeling

A significant challenge to improving efficiency in the housing sector has been a relatively low level of awareness and understanding among home buyers of the energy costs and energy-saving features of homes on the market. While miles-per-gallon stickers and Energy Guide labels have become dependable fixtures of the vehicle and home appliance markets, a lack of transparent energy use information has historically plagued the housing sector. Market signals are insufficient to direct consumers to the most efficient homes, leading to uninformed purchasing decisions, and home buyers end up saddled with higher long-term costs than anticipated. This critical information gap has far-reaching ramifications that include not just bloated utility bills, but also the undervaluation of efficiency services, a concealment of vital knowledge about a home's maintenance and repair needs, and an excessive energy burden that may cause homeowners to forgo other important purchases.

On the commercial side, a growing number of jurisdictions—including most major cities—have established building energy benchmarking and transparency laws. These require property owners, builders, or sellers to compile information about their buildings' energy use or energy efficiency characteristics and report these data to a central database and/or to prospective buyers at the time of sale. This information can then be used to evaluate building energy use patterns and identify energy efficiency opportunities. Several studies demonstrate that benchmarking and transparency policies can be associated with a 3–8% reduction in energy consumption or energy use intensity (EPA 2012; Mims et al. 2017).[41] Energy use transparency requirements are a fairly recent policy innovation. Commercial transparency policies are uncommon at the state level, with only California, Washington, and the District of Columbia requiring energy use disclosure upon sale or lease (BuildingRating 2014). Local governments are more likely to pursue these policies, but state governments can also use them to incentivize building stock upgrades.

[41] A study by the EPA showed that benchmarking energy use led to a 7% decrease in consumption across a sample of more than 35,000 buildings (EPA 2012). A Lawrence Berkeley National Lab (LBNL) review of state and local benchmarking and transparency studies found these requirements to correlate with a 3–8% reduction in gross energy consumption or energy use intensity over a two- to four-year period of policy implementation. The LBNL review, however, suggested that additional research be conducted in order to confirm energy impacts and determine causal relationships (Mims et al. 2017).

Efficiency advocates and government agencies at all levels have also worked to devise residential energy labeling programs and policies that inform home buyers and real estate stakeholders about a home's energy performance. Given differences in priorities among regions and stakeholders, a diverse patchwork of ratings, each with varying metrics and areas of focus, have arisen to meet the challenge. Examples include:

- *Residential Energy Services Network (RESNET) Home Energy Rating System (HERS).*[42] Considered the industry standard, the HERS rating is required for a home to qualify for ENERGY STAR® certification, DOE Zero Energy Ready Home certification, and many energy efficiency programs that target new construction (Cluett and Amann 2013). ANSI/RESNET/ICC Standard 301-2014, known as the Energy Rating Index—which the HERS rating is largely based on—is formally referenced as its own compliance path in the 2018 IECC. This means that states and communities updating their codes have the opportunity to increase uptake of the HERS rating. This in turn allows builders flexibility in meeting code standards and provides home sellers an opportunity to demonstrate the added energy-saving value of the home by including the score in real estate listings.
- *US DOE Home Energy Score (HES).* Launched in 2012, HES has been used primarily for existing homes. HES rates homes on a 1–10 scale, with 10 being the most efficient. The score has been incorporated into voluntary labeling initiatives in states including Alabama, Colorado, Connecticut, Massachusetts, and Oregon.
- *Energy Trust of Oregon Energy Performance Score (EPS).* This is one of the longest-running state energy label programs. Rating on a scale of 0 (most efficient) to 200 (least efficient), the EPS provides an estimate of monthly and annual energy costs, as well as the home's carbon footprint, and compares these with other Oregon homes of similar size and homes built to code. DOE's HES and RESNET's HERS ratings are also approved for use in Oregon. While there is no requirement to score homes at the time of sale, the Multiple Listing Service for the majority of Oregon accepts and posts each of the three approved scoring systems.

To help consumers navigate the varied and sometimes confusing landscape of residential energy labeling protocols, a number of state energy offices have partnered with organizations like NASEO and NEEP to strengthen the regional consistency of energy rating practices. These efforts include:

- *Energy Metrics to Promote Residential Energy Scorecards in States (EMPRESS).* A state energy office-led initiative supported by DOE and private partners, EMPRESS aims to coordinate and harmonize the software platforms for DOE's HES and RESNET's HERS ratings as well as to foster voluntary use of residential energy data by real estate market stakeholders and others (NASEO 2018).
- *Home Energy Labeling Information eXchange (HELIX).* Led by NEEP and supported by DOE, six New England states and New York have come together to develop a database to help bridge the energy information gap between home sellers and the

[42] RESNET is a national not-for-profit membership standard setting organization accredited by the American National Standards Institute (ANSI) as a Standard Development Organization.

market by auto-populating real estate listings with verified independent home energy information from home energy labels, such as HES and HERS, and other available energy data. A final, pilot-tested system is anticipated for full-scale operation in 2019 (NEEP 2018).

- *Home Energy Information Accelerator.* One of 13 Better Buildings Accelerators launched by DOE since 2013, the Home Energy Information Accelerator is a collaboration among national, regional, state, and local leaders aimed at expanding the availability and use of reliable home energy information in residential real estate transactions, such as through listing services and other reports. Other goals include providing data standards and technical assistance.

Mandates for residential home energy labeling are more common in local jurisdictions than they are at the state-level. However voluntary state programs in Connecticut, Massachusetts, and Vermont have found success through a variety of policy levers, such as piggybacking labels onto existing energy efficiency programs. This can help increase exposure to consumers and build a case for more widespread implementation through demonstration of the increased market value associated with improved energy transparency (Faesy et al. 2014). By convening stakeholders and real estate interests to share perspectives, challenges, and opportunities through a consistent governance structure, states can help craft a successful labeling program that integrates with regional listing services and has the support of both home buyers and sellers.

METHODOLOGY

Our review of state building energy code stringency is based predominantly on publicly available information, such as that provided by BCAP, the DOE Building Energy Codes Program, the NBI, and the national network of REEOs. It draws as well on the expert knowledge of individuals who are active in state building energy code policy and evaluation. We also rely on primary data collection in order to verify publicly available data, particularly for very recent or forthcoming code adoptions. We distributed a data request to energy offices and knowledgeable officials in each state, requesting information on their efforts to measure and enforce code compliance.

While model codes are determined at the national level, states often amend these codes during the adoption process, thereby affecting the energy use intensity (EUI) of buildings constructed to that code. To more accurately capture the energy savings impact of these amendments, ACEEE worked with the NBI this year to score building energy code stringency according to the modeled EUI of each code as measured by NBI's Zero Energy Performance Index (zEPI). A zEPI score of zero is a net-zero energy building.[43]

[43] The zEPI system is based on a scale presented in a paper by Charles Eley, an energy efficiency advocate and New Buildings Institute fellow. The scale establishes zero net energy as the absolute goal and enables the measurement of a building's progress toward zero net energy performance, as opposed to the traditional percent-better-than-code metric. To learn more about this scale, see Eley (2009). To learn more about the zEPI methodology, see newbuildings.org/code_policy/zepi/.

SCORING AND RESULTS

States earned credit on two measures of building energy codes: the stringency of residential and commercial codes and the level of efforts to support code compliance. We also awarded points for efforts to improve the transparency of building energy use. This included awarding points for benchmarking and energy use transparency laws, basing our review on policy information compiled by the Institute for Market Transformation's BuildingRating.org project (BuildingRating 2014). We also added a new metric tracking the number of home energy labels distributed annually as a percentage of new home construction, based on information received through our annual data request and from publicly available data from RESNET. We awarded points as follows:

- Code stringency
  - Residential energy code (2 points)
  - Commercial energy code (2 points)
- Code compliance
  - Compliance study (1 point)
  - Other compliance activities (1.5 points)
- Building Energy Use Transparency and Home Energy Labeling
  - Residential and/or commercial benchmarking/transparency policies (1 point)
  - Energy rating and labeling of homes (0.5 points)

As in past *Scorecards*, states could earn a maximum of 4 points for stringency. Our new recognition of residential energy labeling efforts, as well as an additional metric dedicated to states requiring training certification for code officials, resulted in some scoring adjustments, such that a half-point was shifted from the compliance category to the building energy use transparency category.

Table 24 lists states' overall building energy code scores. Explanations of each metric follow.

Table 24. State scores for building energy efficiency policies

State	Residential code stringency (2 pts.)	Commercial code stringency (2 pts.)	Compliance study (1 pt.)	Additional compliance activities (1.5 pts.)	Benchmarking and transparency (1 pt.)	Energy rating and labeling of homes (0.5 pt.)	Total score (8 pts.)
California	2	2	1	1.5	1	0	7.5
Connecticut	2	2	1	1.5	0	0.5	7
Pennsylvania	2	2	1	1.5	0	0.5	7
Texas	2	2	1	1.5	0	0.5	7
Massachusetts	2	2	1	1	0	0.5	6.5
New York	2	2	1	1	0.5	0	6.5
Oregon	2	1.5	1	1.5	0	0.5	6.5
Vermont	2	2	1	1	0	0.5	6.5
Washington	2	2	1	1	0.5	0	6.5
District of Columbia	1.5	1.5	1	1	1	0	6
Illinois	2	2	1	1	0	0	6
Maryland	2	2	1	0.5	0	0.5	6
Minnesota	2	1.5	1	1	0	0.5	6
Virginia	2	2	1	0.5	0	0.5	6
Alabama	1.5	2	1	1	0	0	5.5
Colorado	1.5	1.5	1	1	0	0.5	5.5
Florida	1.5	2	1	1	0	0	5.5
Idaho	1.5	2	1	1	0	0	5.5
Michigan	2	2	1	0.5	0	0	5.5
New Jersey	1.5	2	0	1	0.5	0.5	5.5
Rhode Island	1.5	1.5	1	1	0	0.5	5.5
Delaware	2	1.5	0	1	0	0.5	5
Iowa	2	1.5	0	1	0	0.5	5
Kentucky	1	1.5	1	1	0	0.5	5
Montana	2	1.5	0.5	1	0	0	5
Utah	1.5	2	0.5	1	0	0	5
Hawaii	1.5	1.5	0.5	0.5	0.5	0	4.5
North Carolina	1.5	1.5	1	0	0	0.5	4.5
Nebraska	1	1	1	1	0	0	4
Georgia	1	1	1	0	0	0.5	3.5
Kansas	1	1	0	0.5	0.5	0.5	3.5

State	Residential code stringency (2 pts.)	Commercial code stringency (2 pts.)	Compliance study (1 pt.)	Additional compliance activities (1.5 pts.)	Benchmarking and transparency (1 pt.)	Energy rating and labeling of homes (0.5 pt.)	Total score (8 pts.)
Missouri	1	1	1	0.5	0	0	3.5
Nevada	1	1	0	1	0	0.5	3.5
New Hampshire	1	1	0	1	0	0.5	3.5
South Dakota	1.5	1.5	0	0	0.5	0	3.5
Arizona	1	1	0	0.5	0	0.5	3
Arkansas	1	1	1	0	0	0	3
Maine	1	1	0	0.5	0.5	0	3
North Dakota	1.5	1.5	0	0	0	0	3
Ohio	1	1.5	0	0	0	0.5	3
South Carolina	1.5	1	0	0	0	0.5	3
Tennessee	0.5	1.5	1	0	0	0	3
West Virginia	1	1	1	0	0	0	3
Wisconsin	1.5	1.5	0	0	0	0	3
Indiana	1	1	0	0	0	0.5	2.5
New Mexico	1	1	0	0	0	0.5	2.5
Louisiana	1	1	0	0	0	0	2
Alaska	1	0	0	0	0.5	0	1.5
Mississippi	0	1.5	0	0	0	0	1.5
Oklahoma	1	0	0	0	0	0.5	1.5
Wyoming	0	0	0	0	0	0	0

Sources: Stringency scores derived from data request responses (Appendix A), the Building Codes Assistance Program (BCAP 2018), and discussions with code experts as of August 2018. Compliance and enforcement scores are based on information gathered in surveys of state building energy code contacts. See the ACEEE State and Local Policy Database for more information on state codes and compliance (ACEEE 2018).

DISCUSSION

Stringency

We assigned each state 0 to 2 points for residential building energy codes and another 0 to 2 points for commercial building energy codes, with 2 being assigned to those with the lowest score as measured by NBI's zEPI scale. We grouped the zEPI code impact scores into awarded point values clustered generally according to their alignment with similar corresponding model codes.[44] For detailed information on building code stringency in each

[44] We have not developed a quantitative method for comparing the interstate impact of jurisdictional code adoptions, in part because of a lack of consistent data across states. We recognize that our methodology is limited, and we do not intend to dismiss this local progress by assigning a lower score to these states.

state, visit ACEEE's State and Local Policy Database. The zEPI Jurisdictional Score uses data from PNNL, calculating expected energy use intensity in kBtu/ft^2 by accounting for building type and distribution and regional climate zones for each state.[45] zEPI sets the scale's zero value at zero energy consumption, with a baseline roughly equivalent to the average building in the year 2000. Minor credits are awarded for stretch code adoption in local jurisdictions, which has the effect of improving the overall performance level of mandatory energy code adoptions within a state base.

Table 25 summarizes our scoring methodology for code stringency. Lower zEPI scores indicate lower projected energy use intensity owing to more stringent building energy codes. Residential zEPI scores between 49.7 and 59.6 earned the maximum of 2 points; these generally correspond with states that have adopted codes aligned with the 2015 IECC. Scores between 59.7 and 65.5 earned 1.5 points, generally reflecting states that have adopted the 2012 IECC. Scores between 65.6 and 70.0 earned 1 point and hew roughly to those states that have adopted codes matching the 2009 IECC. We applied a similar approach to point distributions for commercial buildings. However state-specific amendments strengthening or weakening certain sections of the code—such as adjusting the number of air changes allowed per hour, or altering the amount of insulation required—can positively or negatively impact a state's zEPI value, and in turn its score.

Some home-rule states that have no mandatory state code and adopt building energy codes at the local level lacked sufficient data to allow calculation of a zEPI value.[46] These states could still earn points if they demonstrated a significant percentage of local adoption of a particular code. Within Arizona, for example, more than 60% of new construction occurs in jurisdictions that have enacted the 2012 IECC or better, according to SWEEP. For detailed information on building code stringency in each state, visit ACEEE's State and Local Policy Database.

[45] Pacific Northwest National Laboratory (PNNL) conducts state-level technical analysis based on a methodology established by DOE. PNNL reviews state energy codes based on the IECC and Standard 90.1, including any significant amendments. This helps states understand how their codes compare to the national model codes and provides a portrait of national code adoption. A quantitative analysis is performed to assess the energy savings impacts within a given state. The calculated energy use intensity (EUI) of buildings constructed to a particular state code is compared with the energy use of the model energy code. This comparison allows a categorization of each state, with categories based on recent editions of the model codes.

[46] Home rule decentralizes power, allowing a locality to exercise certain powers of governance within its own administrative area. See database.aceee.org for more information on building codes in home-rule states.

Table 25. Scoring of state residential and commercial building energy code stringency

Residential zEPI score	Score (2 pts.)	Commercial zEPI score	Score (2 pts.)
49.4–59.6	2	50.3–55.7	2
59.7–65.5 or adoption of 2015 IECC in major jurisdictions	1.5	55.8–65.6 or adoption of 2015 IECC or ASHRAE 90.1-2013 in major jurisdictions	1.5
65.6–70.0 or adoption of 2012 IECC in major jurisdictions	1	65.7–70.0 or adoption of 2012 IECC or ASHRAE 90.1-2010 in major jurisdictions	1
Adoption of 2009 IECC or equivalent in major jurisdictions	0.5	Adoption of 2009 IECC or ASHRAE 90.1-2007 in major jurisdictions	0.5

Table 26 shows state-by-state scores for this category. We should also note that in some cases a state may have adopted a more-efficient code in recent months, too late to have its zEPI score calculated in time for *Scorecard* publication. We note these states with an asterisk and award them points based on the anticipated zEPI score generally corresponding with the adopted title code. For example, until earlier this year Pennsylvania's codes were based on the 2009 IECC, but the state approved an update to the 2015 IECC in May 2018. This earns 2 points in both the residential and commercial code scoring categories.

Table 26. State scores for code stringency

State	zEPI score	Score	Residential code
CT*		2	*2015 IECC (effective 10/1/2018)*
OR*		2	*2017 Oregon Residential Specialty Code*
PA*		2	*2015 IECC (effective 10/1/2018)*
VA*		2	*2015 IECC (effective 7/4/2018)*
HI		1.5	*2015 IECC (county adoption pending)*
VT	49.4	2	2015 IECC with amendments
MN	51.2	2	2012 IECC with amendments
MA	51.5	2	2015 IECC with amendments
NY	52.6	2	2015 IECC
DE	53.1	2	2012 IECC
IA	54.9	2	2012 IECC with amendments
WA	55.1	2	2015 Washington State Energy Code
MD	55.9	2	2015 IECC
MI	56.1	2	2015 IECC with weakening amendments
MT	56.5	2	2012 IECC with amendments
TX	58.1	2	2015 IECC
IL	59.3	2	2015 IECC with amendments
CA	59.3	2	2016 Building Energy Efficiency Standards
FL	60.7	1.5	2015 IECC with amendments
AL	62.5	1.5	An amended version of the 2015 IECC
NJ	62.7	1.5	2015 IECC with weakening amendment
WI	63.6	1.5	2009 IECC with state amendments
DC	63.6	1.5	2012 IECC with amendments
ID	64.5	1.5	2012 IECC with amendments
SC	64.5	1.5	2009 IECC
NC	64.6	1.5	2009 IECC with amendments
RI	64.9	1.5	2012 IECC with weakening amendments
UT	65.5	1.5	2015 IECC with amendments
OK	65.6	1	2009 IECC with amendments
ME	66.5	1	2009 IECC
KY	67.3	1	2009 IECC
GA	67.7	1	2009 IECC with amendments
NM	67.8	1	2009 IECC
WV	67.9	1	2009 IECC
LA	68.0	1	2009 IECC
NH	68.0	1	2009 IECC with amendments
NE	68.4	1	2009 IECC
IN	68.5	1	2009 IECC
OH	68.6	1	2009 IECC
AR	68.7	1	2009 IECC with amendments
TN	70.5	0.5	2009 IECC
CO	Home Rule	1.5	Significant adoption of 2015 IECC
ND	Home Rule	1.5	Significant local adoption of 2015 IECC
SD	Home Rule	1.5	Significant local adoption of 2015 IECC
AK		1	Most new construction follows 2012 IECC
AZ	Home Rule	1	Significant local adoption of 2012 IECC
MO	Home Rule	1	Significant adoption of 2009/2012 IECC
NV	Home Rule	1	Significant local adoption of 2012 IECC
KS	Home Rule	1	Significant adoption of 2009/2012 IECC
WY	Home Rule	0	No mandatory code
MS		0	No mandatory code

State	zEPI score	Score	Commercial code
CT*		2	*2015 IECC (effective 10/1/2018)*
PA*		2	*2015 IECC (effective 10/1/2018)*
VA*		2	*2015 IECC (effective 7/4/2018)*
WI*		1.5	*2015 IECC with significant weakening amendments (5/1/2018)*
HI		1.5	*2015 IECC (county adoption pending)*
MI	50.3	2	2015 IECC and ASHRAE 90.1-2013 with amendments
MA	51.7	2	2015 IECC and ASHRAE standard 90.1-2013
CA	51.7	2	2016 Building Energy Efficiency Standards exceed ASHRAE 90.1-2013
WA	51.9	2	2015 IECC/ASHRAE 90.1-2013
NJ	52.0	2	ASHRAE 90.1-2013
TX	52.9	2	2015 IECC; ASHRAE 90.1-2013 for state-funded buildings
IL	53.1	2	2015 IECC with amendments and ASHRAE 90.1-2013
FL	53.4	2	2015 IECC with amendments
AL	53.7	2	ASHRAE 90.1 2013
ID	53.9	2	2015 IECC with reference to ASHRAE 90.1-2013
VT	55.0	2	2015 IECC with ASHRAE 90.1-2013 as alternative compliance path
MD	55.3	2	2015 IECC with amendments
UT	55.4	2	2015 IECC and ASHRAE 90.1-2013
NY	55.7	2	2015 IECC/ASHRAE 90.1-2013
MS	56.8	1.5	ASHRAE 90.1-2010
IA	57.2	1.5	2012 IECC and ASHRAE 90.1-2010
MN	57.3	1.5	2012 IECC with amendments and ASHRAE 90.1-2010
KY	58.6	1.5	2012 IECC and ASHRAE 90.1-2010
OH	59.0	1.5	2012 IECC with amendments and ASHRAE 90.1-2010
TN	59.2	1.5	2012 IECC and ASHRAE 90.1-2010
DE	59.7	1.5	2012 IECC and ASHRAE 90.1-2010
OR	59.9	1.5	2014 Energy Efficiency Specialty Code
MT	60.0	1.5	2012 IECC and ASHRAE 90.1-2010
RI	60.0	1.5	2012 IECC and ASHRAE 90.1-2010 with weakening amendments
NC	63.6	1.5	2009 IECC with amendments and ASHRAE 90.1-2010
DC	65.6	1.5	2012 IECC with amendments and ASHRAE 90.1-2010
ME	66.3	1	2009 IECC and ASHRAE 90.1-2007
AR	66.5	1	2009 IECC and ASHRAE 90.1-2007
NH	66.8	1	2009 IECC and ASHRAE 90.1-2007
GA	66.9	1	ASHRAE 90.1-2007
NE	67.0	1	2009 IECC with reference to ASHRAE 90.1-2007
SC	67.3	1	2009 IECC with reference to ASHRAE 90.1-2007
NM	68.5	1	2009 IECC with amendments; ASHRAE 90.1-2007
WV	68.8	1	ASHRAE 90.1-2007
IN	69.0	1	ASHRAE 90.1-2007 with amendments
LA	70.0	1	ASHRAE Standard 90.1-2007
OK	74.5	0	2006 IECC and ASHRAE 90.1-2004
CO	Home Rule	1.5	Significant local adoption of 2012/2015 IECC
ND	Home Rule	1.5	Significant local adoption of 2015 IECC
SD	Home Rule	1.5	Significant local adoption of 2015 IECC
AZ	Home Rule	1	Significant local adoption of the 2012 IECC
KS	Home Rule	1	No mandatory code, but significant adoption of 2009/2012 IECC
MO	Home Rule	1	No mandatory code, but significant adoption of 2009/2012 IECC
NV	Home Rule	1	Significant local adoption of 2012 IECC and ASHRAE 90.1-2010
AK		0	No mandatory code
WY	Home Rule	0	Significant adoption of IECC 2006 or equivalent

* These states have signed or passed legislation requiring compliance with a new iteration of codes effective by October 1, 2018. We award these states full credit commensurate with the average zEPI score corresponding with a state enforcing a similar title code.

Some states regularly adopt the latest iterations of the IECC and ASHRAE 90.1 code standards as they are determined. However other states have recently considered statutory or regulatory requirements to extend code adoption cycles. States unable to adopt the latest building energy codes will miss out on significant energy savings opportunities. ACEEE considered removing points from states with extended code adoption cycles, but most states do not actually update building codes every three years (Athalye et al. 2016). We therefore decided not to penalize those with extended cycles.

The *2017 State Scorecard* highlighted a variety of states that had recently updated to the 2015 IECC, including Florida, Hawaii, Maryland, New York, New Jersey, Texas, Vermont, and Washington.[47] Now, with the finalization and publication of the 2018 IECC in late 2017, several states, including Delaware, Illinois, Iowa, Minnesota, Nevada, New Hampshire, Oregon, and Vermont, spent this year reviewing the codes for adoption. Pennsylvania and Virginia, which both updated to the 2015 IECC this year, also incorporated some elements of the 2018 IECC.

At the other end of the spectrum, 10 states lack mandatory statewide energy codes for new residential and/or commercial construction: Alaska, Arizona, Colorado, Kansas, Mississippi, Missouri, Nevada, North Dakota, South Dakota, and Wyoming. Some of these home-rule states, including Arizona, Colorado, Kansas, and Missouri, are nonetheless showing high rates of adoption at the jurisdictional level. We award these states points accordingly.

Compliance

It is difficult to score states in this area because consistent data on actual compliance rates are lacking and other compliance metrics are largely qualitative. Still, we continue to seek ways to score states in ways that reflect tangible improvements in energy savings.

In 2015 we updated our scoring methodology to award more credit to states that had completed compliance studies in recent years. The reasoning was that, as the 2017 deadline under ARRA approached for states to demonstrate 90% compliance with 2009 IECC and ASHRAE 90.1-2007 codes, compliance rates should reflect a state's code enforcement efforts. Although we use the same methodology this year, ACEEE will continue to revisit this metric to determine how it might be improved to equitably score states on the basis of actual levels of compliance reported. For more information on state compliance efforts, visit ACEEE's State and Local Policy Database (ACEEE 2018).

Table 27 shows our scoring methodology for assessing state compliance studies.

[47] Although Hawaii has adopted the 2015 IECC for both residential and commercial buildings, the state included substantial weakening amendments to its residential code. The state's score reflects these weakening amendments.

Table 27. Scoring of state efforts to assess compliance

Compliance study	Score (1 pt.)
Compliance study has been completed in the past five years, follows standardized protocols, and includes a statistically significant sample.	1
Compliance study has been completed in the past five years but does not follow standardized protocols or is not statistically significant.	0.5
No compliance study has been completed in the past five years.	0

Table 28 shows our scoring methodology for additional activities to improve and enforce energy code compliance. A state could earn 0.5 points for each compliance strategy it engaged in during the past year, up to a total of 1.5 points.

We made two significant changes to this scoring category. One was to remove our metric for states that had completed a codes gap analysis in the past five years. While gap analyses have been instrumental in the past for helping states identify opportunities and resource needs to help strengthen energy code adoption and infrastructure, most of these studies were completed close to 10 years ago under funding from the 2009 American Recovery and Reinvestment Act. Because few of these studies have been completed in recent years, we decided to discontinue using it as a metric in our compliance scoring category.

Also, in the past we awarded credit if significant state or utility funding or support had been made available for codes-related training and technical assistance. Given that nearly all states provide at least some support in this policy area, we decided to raise the bar this year to award points only to states that have established specific training certification requirements for code officials, including inspectors, plan reviewers, and/or third-party inspectors. For example, in Oregon anyone providing plan review or inspection services in the state must have an Oregon Inspector Certification (OIC), which can be obtained only by completing a class through the Oregon Inspector Training Program. The California Health and Safety Code (HSC) Section 18949.28 also requires certification for inspectors, plan examiners, and building officials who work for a local buildings department. The majority of local agencies statewide require ICC certification, and a minimum number of hours of continuing education must be completed every three years to maintain certification.

Table 28. Scoring of efforts to improve and enforce code compliance

Additional metrics for state compliance efforts	Score (1.5 pts.)
Stakeholder advisory group or compliance collaborative	0.5
Utility involvement	0.5
Code training requirements	0.5

Several states have recently completed compliance studies demonstrating 90% or higher compliance rates for residential and/or commercial buildings. It could well be argued that states demonstrating compliance rates approaching 100% should receive full credit within the above metrics regardless of whether they engage in the additional strategies to enforce compliance listed in table 29. However we believe the current methodology is valid in the near term for several reasons. First, while we plan to award more points in the future to states on the basis of their compliance studies' results, we also want to recognize the enormous value in a state's maintaining a robust policy framework. Such a framework can support ongoing efforts to provide training and education to staff, actively monitor code changes, and make up-to-date information available to stakeholders through strong coordination. Second, we want to avoid inadvertently penalizing states with lower compliance rates under newer or more stringent codes; this would work against the *Scorecard*'s goal of rewarding states operating at the leading edge of energy efficiency.

As we look ahead to future *Scorecards*, we plan to address these important methodological questions, as well as others—including how best to compare the results of compliance studies conducted using differing methodologies (e.g., prescriptive versus performance-based) and how to update our data request accordingly.

Table 29 shows how states scored for each compliance metric. Details on state activities in these areas are given in the ACEEE State and Local Policy Database (ACEEE 2018).

Table 29. State scores for energy code compliance efforts

State	Compliance study (1 pt.)	Stakeholder group (0.5 pts.)	Utility involvement (0.5 pts.)	Code training certification requirement (0.5 pts.)	Total score (2.5 pts.)
California	•	•	•	•	2.5
Connecticut	•	•	•	•	2.5
Oregon	•	•	•	•	2.5
Pennsylvania	•	•	•	•	2.5
Texas	•	•	•	•	2.5
Alabama	•	•	•		2
Colorado	•	•	•		2
District of Columbia	•	•	•		2
Florida	•	•	•		2
Idaho	•	•	•		2
Illinois	•	•	•		2
Kentucky	•	•	•		2
Massachusetts	•	•	•		2
Minnesota	•	•	•		2
Nebraska	•	•	•		2

State	Compliance study (1 pt.)	Stakeholder group (0.5 pts.)	Utility involvement (0.5 pts.)	Code training certification requirement (0.5 pts.)	Total score (2.5 pts.)
New York	•		•	•	2
Rhode Island	•	•	•		2
Vermont	•	•	•		2
Washington	•	•	•		2
Maryland	•	•			1.5
Michigan	•	•			1.5
Missouri	•	•			1.5
Montana	○	•	•		1.5
Utah	○	•	•		1.5
Virginia	•	•			1.5
Arkansas	•				1
Delaware		•		•	1
Georgia	•				1
Hawaii	○	•			1
Iowa		•	•		1
Nevada		•	•		1
New Hampshire		•	•		1
New Jersey			•	•	1
North Carolina	•				1
Tennessee	•				1
West Virginia	•				1
Arizona			•		0.5
Kansas		•			0.5
Maine		•			0.5
Alaska					0
Indiana					0
Louisiana					0
Mississippi					0
New Mexico					0
North Dakota					0
Ohio					0
Oklahoma					0

State	Compliance study (1 pt.)	Stakeholder group (0.5 pts.)	Utility involvement (0.5 pts.)	Code training certification requirement (0.5 pts.)	Total score (2.5 pts.)
South Carolina					0
South Dakota					0
Wisconsin					0
Wyoming					0

Unfilled circles indicate states receiving half credit for compliance studies. Data from state responses to data requests (see Appendix A). See State and Local Policy Database (ACEEE 2018) for more details on each activity.

According to our survey results, almost every state in the country makes some effort to support code compliance, whether a statewide code is mandatory or not. Nearly every state that responded uses at least one of the strategies for boosting compliance discussed above, and a growing number of states use many or all of them. For states that did not respond or provided partial responses to this year's survey, we referred to last year's data to complement information in some cases. States that received zero points for compliance are those that did not respond to our survey or could not report compliance activities.

SCORES FOR BENCHMARKING AND ENERGY TRANSPARENCY REQUIREMENTS

We previously credited this metric under Chapter 6, "State Government-Led Initiatives," but we moved it into this chapter this year because it pertains to private-sector building efficiency. States with mandatory energy use benchmarking and transparency laws received 0.5 points for a policy covering either commercial or residential buildings. States with those policies in place for some or all of their commercial *and* residential buildings received 1 point. Table 30 presents the state disclosure policies.

Table 30. State benchmarking and energy transparency policies

State	Disclosure type	Building energy use transparency requirements	Score (1 pt.)
District of Columbia	Commercial, residential multifamily	The Clean and Affordable Energy Act of 2008 requires privately owned commercial buildings to be benchmarked annually using EPA ENERGY STAR Portfolio Manager. Results are publicly available in the BuildSmart DC database.	1
California	Commercial, residential multifamily	AB 1103 requires nonresidential building owners or operators to benchmark their buildings' energy use with EPA ENERGY STAR Portfolio Manager and to disclose this information to buyers, lenders, and lessees. AB 802 replaces this legislation and expands the requirement to any building with five or more active utility accounts, including residential multifamily buildings.	1
Alaska	Residential	Alaska statute AS.34.70.101 requires the release of utility data for residential buildings at the time of sale.	0.5
Hawaii	Residential	§508D-10.5 requires residential property owners to disclose energy efficiency consumer information at the time of sale or lease.	0.5

State	Disclosure type	Building energy use transparency requirements	Score (1 pt.)
Kansas	Residential	HB 2036 requires builders or sellers of new residential single-family homes or multifamily buildings of four units or fewer to disclose information regarding the energy efficiency of the structure to prospective buyers prior to the signing of a purchase contract.	0.5
Maine	Residential rental	HP 1468 requires the disclosure of an energy efficiency checklist upon request by tenant or lessee and allows for the release of audit information on residential rental properties, both at the time of rental.	0.5
New Jersey	Commercial	AB A3723 (2018) requires that within five years of enactment, the owner or operator of each commercial building larger than 25,000 square feet is required to benchmark energy and water use with the EPA's Portfolio Manager tool.	0.5
New York	Residential	Beginning in 1981, the Truth in Heating law has required the release of residential buildings' utility data upon request by prospective purchasers at the time of sale.	0.5
South Dakota	Residential	SB 64 (2009) established certain energy efficiency disclosure requirements for new residential buildings at the time of sale.	0.5
Washington	Commercial	SB 5854 (2009–10) requires all nonresidential customers and qualifying public agency buildings to benchmark their buildings' energy use with ENERGY STAR Portfolio Manager and to disclose this information to buyers, lenders, and lessees.	0.5

Policy information is based on BuildingRating 2014 and responses to data requests from state energy offices.

Several states have taken the lead in requiring benchmarking and energy use transparency. The most recent is New Jersey, which passed significant renewable energy legislation earlier this year that included requirements for the owners of commercial buildings larger than 25,000 square feet to benchmark energy and water use using EPA's Portfolio Manager tool. The District of Columbia and California are the only jurisdictions we surveyed that have such requirements for both the commercial and residential multifamily sectors. As benchmarking and energy use transparency policies become more common, more states will likely expand their scope to target more buildings across both markets. However local jurisdictions are more likely to pursue these policies. Most recently, Kansas City, Missouri; Portland, Oregon; and Seattle adopted benchmarking ordinances.[48]

SCORES FOR RESIDENTIAL ENERGY LABELING

We also added a new half-point metric to recognize state efforts to make visible the energy consumption and efficiency of homes through issuance or support of residential energy labeling initiatives. As mentioned, a variety of energy rating protocols exist, with some state-specific labels having been uniquely adapted from DOE's Home Energy Score. In order to compare states, we used publicly available 2017 RESNET HERS ratings figures as a foundational data set, which we supplemented with additional state-provided labeling records gathered through ACEEE's data request to state energy offices. We then calculated

[48] For more information on how municipalities are encouraging building energy disclosure, see Ribeiro et al. (2015) and Cluett and Amann (2013).

the number of ratings issued as a percentage of total building permits for residential and multifamily new construction as reported by the US Census Bureau. We awarded a half point to states for which this percentage was equal to or higher than the median of all states. Table 31 shows the results of this analysis.

Table 31. Residential energy labeling efforts

State	2017 Home Energy Ratings issued*	2017 new residential & multifamily building permits†	2017 Home Energy Ratings as % of new construction	Score (0.5 pt.)
Arizona	20,559	37,981	54.1%	0.5
Indiana	9,781	20,115	48.6%	0.5
Massachusetts	7,915	17,230	45.9%	0.5
Rhode Island	529	1,156	45.8%	0.5
Maryland	6,750	16,008	42.2%	0.5
New Mexico	1,857	4,755	39.1%	0.5
Delaware	2,601	6,735	38.6%	0.5
Iowa	4,800	13,233	36.3%	0.5
Ohio	7,899	23,755	33.3%	0.5
Oklahoma	3,470	11,168	31.1%	0.5
Connecticut	1,395	4,606	30.3%	0.5
Minnesota	6,261	22,927	27.3%	0.5
Colorado	11,340	41,911	27.1%	0.5
Texas	44,680	169,885	26.3%	0.5
South Carolina	8,877	34,730	25.6%	0.5
Virginia	8,293	33,417	24.8%	0.5
North Carolina	15,545	65,009	23.9%	0.5
Pennsylvania	4,608	22,509	20.5%	0.5
Kentucky	2,354	13,055	18.0%	0.5
Vermont	311	1,727	18.0%	0.5
Nevada	3,321	19,376	17.1%	0.5
New Hampshire	555	3,395	16.3%	0.5
Georgia	8,086	49,591	16.3%	0.5
Oregon[1]	3,220	19,886	16.2%	0.5
New Jersey	4,146	28,893	14.3%	0.5
Kansas	1,219	8,636	14.1%	0.5
Florida	15,996	118,548	13.5%	0
Nebraska	1,160	8,919	13.0%	0

State	2017 Home Energy Ratings issued*	2017 new residential & multifamily building permits†	2017 Home Energy Ratings as % of new construction	Score (0.5 pt.)
Alabama	1,882	14,497	13.0%	0
Wisconsin	2,389	18,511	12.9%	0
Michigan	3,129	24,518	12.8%	0
Hawaii	426	4,035	10.6%	0
Illinois	2,565	25,313	10.1%	0
Idaho	1,259	13,348	9.4%	0
New York	3,711	40,772	9.1%	0
Arkansas	888	11,021	8.1%	0
Utah	1,589	24,386	6.5%	0
West Virginia	160	2,700	5.9%	0
Louisiana	706	15,232	4.6%	0
Tennessee	1,687	38,470	4.4%	0
Missouri[2]	706	17,852	4.0%	0
Wyoming	65	1,899	3.4%	0
District of Columbia	166	6,037	2.7%	0
South Dakota	123	5,364	2.3%	0
Washington	1,041	45,780	2.3%	0
Montana	95	4,424	2.1%	0
Alaska	28	1,553	1.8%	0
California[3]	1,190	113,320	1.1%	0
North Dakota	23	3,375	0.7%	0
Mississippi	25	7,881	0.3%	0
Maine	13	4,607	0.3%	0

* 2017 RESNET HERS ratings unless otherwise noted. † 2017 US Census Bureau data prepared by the National Association of Home Builders. [1] The Energy Trust of Oregon Energy Performance Score is issued to about 3,000 new homes per year. [2] Missouri's Home Energy Certification program certified 24 homes. [3] California Home Energy Rating System Program, authorized pursuant to PRC 25942, completed 570 whole-house ratings in 2017.

Chapter 5. Combined Heat and Power

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INTRODUCTION

CHP systems generate electricity and thermal energy in a single, integrated system. CHP is more energy efficient than generating electricity and thermal energy separately because heat that is normally wasted in conventional generation is captured as useful energy. That recovered energy can then be used to meet a thermal demand for onsite processes, such as heating or cooling a building or generating steam to run a manufacturing process. CHP systems can save customers money and reduce net emissions. The majority are powered by natural gas, but many are fueled by biomass, biogas, or other types of fossil fuels.

SCORING AND RESULTS

States can encourage or discourage CHP in many ways. Financial, technical, policy, and regulatory factors affect the extent to which CHP systems are deployed. Our scoring methodology emphasizes CHP as an energy resource, which we believe is the most important policy driver for increasing the use of highly efficient CHP in the United States.

Our methodology is based on four policy categories:

- Interconnection standards for electrically linking CHP systems to the grid
- Promotion of CHP as a resource
- Deployment incentives
- Additional supportive policies

The second point, promoting CHP as a resource, is an umbrella category with the greatest weight. In this category, states are scored on activities and policies that definitively identify CHP as an energy resource and integrate CHP into system planning and energy resource acquisition efforts. The full scoring methodology is outlined below and described in detail later in this chapter.

A state could earn up to 4 points based on the above categories. We awarded points for:

- The presence and design of interconnection standards (0.5 points)
- The extent to which CHP is identified and promoted as an energy resource, based on four subcategories:
    - Eligibility of CHP within an energy efficiency resource standard or other, similar regulatory requirement (0.5 points)
    - The presence of utility-run or program administrator-run CHP programs designed to acquire CHP energy resources (0.5 points)
    - The presence of state-approved production goals or program budgets for acquiring a defined amount of kWh savings from CHP (0.5 points)
    - Access to production incentives, feed-in tariffs, standard offer programs, or other revenue streams linked to CHP system kWh production (0.5 points)
- Deployment incentives—including rebates, grants, and financing—or a net metering standard that applies to CHP (0.5 points)

- Additional supportive policies, including certain streamlined air permitting processes, technical assistance, goals for CHP in critical facilities, resilience efforts, and policies that encourage the use of renewable or opportunity fuels in conjunction with CHP (1 point)

We also assessed, but did not score, the number of recent CHP installations in each state and the total CHP capacity installed.

Some states have recently adopted new or improved policies or regulations, while others are still developing or refining them. Generally we did not give credit for a policy unless a legislative body had enacted it or an agency or regulatory body had promulgated it as an order. We considered policies in place as of July 2017 and relied on primary and secondary sources for data collection. Primary sources included public utility commission dockets and responses to data requests from state energy offices. Secondary sources included policy databases such as the Database of State Incentives for Renewables and Efficiency (DSIRE 2018) and the EPA's CHP Policies and Incentives Database (EPA 2018).

Table 32 lists each state's total score and its point distribution in each category. Detailed information on the policies and programs that earned points for this metric is available in the CHP section of the online ACEEE State and Local Policy Database (ACEEE 2018).

Table 32. Scores for CHP

State	Interconnection (0.5 pts.)	EERS treatment (0.5 pts.)	CHP programs (0.5 pts.)	Production goal (0.5 pts.)	Revenue streams (0.5 pts.)	Deployment incentives (0.5 pts.)	Supportive policies (1 pt.)	Total score (4 pts.)
California	0.5	0.5	0.5	0.5	0.5	0.5	1	4
Maryland	0.5	0.5	0.5	0.5	0.5	0.5	1	4
Massachusetts	0.5	0.5	0.5	0.5	0.5	0.5	1	4
Rhode Island	0.5	0.5	0.5	0.5	0.5	0.5	1	4
New York	0.5	0.5	0.5	0.5	0	0.5	1	3.5
Maine	0.5	0.5	0.5	0.5	0	0.5	1	3.5
Illinois	0.5	0.5	0.5	0.5	0.5	0	1	3.5
Connecticut	0.5	0.5	0	0	0	0.5	1	2.5
Minnesota	0.5	0.5	0	0	0	0.5	1	2.5
Oregon	0.5	0.5	0	0	0	0.5	1	2.5
Pennsylvania	0	0.5	0	0	0.5	0.5	1	2.5
Washington	0.5	0.5	0	0	0	0.5	1	2.5
Vermont	0.5	0.5	0	0	0	0.5	0.5	2
Arizona	0	0.5	0	0	0	0.5	0.5	1.5
Delaware	0.5	0	0	0	0	0.5	0.5	1.5
Iowa	0.5	0	0	0	0	0	1	1.5
Michigan	0.5	0	0	0	0	0	1	1.5

State	Interconnection (0.5 pts.)	EERS treatment (0.5 pts.)	CHP programs (0.5 pts.)	Production goal (0.5 pts.)	Revenue streams (0.5 pts.)	Deployment incentives (0.5 pts.)	Supportive policies (1 pt.)	Total score (4 pts.)
New Jersey	0	0	0	0	0	0.5	1	1.5
New Mexico	0.5	0	0	0	0	0.5	0.5	1.5
Ohio	0.5	0.5	0	0	0	0.5	0	1.5
Texas	0.5	0	0	0	0	0	1	1.5
Wisconsin	0.5	0	0	0	0	0	1	1.5
Dist. of Columbia	0.5	0	0	0	0	0.5	0.5	1.5
Missouri	0	0	0	0	0	0.5	1	1.5
New Hampshire	0	0.5	0	0	0	0.5	0.5	1.5
North Carolina	0.5	0.5	0	0	0	0	0.5	1.5
Tennessee	0	0	0	0	0	0.5	1	1.5
Alaska	0	0	0	0	0	0	1	1
Colorado	0.5	0	0	0	0	0	0.5	1
Hawaii	0	0.5	0	0	0	0	0.5	1
Louisiana	0	0	0	0	0	0	1	1
Montana	0.5	0	0	0	0	0	0.5	1
Utah	0.5	0	0	0	0	0	0.5	1
Kentucky	0	0	0	0	0	0	1	1
Florida	0	0	0	0	0	0.5	0	0.5
Georgia	0	0	0	0	0	0	0.5	0.5
Idaho	0	0	0	0	0	0	0.5	0.5
Indiana	0.5	0	0	0	0	0	0	0.5
Kansas	0	0	0	0	0	0	0.5	0.5
Mississippi	0	0	0	0	0	0	0.5	0.5
Nevada	0	0	0	0	0	0	0.5	0.5
North Dakota	0	0	0	0	0	0.5	0	0.5
South Dakota	0.5	0	0	0	0	0	0	0.5
West Virginia	0	0	0	0	0	0.5	0	0.5
South Carolina	0	0	0	0	0	0	0.5	0.5
Alabama	0	0	0	0	0	0	0	0
Arkansas	0	0	0	0	0	0	0	0
Nebraska	0	0	0	0	0	0	0	0
Oklahoma	0	0	0	0	0	0	0	0
Virginia	0	0	0	0	0	0	0	0
Wyoming	0	0	0	0	0	0	0	0

Massachusetts, California, Maryland, and Rhode Island continued to lead the way this year, with each state earning the full 4 points. These states and Maine, Illinois, and New York were the only ones to receive credit for a state-approved production goal for CHP generation, which is a strong policy driver for encouraging utilities and program administrators to acquire generation from CHP. However even the top-scoring states can do more to encourage CHP. For example, California meets all the criteria in our scoring methodology, but barriers to deployment still exist, especially around air permitting, and state policies and programs could be improved to more effectively treat CHP as an energy efficiency resource. One of California's longest-running efforts to support distributed energy resources, the Self-Generation Incentive Program (SGIP), mandates that a portion of input fuel be renewable fuel, with the required proportion rising to 25% in 2018. This is likely to limit projects that can take advantage of the SGIP to those with access to cost-effective renewable resources such as biogas. Additionally, the program now focuses more on the development of energy storage resources than on CHP.

New York, which earned 3.5 points out of a possible 4, has shown greater support for the use of CHP as a means to avoid distribution system costs. New York is very supportive of CHP deployment and had 53 new CHP installations in 2017. Under New York's Reforming the Energy Vision proceedings, the state has encouraged CHP to be included in utility nonwires alternative projects and in other pilot programs. The New York State Energy Research and Development Authority (NYSERDA) has instituted a catalog of innovative CHP programs that have led to lowered costs, reduced project lead times, and more realized projects. For example, NYSERDA provides free coaching to CHP projects that are underperforming in order to facilitate a partnership with the project team and encourage high levels of production. This approach does not reward CHP projects on the basis of electricity output, but rather seeks to ensure that projects are economically motivated to produce in order to avoid high-cost grid-supplied electricity over the entire lifetime of the CHP system. Future scoring methodologies may consider the inclusion of CHP in market-based approaches such as nonwires alternative programs.

Maine too earned 3.5 points this year, including credit for a program designed to acquire cost-effective CHP energy resources. Efficiency Maine ran a limited-time bonus incentive for CHP projects as part of its commercial and industrial custom energy efficiency program, offering assistance of up to 70% of the total project cost. New York, Maine, and the four top states were the only states to earn credit for CHP programs designed to acquire cost-effective CHP resources.

Illinois also earned a score of 3.5 points; its major electric and gas utilities offer CHP programming to commercial and industrial customers. All of the highest-scoring states (those earning 3–4 points) define CHP as an eligible resource in an energy efficiency resource standard, have implemented a standard for connecting CHP systems to the grid, and have a state-approved CHP production goal. Connecticut, Minnesota, Oregon, Washington, Pennsylvania, and Vermont rounded out the 13 highest-scoring states.

The majority of states have some kind of policy in place to encourage CHP; only six states scored zero points in the CHP chapter. Eighteen states clearly define energy savings from

CHP as eligible to contribute to a statewide energy savings target. It is noteworthy that all utilities running CHP programs are operating in states where CHP is an eligible technology for reaching utility savings goals. Of the 52 largest electric distribution utilities (by retail sales volume), approximately 15 offer CHP programs (Relf, Baatz, and Nowak 2017).

DISCUSSION

Interconnection Standards

States received 0.5 points for having an interconnection standard that explicitly establishes parameters and procedures for the electrical interconnection of CHP systems. To earn points in this category, a state's interconnection standard has to

- Be adopted by utilities serving the majority of the state's customers
- Cover all forms of CHP, regardless of fuel
- Have multiple tiers of interconnection and some kind of fast-track option for smaller systems
- Apply to systems of 10 MW or greater

Having multiple levels (or tiers) of interconnection is important because larger CHP systems are more complex than smaller ones. Because of the potential for impacts on the utility grid, the interconnection of larger systems requires more extensive approvals. These are unnecessary and financially burdensome for smaller systems, which can benefit from a faster and often cheaper path toward interconnection. Scaling transaction costs to project size makes economic sense. Additionally, CHP developers prefer interconnection standards that have higher size limits and are based on widely accepted technical industry standards, such as IEEE 1547.[49]

Encouraging CHP as a Resource

While CHP is known for its energy efficiency benefits, few states actively identify it as an energy resource akin to more traditional sources such as centralized power plants. CHP can offer energy, capacity, and even ancillary services to grids to which they are connected, but to maximize those benefits, states must first identify CHP as a resource and integrate it into system planning and energy resource acquisition efforts.[50] One of the best ways to do this is to include CHP within state energy efficiency goals and utility programs.

States could receive up to 2 points for activities and policies that encourage CHP as an energy resource. We considered the following subcategories in awarding points:

[49] This standard establishes criteria and requirements for interconnection of distributed energy resources with electric power systems. Its requirements are relevant to the performance, operation, testing, safety, and maintenance of the interconnection. For more information, visit www.ieee.org.

[50] The Federal Energy Regulatory Commission (FERC) defines ancillary services as "those services necessary to support the transmission of electric power from seller to purchaser, given the obligations of control areas and transmitting utilities within those control areas, to maintain reliable operations of the interconnected transmission system. Ancillary services supplied with generation include load following, reactive power-voltage regulation, system protective services, loss compensation service, system control, load dispatch services, and energy imbalance services." For more information, visit www.ferc.gov/market-oversight/guide/glossary.asp.

EERS treatment. We awarded 0.5 points if CHP was clearly defined as eligible in a binding EERS or similar requirement. Most states with EERS policies set goals for future years. These goals are generally a percentage of total electricity sold that must be derived from efficiency resources, with the percentage of these resources increasing over time. To receive credit, a state's EERS must explicitly apply to CHP powered by natural gas, be technology neutral, and be a binding obligation.

CHP resource acquisition programs. We awarded 0.5 points for programs designed to acquire cost-effective CHP in a way similar to the acquisition of other energy efficiency resources. For a state to earn this half point, a majority of its energy customers must have access to clearly defined CHP programming offered by major utilities or other program administrators. We did not give credit if only a small selection of customers have access to a CHP program or if a state has a custom commercial or industrial incentive program that could theoretically be used for CHP but is not marketed as a CHP program. To earn credit, states have to be actively reaching out to potential CHP users and developers to market the program, and they must be acquiring new CHP resources as a result.

Production goal. We awarded 0.5 points for the existence of either a state-approved production goal (kWh) from CHP resources or a program budget for the acquisition of a defined amount of kWh savings from CHP by utilities or program administrators. The presence of either (or both) of these indicates that a state has identified CHP as a resource and, importantly, has given utilities a clear signal to develop and deploy programming designed to acquire CHP. In many states, utilities report receiving mixed signals about whether their regulators are actually supportive of program spending tied to CHP. This subcategory addresses this particular issue of utility incentives and disincentives to pursue CHP programming.

Revenue streams. We awarded 0.5 points to states that provide access to favorable revenue streams for CHP, including production incentives ($/kWh), feed-in tariffs, standard offer programs, or other revenue streams linked to kWh production. These incentives are specifically designed to encourage measurable energy savings from CHP. Production incentives are linked directly to a CHP system's production or to some calculated amount of energy savings relative to an established baseline. Feed-in tariffs usually specify $/kWh payments to CHP operators for exporting electricity to the grid, providing price certainty and long-term contracts that can help finance CHP systems (EPA 2015). Standard offer programs offer a set price for qualifying CHP production and often have a program cap or point at which the standard offer is no longer available. Revenue streams through net metering are treated in a separate category described later in this chapter.

In general, we did not give credit for custom program offerings marketed to commercial and industrial sectors that could only *potentially* be used for CHP, as the spending and savings for these programs are reflected in other parts of the *State Scorecard*. However we did give credit for programs that included a specific CHP-focused component, such as the identification of and outreach to potential sites for CHP installations.

To earn points in any of the four subcategories outlined above, a state policy or program must be usable by all customer classes and apply to CHP systems powered by natural gas.

Detailed information on the policies and programs that earned points in this category is available in the CHP section of the ACEEE State and Local Policy Database (ACEEE 2018).

Deployment Incentives

States could receive 0.5 points for the presence of deployment incentives that improve the economics of a CHP investment but are not necessarily tied to resource acquisition efforts by utilities. Deployment incentives can encourage CHP at the state level in a variety of ways, and the leading states have multiple types of incentive programs. To earn points in this category, at least one available incentive must

- Apply to all CHP, regardless of fuel
- Be an investment tax credit, a credit for installed capacity, a loan or loan guarantee, a project grant, or a net metering standard
- Apply to both the commercial and the industrial sectors

Tax incentives for CHP can take many forms but are often credits taken against business or real estate taxes. The Bipartisan Budget Act of 2018 reinstated a federal business energy investment tax credit administered by the US Internal Revenue Service. The credit incentivizes CHP systems by offering a credit for 10% of CHP project costs (DSIRE 2018). Systems up to 50 MW placed in service between October 3, 2008, and December 31, 2021, are generally eligible for the full credit, subject to some limitations. Larger systems may be eligible for partial credit (DOE 2018b). Tax credits administered by a state can also provide support for CHP deployment.

State grants can further support CHP deployment by providing financing for capital and other costs. Some grant awards and other simple incentive programs offer rebates or payments linked to the installation of CHP capacity with amounts set in $/kW. Many of these programs are administered in conjunction with production incentives. Low-interest loan programs, loan guarantees, and bonding authorities are other strategies states can use to make CHP systems financially attractive and reduce the cost of financing. To earn points for these programs, a state must clearly identify CHP as an eligible project type and market it to CHP project developers who then take advantage of the financing opportunity.

Net metering regulations can also incentivize CHP deployment by allowing owners of small distributed generation systems to get credit for net excess electricity that they produce and export to the grid. We gave credit to states that explicitly list CHP as an eligible technology and offer at least wholesale net metering to all CHP systems, regardless of fuel, in all customer classes. Some states are transitioning away from net metering and are developing new methods for valuing and compensating distributed energy resources, including CHP. Future editions of the *Scorecard* may consider new mechanisms that replace net metering approaches.

Detailed information on incentives for CHP is available from the EPA's CHP Policies and Incentives Database (EPA 2018) and from the Database of State Incentives for Renewables and Efficiency (DSIRE 2018).[51]

Additional Supportive Policies

A state could receive up to 1 point for additional activities or policies that support the deployment of CHP. Because barriers to deployment and opportunities to encourage CHP vary from state to state, this category recognizes a wide variety of efforts. States earned 0.5 points for the presence of any one of the following supportive policies, or 1 point for the presence of two or more:

- Policies that encourage the use of opportunity fuels in conjunction with CHP technologies, such as biomass, biogas, anaerobic digester gas, landfill gas, wood, and other waste (including waste heat)
- Streamlined air permitting procedures, including permit-by-rule, for CHP systems for multiple major pollutants
- Dedicated CHP-focused technical assistance
- Requirements that public buildings and/or other critical facilities consider CHP during times of upgrade and new construction
- Policies and programs that specifically encourage CHP for its resilience and reliability benefits

States could earn points for renewable portfolio standards (RSPs) and other policies that encourage the use of renewable-fueled CHP as an additional supportive policy. The availability of biomass and biogas resources is often local, and some states are better suited than others to use these resources. Natural gas is available nearly everywhere in the United States and is the predominant fuel used by CHP systems. While natural gas CHP systems do not generally benefit from RPS treatment, biomass or biogas systems often do, and we recognize the use of these and other opportunity fuels in this category.

States could also earn points for streamlined air permitting, including permit-by-rule processes. These alternatives to conventional air permits help reduce the time and cost involved in permitting eligible CHP units. Additional information about approaches to streamline air permitting for CHP is available in an EPA fact sheet (EPA 2014).

States could earn points for several other supportive policies in this category. Such policies can include targeted technical assistance programs, education campaigns, or other state-led special efforts that support CHP. To earn credit for technical assistance, a state's efforts must go beyond the critical services provided by DOE's CHP Technical Assistance Partnerships. States also earn points for requirements to consider CHP for public buildings and critical facilities during times of upgrade or new construction, or for programs that encourage consideration of CHP's resilience benefits during grid outages. The ACEEE State and Local

[51] EPA's database is available at www.epa.gov/chp/dchpp-chp-policies-and-incentives-database. The DSIRE database is available at www.dsireusa.org.

Policy Database's CHP section contains state-by-state descriptions of these policies (ACEEE 2018).

ADDITIONAL METRICS

We noted two additional metrics—the number of individual CHP systems installed in each state and the total capacity (MW) installed—but did not use them in our scoring.[52] We believe information on actual installations is useful for comparing CHP activity but does not in itself fully indicate a state's CHP friendliness. Table 33 shows the number of new CHP systems and installed CHP capacity over the past two years.

Various economic considerations determine how many CHP projects are installed, but the retail price of energy is a major factor in their economic attractiveness. Higher electricity prices may improve the case for CHP in some states by making self-generation more cost effective than purchasing electricity from the grid. In other states, lower and stable natural gas prices can help hasten investment in CHP systems, since many are fueled by natural gas. States cannot control the price of electricity or gas that customers pay, but policymakers can implement policies that help overcome economic barriers posed by lower electricity prices or higher gas prices. Future editions of the *State Scorecard* may account for these factors by scoring states on their installed CHP capacity relative to some measure of technical or economic potential, or by assessing the degree to which unfavorable economics are minimized by certain regulatory or policy treatments.

Distributed generation systems such as CHP are charged standby rates when they must rely on power from the grid due to scheduled or emergency outages. These rates can be a barrier to CHP deployment. Recently there has been momentum to address standby rates to reduce these issues. We do not score states on their standby rates, but we may consider it in future editions.

Table 33. Number of new CHP systems and installed CHP capacity by state, 2016–2017

State	Number of new CHP installations in 2016	New capacity installed in 2016 (MW)	Number of new CHP installations in 2017	New capacity installed in 2017 (MW)	Total number of new CHP installations	Total new capacity installed (MW)
Alabama	2	75.13	0	0	2	75.1
Alaska	11	61.877	2	7.24	13	69.1
Arizona	1	0.07	0	0	1	0.1
Arkansas	1	5.2	0	0	1	5.2
California	18	28.792	5	33.9	23	62.7
Colorado	2	0.44	1	0.48	3	0.9
Connecticut	7	23.175	2	3.4	9	26.6

[52] We use data from the DOE CHP Installation Database maintained by ICF International. The data reflected in the *State Scorecard* were released June 1, 2017, and reflect installations as of December 31, 2017 (DOE 2018c).

State	Number of new CHP installations in 2016	New capacity installed in 2016 (MW)	Number of new CHP installations in 2017	New capacity installed in 2017 (MW)	Total number of new CHP installations	Total new capacity installed (MW)
District of Columbia	2	0.3	1	1	3	1.3
Delaware	1	2	0	0	1	2.0
Florida	2	22.9	0	0	2	22.9
Georgia	2	3.1	2	58.5	4	61.6
Hawaii	0	0	1	2	1	2.0
Idaho	2	0.4	0	0	2	0.4
Illinois	2	7.1	0	0	2	7.1
Indiana	3	3.5	1	86	4	89.5
Iowa	1	38.5	0	0	1	38.5
Kansas	0	0	0	0	0	0
Kentucky	0	0	0	0	0	0
Louisiana	1	39.2	0	0	1	39.2
Maine	3	9.4	0	0	3	9.4
Maryland	7	19.5	4	5.465	11	25.0
Massachusetts	28	26.7	3	21	31	47.7
Michigan	4	14.8	3	147.8	7	162.6
Minnesota	0	0	3	69.4	3	69.4
Mississippi	0	0	0	0	0	0
Missouri	1	2	0	0	1	2.0
Montana	0	0	0	0	0	0
Nebraska	0	0	0	0	0	0
Nevada	2	0.3	0	0	2	0.3
New Hampshire	0	0	0	0	0	0
New Jersey	7	3.7	10	5	17	8.6
New Mexico	0	0	1	0.7	1	0.7
New York	47	33.8	53	11.8	100	45.6
North Carolina	1	5.2	3	3.2	4	8.4
North Dakota	0	0	0	0	0	0
Ohio	1	0.2	0	0	1	0.2
Oklahoma	0	0	0	0	0	0
Oregon	1	1.7	0	0	1	1.7

State	Number of new CHP installations in 2016	New capacity installed in 2016 (MW)	Number of new CHP installations in 2017	New capacity installed in 2017 (MW)	Total number of new CHP installations	Total new capacity installed (MW)
Pennsylvania	10	13	5	7.2	15	20.2
Rhode Island	2	1.3	1	3.2	3	4.5
South Carolina	0	0	0	0	0	0
South Dakota	0	0	0	0	0	0
Tennessee	1	0.4	2	56.3	3	56.7
Texas	4	12.2	4	23	8	35.1
Utah	6	45.1	0	0	6	45.1
Vermont	0	0	0	0	0	0
Virginia	1	0.4	0	0	1	0.4
Washington	1	0.004	0	0	1	0
West Virginia	1	0.008	0	0	1	0
Wisconsin	2	1.0	0	0	2	1.0
Wyoming	0	0	0	0	0	0
Total	**188**	**502.4**	**107**	**546.5**	**295**	**1,048.8**

Source: DOE 2018c. Totals may not be exact due to rounding.

In general, states enacted few notable policies to enhance CHP's attractiveness in the year since we published the *2017 State Scorecard*. However activities did increase support for CHP in some states, and we describe a sampling of these efforts in the text box below.

Leading and Trending States: Policies to Encourage CHP Development

Pennsylvania. In April, the Pennsylvania Public Utility Commission (PUC) took steps to promote the development of CHP resources in the state. The PUC unanimously adopted a policy statement that encourages investment in CHP, its development in general, and its use as a resource for critical infrastructure. It covers many of the key areas that are critical for increasing CHP capacity. It reduces barriers to its deployment through increased marketing efforts and by promoting funding opportunities, data disclosure, and implementation of favorable interconnection processes and rates (Pennsylvania PUC 2018). A CHP working group under the Bureau of Technical Utility Services will help utilities reduce barriers to CHP adoption. The group will develop standardized biennial reporting methods for utilities to disclose their plans to promote and develop CHP resources and make data publicly available. The PUC developed the statement on the basis of a series of stakeholder meetings that affirmed the benefits of CHP to the state.

Illinois. The Illinois Future Energy Jobs Act (2016) enacted changes to the state's energy efficiency programs. Under the act, utilities in Illinois are developing CHP resources in a number of ways. In 2017, the Illinois Commerce Commission approved energy efficiency plans that included incentives for CHP for all the regulated utilities in the state. The policy change has built momentum behind utilities embracing CHP in their territories. For example, Commonwealth Edison has implemented incentives of up to $25,000 for project feasibility costs for sites with a peak demand of 500 kW or greater. Additionally, the program offers a production incentive of $0.07/kWh based on 12 months of metered data and the eligible kWh generated. The production incentive is available to nonresidential customers with demand below 10 MW (ComEd 2018). Nicor Gas has introduced a CHP program called energySMART as part of its custom business efficiency programs. It offers reimbursements of up to 25% (up to $12,500) for feasibility studies as well as $1/therm saved up to $500,000 (Nicor Gas 2018).

Connecticut. In response to a series of storms that caused widespread blackouts, Connecticut implemented the nation's first statewide microgrid pilot program to support distributed generation at critical facilities. The program provides grants for the cost of design, engineering services, and interconnection services, with the first recipients announced in 2013. While CHP systems have been included in winning proposals to date, the program was changed in 2017 (Round 4 of the grants) to provide matching cash awards or low-interest loans to help with up-front capital costs to Class III energy resources, including CHP. With this change, the program received eight project applications. The Department of Energy and Environmental Protection may issue up to $30 million in microgrid awards (Connecticut DEEP 2018).

Missouri. As a result of a rate tariff settlement in 2017, Ameren Missouri developed a tool to analyze the cost impacts of standby rates for self-generating customers under the Standby Service Rider (SSR). Customers in the Large General Service and Small Primary Service rate classes can request that Ameren input their data into the model. Confusing or seemingly arbitrary tariff structures can disincentivize investments in CHP systems (ACEEE 2016). With this tool, however, customers can calculate avoided cost percentage and make informed decisions to optimize CHP capacity and operations. Stakeholders are enthusiastic about the potential of this tool to promote and optimize the use of CHP systems (T. Bronson, CHP TAP coordinator, DOE, pers. comm., May 17, 2018).

Chapter 6. State Government–Led Initiatives

Authors: Weston Berg and Emma Cooper

INTRODUCTION

State legislatures and governors can advance energy efficiency policies and programs that affect the utilities, transportation, buildings, and CHP sectors discussed in previous chapters. In this chapter, we focus on energy efficiency initiatives that are designed, funded, and implemented by state entities, including energy offices, public universities, economic development agencies, and general services agencies.

We focus on three initiatives commonly undertaken by state governments: financial incentive programs for consumers, businesses, and industry; lead-by-example policies and programs to improve the energy efficiency of public facilities and fleets; and R&D for energy efficiency technologies and practices.

SCORING AND RESULTS

States could earn up to 5 points in this policy area for the following:

- Financial incentives offered by state agencies (2.5 points)
- Lead-by-example policies (2 points)
- Publicly funded R&D programs focused on energy efficiency (0.5 points)

Readers may notice we have reduced the number of achievable points within this chapter from 6 to 5 this year. Our reason for doing so was to shift a point to the appliance standards category (Chapter 7) at a time when leadership on safeguarding and strengthening standards for appliances has transitioned away from the federal level toward the states, which are now advancing and passing standards legislation of their own. To accommodate the shift, we took 0.5 points each from the financial incentives and R&D categories. However our reduction in points within this scoring category is in no way intended to diminish the importance of state-sponsored efficiency programs or state support of R&D institutions. Not only do state R&D efforts provide a variety of services to create, develop, and deploy new technologies for energy efficiency, but they also address a number of failures in the energy services marketplace that impede the diffusion of new technologies (Pye and Nadel 1997). These programs can also encourage cooperation among organizations from different sectors and backgrounds to further spur innovation.

Table 34 presents the overall results of scoring on state initiatives.

Table 34. Summary of scores for government-led initiatives

State	Financial incentives (2.5 pts.)	Lead by example (2 pts.)	R&D (0.5 pt.)	Total score (5 pts.)
California	2.5	2	0.5	5
Colorado	2.5	2	0.5	5
Connecticut	2.5	2	0.5	5

State	Financial incentives (2.5 pts.)	Lead by example (2 pts.)	R&D (0.5 pt.)	Total score (5 pts.)
Massachusetts	2.5	2	0.5	5
Minnesota	2.5	2	0.5	5
Oregon	2.5	2	0.5	5
Rhode Island	2.5	2	0.5	5
Vermont	2.5	2	0.5	5
Washington	2.5	2	0.5	5
Kentucky	2.5	1.5	0.5	4.5
Maryland	2.5	1.5	0.5	4.5
Missouri	2.5	1.5	0.5	4.5
New York	2.5	1.5	0.5	4.5
Tennessee	2	2	0.5	4.5
Virginia	2.5	1.5	0.5	4.5
Alaska	2.5	1	0.5	4
Delaware	1.5	2	0.5	4
Florida	2	1.5	0.5	4
Maine	2	1.5	0.5	4
Michigan	2.5	1	0.5	4
Nevada	2.5	1	0.5	4
Ohio	2.5	1	0.5	4
Texas	1.5	2	0.5	4
Utah	1.5	2	0.5	4
Arkansas	2	1.5	0	3.5
District of Columbia	1.5	1.5	0.5	3.5
Illinois	1	2	0.5	3.5
New Hampshire	1.5	2	0	3.5
New Mexico	1.5	2	0	3.5
North Carolina	1	2	0.5	3.5
South Carolina	2	1.5	0	3.5
Wisconsin	1.5	1.5	0.5	3.5
Alabama	1	1.5	0.5	3
Idaho	2	0.5	0.5	3
Montana	1.5	1.5	0	3
Oklahoma	1.5	1.5	0	3
Pennsylvania	2.5	0	0.5	3

State	Financial incentives (2.5 pts.)	Lead by example (2 pts.)	R&D (0.5 pt.)	Total score (5 pts.)
Arizona	1	1	0.5	2.5
Hawaii	0.5	1.5	0.5	2.5
Louisiana	1	1.5	0	2.5
Mississippi	1	1	0.5	2.5
Nebraska	1.5	0.5	0.5	2.5
Georgia	0	1.5	0.5	2
Indiana	1	0.5	0.5	2
Wyoming	1.5	0.5	0	2
Iowa	0.5	0.5	0.5	1.5
Kansas	0	1	0.5	1.5
New Jersey	0	1	0.5	1.5
West Virginia	0.5	0	0.5	1
North Dakota	0.5	0	0	0.5
South Dakota	0	0.5	0	0.5

DISCUSSION

Financial Incentives

While utilities offer ratepayer-funded energy efficiency programs, many states also provide financial incentives to spur the adoption of technologies and practices in homes and businesses. These incentives can be administered by various state agencies, but they are most often coordinated by state energy offices. Incentives can take many forms: rebates, loans, grants, or bonds for energy efficiency improvements; income tax credits and deductions for individuals or businesses; and sales tax exemptions or reductions for eligible products. Financial incentives can lower the up-front cost and shorten the payback period for energy efficiency upgrades, shrinking two barriers for consumers and businesses that hope to make cost-effective efficiency investments. Incentives also raise consumer awareness of eligible products, encouraging manufacturers and retailers to market these products more actively and to continue to innovate. As economies of scale improve, prices of energy-efficient products fall, and the products eventually compete in the marketplace without the incentives.

SCORES FOR FINANCIAL INCENTIVES

We relied primarily on the Database of State Incentives for Renewables and Efficiency for information on current state financial incentive programs (DSIRE 2018). We supplemented these data with information from our survey of state energy officials and a review of state government websites and other online resources.

We did not give points in this category for utilities' customer-funded financial incentive programs, which we covered in Chapter 2. Acceptable sources of funding included state appropriations or bonds, oil overcharge revenues, auction proceeds from the RGGI or

California's cap-and-trade program, other noncustomer sources, and tax incentives. While state and customer funding sometimes overlap—for example, where state incentives are funded through a system benefits charge—we designed this category to capture energy efficiency initiatives not already covered in Chapter 2.

We recognize growing state efforts to leverage private dollars for energy efficiency programs by awarding points for loans offered by green banks with active energy efficiency programs and giving credit for the PACE financing programs enabled by state-level legislation. From 2010 to 2017, energy efficiency projects accounted for 48% of commercial and 58% of residential PACE funding (PACENation 2018b). State legislatures pass and amend legislation enabling residential and/or commercial PACE, and localities and private program administrators typically run the programs, depending on the jurisdiction.[53] Sometimes states play a more prominent role in PACE coordination by administering a statewide program or offering guidance to PACE providers (Fazeli 2016). Because programs are usually locally administered, we did not give extra credit for multiple active PACE programs; however we indicate in table 35 whether state PACE activity is in the residential or commercial market or both. We discuss other energy efficiency financing efforts in more detail at the end of this chapter.

States earned up to 2.5 points for major financial incentive programs that encourage the purchase of energy-efficient products.[54] We judged these programs on their relative strength, customer reach, and impact. Incentive programs generally received 0.5 points each, but several states have major incentive programs that we deemed worth 1 point each; these include Arizona, Connecticut, Idaho, Nebraska, Nevada, New York, Texas, Washington, and Wisconsin. States that have at least one active PACE program were awarded 0.5 points. Table 35 shows our scoring of state financial incentives.

It should be noted that the number of financial incentive programs a state implements may not fully reflect the robustness of its efforts. Accordingly, this year we attempted to collect additional information from state energy offices regarding state budgets for financial incentives, program participation rates, verified savings from incentives, and leveraging of private capital. These data are presented in Appendixes H, I, and J. For additional information, see the end of this chapter, where we discuss potential new metrics for state-led initiatives.

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[53] Currently, 34 states plus Washington, DC, authorize PACE (PACENation 2018a). While most states' PACE activity is in the commercial market, there have been several residential PACE programs over the past few years. In July 2016, the Federal Housing Administration, the DOE, and the Department of Veterans Affairs issued new guidance and best practices on residential PACE, and these are expected to lay the groundwork for future residential PACE programs. For more information on these announcements, part of the White House's Clean Energy Savings for All Americans initiative, visit www.whitehouse.gov/the-press-office/2016/07/19/fact-sheet-obama-administration-announces-clean-energy-savings-all.

[54] Energy-efficient products include any product or process that reduces energy consumption. While renewable energy technologies such as solar hot-water heating may reduce energy consumption, they are often rolled into larger programs that focus on renewable energy rather than energy efficiency. ACEEE would like to credit states for renewable energy technologies that reduce energy consumption, but they are often difficult to distinguish from broader renewable energy incentives that fall outside the scope of the *State Scorecard*. As a result, they are not credited at this time.

Table 35. State scores for major financial incentive programs

State	Major state financial incentives for energy efficiency	Score (2.5 pts.)
Alaska	Five loan programs; one grant program	2.5
California	California Infrastructure and Economic Development Bank-led bond program for public buildings; three grants; two revolving loans for public buildings; one loan loss reserve for small businesses; one rebate program; one tax incentive for advanced transportation technologies; commercial and residential PACE financing	2.5
Colorado	Loan loss reserve program; school loan program; Residential Energy Upgrade (RENU) loan program; Agricultural Energy Efficiency Program; statewide commercial PACE financing	2.5
Connecticut	Connecticut Green Bank-led programs including three loans, three financing options for multifamily and low- to moderate-income residential projects, commercial PACE financing; one loan for multifamily housing properties; two loans for multifamily and low-income residential projects	2.5
Kentucky	Grants, loans, and bonds for farms, schools, and local governments; Kentucky Green Bank-funded loan for state governments; sales tax exemption for energy-efficient products; commercial PACE financing	2.5
Maryland	Loans and grant programs for agricultural, residential, multifamily, commercial, and industrial sectors; Smart Energy Communities program; loans for state agencies; commercial PACE financing	2.5
Massachusetts	Community Clean Energy Resiliency Initiative grant; Alternative Energy and Energy Conservation Patent Exemption (personal and corporate); one bond; four other grants	2.5
Michigan	Three loans; five grants; commercial PACE financing	2.5
Minnesota	Five loans; two revolving loans; one loan loss reserve; commercial PACE financing	2.5
Missouri	One loan program; one loan loss reserve; one revolving loan; one personal tax deduction; commercial and residential PACE financing	2.5
Nevada	Wide-reaching property tax abatement for green buildings; Home Energy Retrofit Opportunities for Seniors (HEROS); loans for state employees; revolving loan program	2.5
New York	Green Jobs–Green NY Program; loan, grant, financing, rebate, and incentive programs; Energy Conservation Improvements Property Tax Exemption; Green Bank; and commercial PACE financing	2.5
Ohio	Two loans and one grant program; property tax exemption for energy-efficient projects; commercial PACE financing	2.5
Oregon	Several residential and business energy tax credits; one grant program; commercial PACE financing	2.5
Pennsylvania	Alternative Energy Investment Fund; Sustainable Energy Finance Program; several grant and loan programs	2.5

State	Major state financial incentives for energy efficiency	Score (2.5 pts.)
Rhode Island	Rhode Island Infrastructure Bank-led programs, including one revolving loan program and commercial PACE financing; two grants; two rebates	2.5
Vermont	Three Sustainable Energy Loan Fund programs; Energy Loan Guarantee Program; Weatherization Trust Fund; Heat Saver Loan	2.5
Virginia	Energy Leasing Program for state-owned facilities; Clean Energy Manufacturing Incentive Grant Program; one loan program; personal tax incentive; financing for innovative energy technologies; commercial PACE financing	2.5
Washington	Major grant program for energy efficiency in public facilities and local communities; several loans and grants	2.5
Arkansas	Three loans; commercial PACE financing	2
Florida	Farm Renewable and Efficiency Demonstrations (FRED), Renewable Energy and Energy-Efficient Technologies (REET) Grant Matching Program, commercial and residential PACE financing	2
Idaho	Income tax deduction for energy efficiency improvements; one major low-interest loan program; Government Leading by Example (GLBE) program for public buildings in rural cities and counties	2
Maine	Residential rebate and incentive; advanced building incentive; commercial and industrial incentive	2
South Carolina	Tax credits for new energy-efficient manufactured homes; sales tax cap on energy-efficient manufactured homes; two loan programs	2
Tennessee	Energy Efficient Schools Initiative (loans and grants); one grant and one loan program	2
Delaware	Home Energy Loan Program; Energy Efficiency Investment Fund rebates; Energize Delaware Farm Program	1.5
District of Columbia	Green Light Grant Program; commercial PACE financing; Green Bank	1.5
Montana	Energy conservation installation tax credit; tax deduction for energy-conserving investment; Alternative Energy Revolving Loan Program	1.5
Nebraska	Major loan program (Dollar and Energy Saving Loans); commercial PACE financing	1.5
New Hampshire	Two revolving loan funds; commercial PACE financing	1.5
New Mexico	Sustainable Building Tax Credit (corporate and personal); bond program	1.5
Oklahoma	Three loan programs	1.5
Texas	Major loan program (Texas LoanSTAR); commercial PACE financing	1.5
Utah	Two loan programs for state-owned buildings and schools; commercial PACE financing	1.5
Wisconsin	Major loan program (Clean Energy Manufacturing Revolving Loan Fund); commercial PACE financing	1.5

State	Major state financial incentives for energy efficiency	Score (2.5 pts.)
Wyoming	Two grants and one loan program	1.5
Alabama	Alabama SAVES revolving loan program; WISE Home Energy Program (loans)	1
Arizona	Property tax exemption for energy-efficient building components and CHP	1
Illinois	Renewable Energy and Energy Efficiency Project Financing; Green Energy loans	1
Indiana	Tax credit for purchase and installation of residential insulation; Green Project Reserve revolving loan fund	1
Louisiana	Home Energy Loan Program (HELP); Energy Fund Loan Program	1
Mississippi	One loan program; one public-sector lease program for energy-efficient equipment	1
North Carolina	One rebate and one loan program	1
Hawaii	Green Energy Market Securitization (GEMS) financing program	0.5
Iowa	Energy Bank Revolving Loan Program	0.5
North Dakota	Energy Conservation Grant	0.5
West Virginia	West Virginia Division of Energy and the West Virginia University College of Engineering and Mineral Resources partnership	0.5
Georgia	None	0
Kansas	None	0
New Jersey	None	0
South Dakota	None	0

Leading and Trending States: Financial Incentives

Colorado. In February 2018 the Colorado Energy Office (CEO) announced the launch of the Colorado Residential Energy Upgrade (RENU) Loan, a statewide residential program that will finance energy efficiency and renewable energy projects in existing homes. The program is a partnership between the Energy Office and Boulder-based Elevations Credit Union, which will offer long-term, low-interest loans to homeowners seeking energy efficiency improvements such as air sealing, insulation, windows, lighting, and appliances. Loans range from $500 to $35,000 for 3- to 15-year terms and can be used to finance 100% of project costs. As program sponsor, the CEO authorizes contractors to participate in the program, and the contractors then work directly with the homeowner to install upgrades.

Tennessee. In partnership with Pathway Lending, Tennessee provides low-interest energy efficiency loans to businesses and local government entities through the Pathway Lending Energy Efficiency Loan Program (EELP). Pathway Lending operates and manages this revolving loan fund, to which the state of Tennessee committed $15 million, the Tennessee Valley Authority committed $14 million, and Pathway Lending committed $5 million. In 2017, Pathway Lending issued 30 loans on 44 applications received, resulting in more than 5,700 MWh of annual energy savings and $660,000 in estimated monetary savings due to utility reductions. The state also offers grants to utility districts and state and local governments for projects that promote energy efficiency or clean energy technologies. Through the Energy Efficiency Schools Initiative, Tennessee uses excess state lottery funds for grants and loans to school systems for capital outlay projects that meet energy efficiency guidelines. To date, 95% of school districts have participated in at least one grant program.

Florida. Through its Farm Energy and Water Efficiency Realization (FEWER) program, the Florida Department of Agriculture and Consumer Services offers farmers free energy audits to determine the potential for renewable energy, energy efficiency, and water-saving measures. Eligible agricultural producers can receive up to $25,000 for implementing recommended measures. Energy evaluations are conducted by three state universities, Florida A&M University, University of Central Florida, and University of Florida. In 2017, the FEWER Program received 76 applications, conducted 16 energy evaluations, and produced audit reports for several others.

North Carolina. The SystemVision™ Energy Guarantee Program, an affordable housing program run by a partnership of Advanced Energy and the North Carolina Housing Finance Agency (NCHFA), encourages high energy efficiency standards during the construction of affordable housing and has guaranteed more than 5,100 affordable homes to date. NCHFA provides $4,000 in construction subsidies for projects that follow SystemVision energy efficiency guidelines. In addition, Advanced Energy issues a two-year heating and cooling bill guarantee. Specifically, if the average heating and cooling costs are more than $30 a month, Advanced Energy will reimburse homeowners for the outstanding amount. Recently the SystemVision program was awarded the Health and Energy Linked Programs (HELP) Award for Innovation from ACEEE. This award is given to programs that use innovative practices and designs to improve indoor health outcomes and reduce energy waste.

West Virginia. Through a partnership of the West Virginia Division of Energy and the West Virginia University College of Engineering and Mineral Resources, engineering students have worked to improve the energy efficiency and productivity of manufacturers, commercial establishments, school districts, and municipalities in the state. During the past five years, the program has trained more than 350 students and delivered 200 technical assistance projects that have provided 10 million kWh, 60,000 MMBtu, and $650,000 in energy and cost savings.

Lead by Example

State governments can advance energy-efficient technologies and practices in the marketplace by adopting policies and programs to save energy in public-sector buildings and fleets, a practice commonly referred to as *lead by example*. In the current environment of fiscal austerity, lead-by-example policies and programs are a proven strategy for improving the operational efficiency and economic performance of states' assets. Lead-by-example initiatives also reduce the negative environmental and health impacts of high energy use and promote energy efficiency to the broader public.[55]

Many states show leadership in energy efficiency policy through the development of state energy plans. Governors often issue executive orders or form planning committees to evaluate state energy needs, goals, and opportunities. Sometimes legislatures initiate the process. These actions help establish a statewide vision for energy use. Most states have such plans, with several, including New Hampshire, Utah, and West Virginia, developing an update in 2018.[56] We do not award points solely on the basis of the existence of a state energy plan, but we do consider the formal executive orders and policies that execute energy efficiency initiatives included in such plans.

SCORES FOR LEAD BY EXAMPLE

States could earn up to 2 points in this category: 0.5 points each for energy savings targets in new and existing state buildings, benchmarking requirements for public facilities, energy savings performance contract (ESPC) activities, and fleet fuel efficiency mandates. We based our review of states' lead-by-example initiatives on our survey of state energy officials as well as independent research.

State building requirements. States often adopt policies and comprehensive programs to reduce energy use in state buildings. State governments operate numerous facilities, including office buildings, public schools, colleges, and universities, the energy costs of which can account for as much as 10% of a typical government's annual operating budget. In addition, the energy consumed by a state's facilities can account for as much as 90% of its GHG emissions (DOE 2008). Only a handful of states have not yet implemented an energy efficiency policy for public facilities. Mandatory energy savings targets for new and existing state government facilities are the most widely adopted state measures. These requirements encourage states to invest in the construction of new, efficient buildings and retrofit projects, lowering energy bills and promoting economic development in the energy services and construction sectors.

To earn credit, energy savings targets must commit state government facilities to a specific energy reduction goal over a distinct time period. We also gave 0.5 points to states that

[55] Energy efficiency reduces society's need to burn fossil fuels to generate electricity, thereby reducing harmful pollutants from fossil fuel combustion. ACEEE and Physicians for Social Responsibility explore this connection in a joint fact sheet at aceee.org/fact-sheet/ee-and-health.

[56] For more information on states with active energy plans, visit the National Association of State Energy Officials' website: www.naseo.org/stateenergyplans.

require state buildings to exceed the statewide energy code or meet a green building criterion like Leadership in Energy and Environmental Design (LEED) certification.

Benchmarking requirements for public buildings. Proper building energy management is a critical element of successful energy efficiency initiatives in the public sector. Benchmarking energy use in public-sector buildings through tailored tools or widely available tools such as ENERGY STAR Portfolio Manager ensures a comprehensive set of energy use data that can drive cost-effective energy efficiency investments.[57] Comparing building energy performance across agencies can also help prioritize energy efficiency projects.

Through benchmarking policies, states and cities require all buildings to undergo a regular energy audit or have their energy performance tracked. We awarded 0.5 points for energy benchmarking policies and large-scale benchmarking programs for public-sector facilities.

Energy savings performance contracting policies and programs. If state governments have the necessary support, leadership, and tools in place, they can help projects overcome information and cost barriers by financing energy improvements through ESPCs. The state may enter into an ESPC with an energy services company (ESCO), paying for these services with money saved on lower energy bills from energy conservation measures. A designated state agency may serve as the lead contact for implementing the contract.[58]

We based scores for ESPC activities on support, leadership, and tools. To promote performance contracting, states must provide an enabling framework (support) and guidance and resources (leadership and tools) to get projects underway. We awarded a state 0.5 points if it satisfied at least two of the three criteria. Table 36 describes qualifying actions.

Table 36. Scoring of ESPC policies and programs

Criterion	Qualifying action
Support	The state explicitly promotes the use of ESPCs to improve the energy efficiency of public buildings through statutory requirements, recommendations, or explicit preferences for ESPC use; executive orders that promote or require ESPCs; and/or financial incentives for agencies seeking to use ESPCs.
Leadership	A state program directly coordinates ESPCs, or a specific state agency serves as lead contact for implementing ESPCs.
Tools	The state offers documents that streamline and standardize the ESPC process, including a list of prequalified service companies, model contracts, and/or a manual that lays out the procedures required for state agencies to utilize ESPCs.

States must satisfy at least two of the three criteria above to receive credit.

[57] Some states have their own databases of public building energy use that integrate with the ENERGY STAR Portfolio Manager. For example, Maryland's EnergyCAP database compiles the energy use (based on utility bills) of all public buildings in the state and enables comparing buildings occupied by various state agencies.

[58] For a full discussion of ESPCs, the ESCO market, and actual implementation trends, see Stuart et al. (2016). For additional best practices in state and local establishment and implementation of ESPC programs, see DOE's ESPC Toolkit (betterbuildingssolutioncenter.energy.gov/espc/home) and guidelines for state ESPC program development (betterbuildingssolutioncenter.energy.gov/sites/default/files/attachments/ESPC-Program_Guidelines_Final.pdf).

Efficient fleets. In addition to lead-by-example initiatives in state government buildings, many states enact policies encouraging or requiring efficient vehicle fleets to reduce fleet fuel costs and hedge against rising fuel prices. Collectively, state governments own approximately 500,000 vehicles, with a median fleet size of about 3,500. Operation and maintenance costs for these fleets every year exceed $2.5 billion nationwide, ranging from $7 million to $250 million per state (NCFSA 2007). In response to these costs, states often adopt an efficiency standard specifically for state vehicle fleets that reduces fuel consumption and GHG emissions.

For this category, states received credit only if the plan or policy for increasing the efficiency of the state's fleet contains a specific, mandatory requirement. For example, states could qualify for 0.5 points if fleet policies specify fuel economy improvements that exceed existing CAFE standards. Other policies that earned the half point include binding goals to reduce petroleum use by a certain amount over a given time frame, meaningful GHG reduction targets for fleets, and procurement requirements for hybrid-electric or all-electric vehicles. Because state adoption of such targets does not guarantee they will be achieved, we may need to revisit this metric. We will continue to seek data on state progress toward meeting these goals. We did not credit requirements for procuring alternative-fuel vehicles, because they may not result in improved fuel economy.

Table 37 presents states' overall scores for lead-by-example.

Table 37. State scores for lead-by-example initiatives

State	New and existing state building requirements	Benchmarking requirements for public buildings	ESPC policy and programs	Efficient fleets	Total score (2 pts.)
California	•	•	•	•	2
Colorado	•	•	•	•	2
Connecticut	•	•	•	•	2
Delaware	•	•	•	•	2
Illinois	•	•	•	•	2
Massachusetts	•	•	•	•	2
Minnesota	•	•	•	•	2
New Hampshire	•	•	•	•	2
New Mexico	•	•	•	•	2
North Carolina	•	•	•	•	2
Oregon	•	•	•	•	2
Rhode Island	•	•	•	•	2
Tennessee	•	•	•	•	2
Texas	•	•	•	•	2
Utah	•	•	•	•	2

State	New and existing state building requirements	Benchmarking requirements for public buildings	ESPC policy and programs	Efficient fleets	Total score (2 pts.)
Vermont	•	•	•	•	2
Washington	•	•	•	•	2
Alabama		•	•	•	1.5
Arkansas	•	•	•		1.5
District of Columbia	•	•		•	1.5
Florida		•	•	•	1.5
Georgia	•	•	•		1.5
Hawaii		•	•	•	1.5
Kentucky	•	•	•		1.5
Louisiana	•		•	•	1.5
Maine	•		•	•	1.5
Maryland	•	•	•		1.5
Missouri	•		•	•	1.5
Montana	•	•	•		1.5
New York	•	•	•		1.5
Oklahoma	•	•	•		1.5
South Carolina	•	•	•		1.5
Virginia	•	•	•		1.5
Wisconsin	•		•	•	1.5
Alaska	•	•			1
Arizona	•		•		1
Kansas	•		•		1
Michigan		•	•		1
Mississippi		•		•	1
Nevada		•	•		1
New Jersey		•	•		1
Ohio		•	•		1
Idaho			•		0.5
Indiana	•				0.5
Iowa		•			0.5
Nebraska		•			0.5
South Dakota		•			0.5

State	New and existing state building requirements	Benchmarking requirements for public buildings	ESPC policy and programs	Efficient fleets	Total score (2 pts.)
Wyoming			•		0.5
North Dakota					0
Pennsylvania					0
West Virginia					0

Leading and Trending States: Lead-by-Example Initiatives

Rhode Island. In 2015, Governor Gina Raimondo signed Executive Order 15-17, establishing the Lead by Example program within the state's Office of Energy Resources (OER) to oversee efforts to reduce energy consumption and GHG emissions in state facilities. This executive order also requires state agencies to reduce energy consumption by 10% by FY 2019, from a 2014 baseline. OER must establish interim goals, publicly disclose state energy data, and provide agencies with technical assistance. In 2017 OER hosted its inaugural Lead by Example Awards to recognize 11 state agencies, quasi-public agencies, and municipalities for their renewable energy and energy efficiency achievements.

Oregon. Signed by Governor Kate Brown in November 2017, Executive Order 17-20 establishes an ambitious multidimensional plan to cut energy use and carbon emissions in state buildings and residential and commercial construction. It calls for updates to building energy codes to require electric vehicle–ready building construction and zero energy–ready homes. The order further directs all state agencies to adopt targets for any remodels and directs the Oregon Department of Energy to report and track all state-owned building energy use to guide energy conservation efforts. New state-owned office buildings permitted after January 1, 2022, must be designed to operate as carbon neutral and follow energy use and renewable energy requirements of ASHRAE Standard 189.1. The EO also calls for a statewide plug-load management strategy and a variety of other measures to improve uptake of EVs, improve state standards for appliances and water efficiency, and improve coordination of energy data across the region.

Washington. In 2018, Governor Jay Inslee signed Executive Order 18-01, establishing several new lead-by-example initiatives. This order includes a focus on zero-energy buildings and requires state agencies to prioritize the purchase or lease of battery electric vehicles (BEVs). It also sets goals for state agencies to purchase environmentally preferable products, and establishes a Governing Council to oversee the goals of the executive order.

New Hampshire. In 2016 New Hampshire joined DOE's Energy Savings Performance Contracting Accelerator in order to expand technical support for agencies interested in engaging ESPCs, to do more projects with limited resources, and to encourage agencies to take ownership of ESPC projects. In order to provide agencies with better information and energy efficiency advocates, the state has developed and is using an ESPC Champions Network. In addition, New Hampshire requires every agency and department that is responsible for utility expenses to benchmark energy and water use.

R&D

R&D programs drive advances in energy-efficient technologies, and states play a unique role in laying the foundation for such progress. By leveraging resources in the public and private sectors, state government programs can foster collaborative efforts and rapidly create, develop, and commercialize new energy-efficient technologies. These programs can also encourage cooperation among organizations from different sectors and backgrounds to further spur innovation.

In response to the increasing need for state initiatives in energy-related R&D, several state bodies established the Association of State Energy Research and Technology Transfer Institutions (ASERTTI) in 1990. ASERTTI members collaborate on applied R&D and share technical and operational information, emphasizing end-use efficiency and conservation.

Aside from those institutions affiliated with ASERTTI, numerous other state-level entities (including universities, state governments, research centers, and utilities) fund and implement R&D programs to advance energy efficiency throughout the economy. Such programs include research on energy consumption patterns in local industries and the development of energy-saving technologies at state or university research centers and through public–private partnerships.

Individual state research institutions provide expertise and knowledge that policymakers can draw from to advance successful efficiency programs. And through information sharing—facilitated by ASERTTI membership—states can benefit from one another's research. States without R&D institutions can use this shared information as a road map to begin or advance their own efficiency programs. Even leading states can improve or add to their R&D efforts by drawing from other states' programs and best practices.

SCORES FOR R&D

We reviewed state energy efficiency R&D institutions based on information collected from our survey of state energy officials and other, secondary research. This research complemented information we had previously collected from the *National Guide to State Energy Research Centers* (ASERTTI 2012). In scoring this metric, we awarded 0.5 points for each major state government-funded R&D program dedicated to energy efficiency, up to a maximum of 1 point. We included programs administered by state government agencies, public–private partnerships, and universities. Because R&D funding often fluctuates, and because it is difficult to determine the dollar amount that specifically supports energy efficiency, we do not currently score R&D on the basis of program funding or staffing levels.[59] We recognize that the presence of an R&D institution does not guarantee the deployment of technologies being developed or the achievement of actual energy savings. In future *State Scorecards*, we will seek ways to refine this metric through additional quantitative data. For full descriptions of state energy efficiency R&D program activities, visit ACEEE's State and Local Policy Database (ACEEE 2018).

[59] Institutions that focus primarily on renewable energy technology or alternative-fuel R&D do not receive credit in the *Scorecard*. In addition, programs that serve primarily an educational or policy-development purpose also do not receive points.

Table 38 presents the scores.

Table 38. Scores for R&D institutions with energy efficiency-focused research

State	R&D institutions	Score (0.5 pt.)
Alabama	University of Alabama's Center for Advanced Vehicle Technologies	0.5
Alaska	Cold Climate Housing Research Center	0.5
Arizona	Sustainable Energy Solutions Group of Northern Arizona University, Arizona State University's LightWorks Center	0.5
California	California Energy Commission's Electric Program Investment Charge (EPIC) Program and Natural Gas Research and Development Program, University of California–Davis's Center for Water-Energy Efficiency and the Energy Efficiency Center, University of California–Berkeley's Center for the Built Environment, University of California–Los Angeles's Center for Energy Science and Technology Advanced Research and Smart Grid Energy Research Center, University of California–Irvine Plug Load Research Center (CalPlug)	0.5
Colorado	Colorado State University's Engines and Energy Conversion Lab and Institute for the Built Environment; University of Colorado–Boulder's Renewable and Sustainable Energy Institute; Colorado School of Mines' Research in Delivery, Usage, and Control of Energy and Center for Renewable Energy Economic Development; Colorado Energy Research Collaboratory	0.5
Connecticut	University of Connecticut's Center for Clean Energy Engineering, DEEP's Energy Efficiency & Renewable Energy Test Bed Program, Connecticut Center for Advanced Technology	0.5
Delaware	University of Delaware's Center for Energy and Environmental Policy and Mid-Atlantic Industrial Assessment Center (IAC), Delaware Technical and Community College energy facilities	0.5
District of Columbia	Green Building Fund Grant Program	0.5
Florida	University of Central Florida's Florida Solar Energy Center; Florida State University's Energy and Sustainability Center; University of Florida's Florida Institute for Sustainable Energy; University of South Florida's Clean Energy Research Center; University of Florida's Florida Energy Systems Consortium; University of West Florida's Community Outreach, Research and Education	0.5
Georgia	Southface Energy Institute, Georgia Institute of Technology's Brook Byers Institute for Sustainable Systems	0.5
Hawaii	Hawaii Natural Energy Institute at the University of Hawaii	0.5
Idaho	Center for Advanced Energy Studies	0.5

State	R&D institutions	Score (0.5 pt.)
Illinois	University of Illinois at Chicago's Energy Resources Center, Illinois Sustainable Technology Center, University of Illinois Urbana-Champaign Department of Urban and Regional Planning and Smart Energy Design Assistance Center, Gas Technology Institute	0.5
Indiana	Purdue University Energy Efficiency and Reliability Center	0.5
Iowa	Iowa Energy Center, research support through the Iowa Economic Development Authority, University of Northern Iowa Center for Energy and Environmental Education	0.5
Kansas	Studio 804, Inc.; Wichita State University's Center for Energy Studies	0.5
Kentucky	University of Louisville's Conn Center for Renewable Energy Research	0.5
Maine	Maine Technology Institute	0.5
Maryland	University of Maryland's Energy Research Center and Maryland Clean Energy Technology Incubator	0.5
Massachusetts	Massachusetts Energy Efficiency Partnership, University of Massachusetts–Amherst's Center for Energy Efficiency and Renewable Energy	0.5
Michigan	Michigan NextEnergy Center	0.5
Minnesota	Conservation Applied Research and Development Program, Center for Diesel Research at the University of Minnesota, Center for Sustainable Building Research, Center for Energy and Environment's Innovation Exchange	0.5
Mississippi	Mississippi State University's Energy Institute	0.5
Missouri	Midwest Energy Efficiency Research Consortium, National Energy Retrofit Institute, Missouri University of Science and Technology's Energy Research and Development Center.	0.5
Nebraska	Nebraska Center for Energy Sciences Research, Energy Savings Potential program, University of Nebraska Utility Corporation	0.5
Nevada	Center for Energy Research at University of Nevada–Las Vegas	0.5
New Jersey	Rutgers Center for Green Building	0.5
New York	New York State Energy Research and Development Authority, State University of New York's Center for Sustainable & Renewable Energy at SUNY-ESF, Syracuse University's Building Energy and Environmental Systems Laboratory, City University of New York's Institute for Urban Systems, Albany State University's Energy and Environmental Technology Application Center (E2TAC)	0.5
North Carolina	North Carolina A&T State University's Center for Energy Research and Technology, Appalachian State University's Energy Center, NC Clean Energy Technology Center at NC State University	0.5
Ohio	Ohio State University's Center for Energy, Sustainability, and the Environment	0.5
Oregon	Oregon Built Environment and Sustainable Technologies Center, University of Oregon's Energy Studies in Building Laboratory and Baker Lighting Lab, Portland State University's Renewable Energy Research Lab, Energy Trust of Oregon, Oregon Transportation Research and Education Consortium	0.5

State	R&D institutions	Score (0.5 pt.)
Pennsylvania	Leigh University's Energy Research Center, Penn State's Indoor Environment Center and Consortium for Building Energy Innovation, Penn State at the Navy Yard, Carnegie Mellon University Wilton E. Scott Institute for Energy Innovation	0.5
Rhode Island	University of Rhode Island Energy Fellows Program	0.5
Tennessee	University of Tennessee partnership with Oak Ridge National Laboratory and the Electric Power Research Institute, CURENT	0.5
Texas	Texas A&M's Engineering Experiment Station, University of Texas–Austin's Center for Energy and Environmental Resources	0.5
Utah	Alliance for Computationally Guided Design of Energy Efficiency Electronic Materials (CDE3M), USTAR Energy Research Triangle Program	0.5
Vermont	University of Vermont Smart Grid Research Center	0.5
Virginia	Southern Virginia Product Advancement Center, R&D Center for Advanced Manufacturing and Energy Efficiency	0.5
Washington	Northwest Building Energy Technology Hub, Clean Energy Fund	0.5
West Virginia	West Virginia University Energy Institute	0.5
Wisconsin	Energy Center of Wisconsin, Wisconsin Focus on Energy, and University of Wisconsin's Solar Energy Lab	0.5

Leading and Trending States: R&D Initiatives

Colorado. Colorado State University, the University of Colorado, and the Colorado School of Mines all have research centers and facilities dedicated to developing energy efficiency and clean energy technologies. The Center for Renewable Energy Economic Development also plays a major role in Colorado's energy efficiency activities by promoting and supporting new clean-tech companies throughout the state.

Delaware. The University of Delaware has several centers that conduct energy efficiency–related research. Its Mid-Atlantic Industrial Assessment Center (IAC) provides energy, waste, and productivity assessments to small and midsize manufacturers, with an emphasis on energy efficiency. Since its creation, IAC has provided energy efficiency recommendations to more than 100 clients, achieved energy bill reductions of 10–30%, and been recognized by the US Department of Energy as a "Center of Excellence." Faculty and research staff at the university's Center for Energy and Environmental Policy conduct studies on sustainable energy utilities and clean energy futures. In addition, the Delaware Technical and Community College recently opened energy efficiency workforce development centers on three of its campuses.

Florida. Florida's universities host an array of energy efficiency research, investing more than $5 million in the institutions that lead this work. The University of Florida's Florida Institute for Sustainable Energy performs research on efficient construction and lighting and has more than 150 faculty members at 22 energy research centers. The University of Central Florida's Florida Solar Energy Center focuses on energy-efficient buildings, schools, and standards and has a similarly large faculty. The state created the Florida Energy Systems Consortium to bring universities together to share their energy-related expertise. Twelve universities participate in the working group, conducting R&D on innovative energy systems that lead to improved energy efficiency and expanded economic development for the state.

New York. The New York State Energy Research and Development Authority (NYSERDA) supports a broad range of technology research, development, and commercialization activities to improve the energy efficiency of, and expand the energy options for, the buildings, industrial, transportation, power, and environmental sectors of the New York economy. NYSERDA invests in scientific research, market analysis, product development, and technology field validation. These investments produce knowledge on the environmental impacts of current and emerging energy options, support early-stage market analysis associated with new technologies, advance clean energy innovations toward market readiness, and stimulate innovation.

Energy Efficiency Programs for Low-Income Households

As discussed in Chapter 2, low-income households often face a disproportionate energy burden that can be alleviated by energy efficiency (Drehobl and Ross 2016). Reducing energy burdens for low-income households not only keeps money in these families' pockets but also improves their quality of life by creating healthier homes and neighborhoods. These efforts can help states address other priorities such as reduced emissions, economic development, and improved public health.

Energy efficiency programs for low-income households are often supported by a diverse array of funding streams that include federal, state, or ratepayer dollars. They can be administered by utilities, state government, community action agencies, or other

organizations. In Chapter 2 we specifically highlight utility- and ratepayer-funded low-income energy efficiency efforts, although in practice these are often combined with other funding streams since nonutility weatherization funding can be used to leverage ratepayer funds and vice versa. State energy offices, state housing agencies, and partner agencies also have many options for investing in energy efficiency in low-income communities. These options include:

- Designing energy efficiency programs or incentives specifically for low-income households and investing state resources alongside federal and ratepayer dollars
- Leveraging existing Weatherization Assistance Program delivery channels to expand energy efficiency offerings to program participants
- Providing technical assistance and financial resources to public housing authorities as they work with ESCOs to improve their properties
- Encouraging agencies and organizations allocating federal grants to low-income recipients, such as the Low Income Housing Tax Credit, to prioritize energy efficiency in their allocation process

Through ongoing research and outreach, ACEEE is working to help states and utilities identify the challenges and opportunities in delivering energy efficiency to this underserved market. Below, we highlight several examples of states that have enacted policies or programs for low-income communities.

Leading and Trending States: Low-Income Energy Efficiency Policies and Programs

Kentucky. In 2016 the Kentucky State Energy Office used DOE State Energy Program funds to deliver energy efficiency to impoverished coal counties to stimulate job creation and reduce costs for homeowners and businesses. The state offered several programs to reduce energy usage in local government facilities and to inform consumers, teachers, small businesses, and industrial customers about energy efficiency.

Tennessee. The Tennessee Department of Environment and Conservation's Office of Policy and Planning and Office of Energy Programs convene a working group on best practices in low-income multi- and single-family energy efficiency program design and implementation. Through this group, state and local agencies, utilities, and nongovernmental organizations have worked together to develop a low-income energy efficiency program resource manual and toolkit. In addition, in its allocation of the Low-Income Housing Tax Credit, the Tennessee Housing Development Agency prioritizes energy-efficient properties in its selection process, driving applicants to pursue certification by Enterprise Green Communities.

California. The state allocates Greenhouse Gas Reduction Funds to the Department of Community Services and Development (CSD) to help low-income residents in disadvantaged communities reduce their energy use through the Low-Income Weatherization Program (LIWP). CSD leverages funding from several sources, including LIWP, ratepayer-funded weatherization programs, and the federally funded Weatherization Assistance Program. CSD collaborates with the California investor-owned utilities and the California Public Utility Commission on opportunities to share information on residential energy usage and more effectively target and qualify households for efficiency and weatherization services.

Wyoming. The state's housing finance agency—Wyoming Community Development Authority (WCDA)—offers its Energy Savers Loan to income-qualified existing single-family homes. WCDA offers loan recipients up to $15,000 for home rehabilitation services, including health and safety repairs, building envelope upgrades, and other energy efficiency improvements (WCDA 2015).

Missouri. The Division of Energy (DE) within the Missouri Department of Economic Development administers utility weatherization program funds on behalf of four investor-owned utilities. To advocate for increased utility funding for low-income energy efficiency programs and to caution against rate designs that negatively impact these consumers, DE intervenes in Missouri Public Service Commission proceedings and participates in a commission-established collaborative on demand-side management programs. In addition, the division participates in the US DOE's Low-Income Accelerator Program and in a coalition of national nonprofits called Energy Efficiency for All.

Connecticut. The Connecticut Green Bank and the Housing Development Fund provide loans and technical assistance to affordable multifamily building owners pursuing energy efficiency improvements and clean energy projects. Funded with a $5 million grant from the MacArthur Foundation, the program will finance energy efficiency upgrades and health and safety remediation measures in eligible properties (The Commercial Record 2016).

POSSIBLE NEW METRICS

During the data collection process for the *2018 State Scorecard*, we considered a variety of new metrics that might more accurately and comprehensively reflect state efforts to improve energy efficiency across sectors. Attempting to refine our analysis of financial incentives, we collected data on state budgets for incentives and financing programs, participation rates, verified energy savings, dollar savings, and the leveraging of private capital. To collect these data, we relied on our requests to state energy offices. We tried to collect enough information for each potential metric to include it in our analysis, but the data we received were not robust enough to use. For example, savings data were generally program specific rather than portfolio wide, and in several cases savings were projected rather than verified. Moreover, states often provided budget data at the agency level and reported participation rates without including the number of eligible customers. For a summary of quantitative data received in 2018 for state financial incentives, performance contracting, and public building energy benchmarking, see Appendixes H–J. We will continue to solicit data from states on these potential metrics and refine our financial incentives scoring methodology in the future, as data availability permits.

Energy Efficiency Financing

To an increasing degree, states are leveraging private capital alongside public dollars to incentivize energy efficiency. Green banks, for example, combine public and ratepayer funds to stimulate private investment in clean energy projects.[60] PACE financing is another increasingly popular public–private partnership model for which we now give credit.

One of the obstacles to measuring the success of private energy efficiency financing is the absence of protocols for measuring and verifying energy savings. Non-ratepayer programs—public and private alike—often have less rigorous EM&V protocols than do utility-run programs. In addition, private institutions offering these financing tools often do not prioritize the collection of energy savings data. While we have begun to credit such incentives in a qualitative way when they are appropriately funded, we will continue to solicit quantitative data from states to better understand these programs' effectiveness.

[60] While we do credit evaluated savings from financing programs (including on-bill financing programs) in the utilities chapter, in this chapter we recognize financing programs, such as green banks, that leverage additional, non-ratepayer state resources.

Green Banks

Challenges and Opportunities

State and local governments can create green banks in order to overcome barriers faced by consumers and lenders in financing energy efficiency and renewable energy projects. These financing institutions offer public dollars and leverage private funds to unleash new investment, reduce costs, and increase consumer demand in the clean energy sector. In addition, green banks often provide technical assistance to clean energy projects across sectors to help consumers understand available funding streams and to simplify the process of purchasing efficiency technologies (CGC 2015). Because most state green banks are in the early planning stages and have yet to reach full scale, there is a lack of data on their performance (Gilleo, Stickles, and Kramer 2016). To more accurately assess the impacts of financing programs offered by green banks, policymakers and program administrators should collect data—and standardize data collection efforts—on the following metrics:

- *Energy savings*. Independently evaluated energy savings achieved as a result of green bank investments
- *Leverage*. The ratio of private loan capital deployed and public or ratepayer funds used
- *Market penetration*. In particular, whether financing is available to low-income, multifamily, and other underserved markets
- *Coordination with utility programs*. The extent to which green banks and utilities coordinate program offerings

Leading and Trending States

Connecticut. The Connecticut Green Bank (CGB) is a quasi-public organization created by the Connecticut General Assembly in 2011 as the nation's first green bank. CGB funding comes from a system benefits charge, RGGI auction proceeds, and ARRA funds. CGB administers a statewide PACE program and offers an array of energy efficiency and renewable energy financing options to Connecticut municipalities, businesses, multifamily building owners, and other residences—including those occupied by low-income households. The CGB continued to grow through 2017, surpassing $1 billion of investment, with every dollar of public ratepayer money bringing in $8 of private capital. In FY 2017, CGB programs saved almost 530,000 MMBtus and created more than 1,600 clean energy jobs in the state (CGB 2017).

New York. The New York Green Bank (NYGB) was established in 2013 as a state-sponsored specialty financing entity, housed under the New York State Energy and Development Authority (NYSERDA). NYGB combines funds from ratepayers and RGGI to leverage private clean energy capital. NYGB's recent energy efficiency projects include retrofits to the Northpoint School District and New York City Housing Authority developments, a CHP system installation at the Hebrew Home for the Aged, and funding for a residential energy software company called Sealed, Inc. As of March 2018, NYGB has received more than $2.6 billion in investment proposals since inception, with an active pipeline of $704.2 million of potential investments proceeding to close. To date NYGB's investments have driven between 6 million and 8 million metric tons of gross lifetime GHG reductions, equivalent to removing 60,000 to 80,000 cars from the road for the next 23 years.

Chapter 7. Appliance and Equipment Efficiency Standards

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INTRODUCTION

Every day we use appliances, equipment, and lighting in our homes, offices, and public buildings. Even when the energy consumption of a particular device seems small, the extra energy consumed by less-efficient products collectively adds up to a substantial amount. For example, a single computer might waste a small amount of electricity, but the energy wasted by millions of computers in the United States is considerable. Persistent market barriers inhibit sales of more-efficient models to consumers. Appliance efficiency standards overcome these barriers by initiating change at the manufacturer level, requiring appliance makers to meet minimum efficiency levels for all products and thereby removing the most inefficient products from the market.

States have historically led the way in establishing standards for appliances and other equipment. In 1976 California became the first state to introduce appliance standards. Many others, including New York and Massachusetts, soon followed. Congress established the first national benchmarks in 1987 when it passed the National Appliance Energy Conservation Act, which included standards based on those previously adopted by California and several other states. Congress enacted additional national standards in 1988, 1992, 2005, and 2007. In general, these laws set initial standards for specific products and require the DOE to periodically review and, if warranted, strengthen them. More than 60 products are now subject to national efficiency standards. Most directly relate to energy use, although several address water efficiency.

Existing national standards save US households about $500 a year on utility bills, or about 16% of average annual utility bill spending in 2015. Businesses saved a total of $23 billion in utility bills in that year, or about 8% of total business spending on electricity and natural gas. Total household and business utility bill savings reached $80 billion in 2015. Annual savings will increase to nearly $150 billion by 2030 as new national standards kick in and the effects of existing ones grow (deLaski and Mauer 2017).

Over the years there has been an inverse relationship between standards activity at the federal and state levels. When federal activity slows down, the impetus for states to set standards increases, and vice versa. Progress on federal standards stalled in 2017 and 2018. The Trump administration withheld four completed national standards from final publication and missed legal deadlines for the review of about a dozen others. States responded to the federal slowdown, with the California Energy Commission (CEC) adding several products to its rulemaking schedule and lawmakers in five other states filing standards legislation based on findings from the ACEEE report, *States Go First* (Mauer, deLaski, and DiMascio 2017). The report recommends a package of standards that states can adopt and analyzes potential energy, water, and utility bill savings and emissions reductions.

Federal preemption generally prevents states from setting standards for federally regulated products. States that wish to implement their own standards after federal preemption generally must apply for a waiver; however states remain free to set standards for any

products that are not subject to national standards. These can have significant energy and water savings benefits and set precedents for adopting new national standards.

At the state level, California remains deeply engaged, with an extensive set of standards, reporting requirements, and labeling regulations in place and more under development. After completing standards for computers and computer monitors in the spring of 2017, the California Energy Commission (CEC) adopted revised standards for portable electric spas in April. CEC also initiated rulemakings for commercial and industrial air compressors, hearth products, portable air conditioners, and certain linear fluorescent lamps.

Legislators in Hawaii, Massachusetts, Rhode Island, Vermont, and Washington filed bills in 2018 to adopt new state standards. The efficiency levels are based on California standards, ENERGY STAR and Water Sense specifications, and completed but never published federal standards. The Vermont bill, signed by Governor Phil Scott on May 21, adopts new standards for 16 products including computers and monitors, faucets, showerheads, commercial dishwashers, and portable air conditioners.

A year earlier, in May 2017, Vermont enacted all existing federal standards as state law. Under the law, if a federal standard is repealed, it will still be in force in Vermont. The 2018 bills filed in Massachusetts, Rhode Island, and Washington also include protection against federal rollbacks alongside new standards for a range of products.

SCORING AND RESULTS

States could earn up to 2.5 points for state-specific appliance standards that are not currently preempted by federal standards; they could earn another 0.5 points for adopting existing federal standards, including those for light bulbs due to take effect in 2020. This scoring system credits states for adopting new standards that substitute for or expand on existing federal standards.

We credited standards only if the compliance date (not the adoption date) for at least one state with an equivalent standard was within the past five calendar years or is slated for the future. This acknowledges the important role early adopters play in paving the way for other states. (The five-year limit also deemphasizes some older state standards that garner little or no savings.) For example, California adopted efficiency standards for televisions in 2009 (compliance required in 2011), followed by Connecticut in 2011 (compliance required in 2014) and Oregon in 2013 (compliance required in 2014). California, Connecticut, and Oregon get credit for television standards in 2018 because the most recent compliance date (2014) is within the past five years. All three states will get credit for these standards in 2019 as well. But if no additional states pass television standards, we will not count those savings in 2020, since no compliance dates will be within five calendar years.

We calculated scores for the adoption of state standards based on cumulative per-capita savings (measured in million Btus) through 2030. We used a floating start date that aligns with each state's product compliance date. For example, standards for commercial dishwashers will take effect in Vermont in 2020. Our savings analysis for that product in Vermont covers the period from 2020 to 2030. If another state adopts the same standard

with a later compliance date, the analysis will begin in the year the standards take effect in that state.

We estimated savings based on the approach used by ASAP and ACEEE in previous analyses of savings from appliance standards (Mauer, deLaski, and DiMascio 2017). We used estimates of annual shipments, per-unit energy savings, and average product lifetime based on the best available data. To estimate state-by-state shipments, we allocated national shipments to individual states on the basis of population. We also accounted for the portion of sales that had already met the standard level at the time the first state standard was established for a given product.

We normalized the savings estimates using the population of each state in order to rank states based on per-capita energy savings. We scored in 0.5-point increments up to a maximum of 2.5 points.

Table 39 shows the scoring breakdown for state standards.

Table 39. Scoring of savings from state appliance standards

Energy savings through 2030 (MMBtu/capita)	Score
30 or more	2.5
20–29.99	2
10–19.99	1.5
5–9.99	1
0.1–4.99	0.5
No energy savings	0

In this year's *Scorecard*, per-capita savings for California and Oregon are lower than in 2017. For 2018 we did not count savings from battery charger standards for either state since those standards are now preempted by federal standards. In addition, we revised our estimate of savings from general service lighting standards based on a new ASAP/ACEEE analysis, which affected the savings in California.

Table 40 shows the scoring results, with points allocated for the adoption of both state-specific and federal standards.

Table 40. Scoring for appliance efficiency standards

State	Energy savings from state standards through 2030 (MMBtu/capita)	Year most recent state standards adopted	Score for adoption of state standards	Score for adoption of federal standards	Total score (3 pts.)
California	35.7	2018	2.5	0.5	3
Vermont	11.7	2018	1.5	0.5	2
Connecticut*	8.3	2011	1.0		1

State	Energy savings from state standards through 2030 (MMBtu/capita)	Year most recent state standards adopted	Score for adoption of state standards	Score for adoption of federal standards	Total score (3 pts.)
Oregon	8.3	2013	1.0		1
Colorado	5.4	2014	1.0		1

* In 2017 we did not credit Connecticut for state television standards because the implementing agency had not written the state standards into regulations as required by state law. This year we are crediting Connecticut for its state television standards because, even absent the implementing regulations, television efficiency performance has improved nationally.

Scoring the maximum of 3.0 points, California continues to lead on appliance efficiency standards, most recently adopting standards for portable electric spas. Not only has California adopted the greatest number of standards, but several other states' standards are based on California's. Connecticut and Oregon earned credit for TVs, and Colorado for faucets and showerheads. Vermont earned credit for enacting a new law covering 16 products and for adopting all federal lighting and appliance efficiency standards.

Over the past decade, a handful of drought-prone states (California, Colorado, Georgia, and Texas) have adopted standards for faucets, showerheads, toilets, and urinals that put them on track to save a significant amount of water. The faucet and showerhead standards will also save energy by reducing hot-water consumption.

Leading and Trending States: Appliance and Equipment Efficiency Standards

California. The 1974 Warren–Alquist Act granted the California Energy Commission (CEC) first-in-the-nation authority to adopt appliance and equipment efficiency standards. Since that time, California has adopted standards for more than 100 products, many of which have subsequently been adopted at the federal level. For more details on CEC standards, see the CEC's *Current Appliance Efficiency Regulations* (CEC 2018b).

In 2018 California updated portable electric spa standards and initiated a public rulemaking process for portable air conditioners, commercial and industrial air compressors, hearth products, and certain linear fluorescent lamps (CEC 2018a). The state now has ongoing rulemakings for more than a dozen products.

Vermont. On May 21, 2018, Governor Phil Scott, for the second time in as many years, signed an appliance standards bill into law. Act 139 sets energy and water efficiency standards for 16 products, including three federal standards that were completed but never published (Vermont 2018). The 2017 law, Act 42, provides that the state can enforce federal standards if they are "withdrawn, repealed or otherwise voided" at the federal level (Vermont 2017). Efficiency measures protected by the 2017 law include all standards on the federal books as of January 17, 2017, including those that have yet to take effect, like the light bulb standards slated for 2020 (ASAP and ACEEE 2018).

Chapter 8. Conclusions

The past year was an emotional rollercoaster for energy efficiency, exciting and teeming with promise in several states, tumultuous and deeply disappointing in others. Energy efficiency savings in the utility sector were dealt devastating blows in some corners, particularly in Iowa and Connecticut, where legislators severely scaled back investment in efficiency for the coming years, with costs to customers in lost bill savings anticipated to reach into the hundreds of millions of dollars. Meanwhile, possible loosening of federal standards for cars, light trucks, and appliances had policymakers and efficiency advocates playing defense for much of the year. Yet there were also plenty of areas for long-term optimism, such as new grid modernization efforts to actively manage distributed resources and a growing acceptance among many utilities of the need to transition to new utility business models. These trends promise to open new possibilities for customer choice and an embrace of energy efficiency as a resource.

SETBACKS AND PROGRESS

First the challenges. While last year's *Scorecard* offered an abundance of good news, with states like Illinois, Michigan, Maryland, and Colorado all recommitting to energy efficiency by strengthening or extending their utility savings targets, in a few states 2018 brought some adversity to customers hoping to reduce energy waste and cut their utility bills. Shortly after the release of last year's *Scorecard*, Connecticut, a longtime leader in efficiency, slashed $127 million over two years, or roughly 33%, from the state's Energy Efficiency Fund to plug a budget deficit. Though the legislature later managed to restore $10 million in efficiency funds to the 2019 budget, the lasting damage is expected to include thousands of lost jobs and more than $250 million in lost bill savings (Connecticut EEB 2018). Then in January, Kentucky residents saw their efficiency programs all but stripped away after a commission order discontinuing almost all of Kentucky Power's DSM offerings, save for those serving low-income customers. Another severe setback came in May, when one of the standard-bearers of midwestern energy efficiency, Iowa, succumbed to a devastating attack on its demand-side offerings, with the legislature cutting utility efficiency investments by more than half through the imposition of a stifling spending cap on programs. To make matters worse, the bill went further to allow customers to opt out of paying for programs that fail to pass the Ratepayer Impact Measure test, a misguided and dated approach to cost–benefit measurement that nearly every state has moved away from, and which will likely choke off efficiency efforts for years to come.

But while the news for energy efficiency took a somber turn for a few states, there was cause for optimism in many others. On Earth Day, New York announced it would significantly raise electric efficiency targets for its investor-owned utilities to nation-leading levels of 3% of sales by 2025, in service to the state's Reforming the Energy Vision (REV) initiative and goals to cut GHG emissions 40% by 2030. The state's new efficiency strategy, released in April, calls for a wide-ranging portfolio of approaches to reach the 2025 target, including increasing market-based efficiency; greater leverage of public funds; consideration of a fuel-neutral approach; and strengthening statutes for building codes, appliance standards, and financing (NYSERDA 2018). With goals and a recommended way forward established, the real test lies ahead as the state must now turn to implementation.

Meanwhile, newly elected governors in New Jersey and Virginia brought a renewed focus to clean energy with plans to greatly increase investments in efficiency and reduce carbon emissions. In April New Jersey legislators passed a clean energy law that calls on its utilities to achieve 2% annual energy savings within the next five years; soon after, the state's Board of Public Utilities released a new strategic plan for the state's Clean Energy Program (CEP) that would greatly ramp up spending on efficiency—assuming leadership can break its habit of diverting CEP funds to other areas of the budget. Also in April, Virginia passed a grid modernization law that calls on the state's two largest utilities to spend roughly $1 billion on efficiency over the next decade, effectively tripling the state's heretofore minimal efforts to achieve savings.

Meanwhile, other states that passed major efficiency legislation in 2017 moved forward this year toward implementation. These included Illinois and New Hampshire, each of which put new demand-side management programs into effect, as well as Michigan, which filed new plans in response to increased incentives under PA 342. Nevada continued to work through proceedings to establish pending savings targets for NV Energy under SB 150, passed last year. In the meantime, earlier this year the utility filed a draft Joint Integrated Resource Plan that includes tentative plans for annual savings of 1.15% over the next three years, a significant improvement on the state's past efficiency efforts.

These states continued to make progress, driven by a recognition that the cheapest kilowatt-hour is still the one you never use and by the simple reality that energy efficiency is a least-cost energy resource, returning at least double its investment and saving American households, on average, $460 a year in electricity savings alone (Molina, Kiker, and Nowak 2016). Efficiency is also an enormous job creator, redirecting funds toward manufacturing and service providers. In fact, the 2018 *U.S. Energy and Employment Report* (USEER) found that energy efficiency jobs grew by 3% from 2016 to 2017, employing 2.25 million Americans, more than the combined total of jobs to produce coal, oil, gas, and electricity (NASEO/Energy Futures Initiative 2018).

The benefits go beyond lower energy bills and higher employment to include health and safety enhancements, a reduction in the energy burden among low-income residents, opportunities for strengthening grid resilience during severe weather, and provision of a low-cost way to reduce pollution and carbon emissions. Perhaps it is no surprise that 14 of the 17 governors that have signed on to the US Climate Alliance—a bipartisan coalition committed to reducing GHG emissions consistent with the Paris Agreement—are from states appearing in the top half of this year's *State Scorecard*.

TRENDS AND OPPORTUNITIES

US retail electricity sales fell in 2017 by the largest amount since 2009, reflecting a consistent trend over the past decade of sales leveling off or declining due to a range of factors including electricity prices, energy efficiency, and macroeconomic cycles. The new reality of flattening load growth has prompted a growing recognition of the need to transform utility business models and reform rate design to incorporate more performance-based standards that reward outcomes rather than the selling of more kilowatts. And the movement to shift home heating and transportation end uses away from high-emission fossil fuels to relatively cleaner regions of the electric grid—often referred to as beneficial electrification—represents

a significant opportunity for states to reduce emissions and for utilities to open new revenue streams while expanding charging infrastructure to support a growing EV market. An increasing number of states are, to varying degrees, working to address and harness this intensifying convergence of forces through grid modernization proceedings centered on reforming utility rates and business models as well as fostering advanced metering infrastructure (AMI) and energy storage. Energy efficiency should play a central role in those efforts to maximize public benefits.

New York's REV proceeding, launched in 2014 as an expansive effort to reimagine the grid as a distributed energy marketplace, forged ahead into an exciting second phase with actions related to AMI, energy storage, and creation of a Utility Energy Registry to improve access to customer energy data. California, a longtime pioneer of smart grid efforts, was also highly active, creating commission guidance early in the year regarding the classification, structure, timing, and cost-effectiveness evaluation of grid modernization investments. Meanwhile, Minnesota, through its e21 Initiative, has taken a slower, more incremental approach as it considers moving from a classic cost-of-service model to a more performance-based regime.

Similar modernization proceedings are ongoing in many other states, such as Ohio's PowerForward, Rhode Island's Power Sector Transformation Initiative, and the Illinois NextGrid Utility of the Future Study. As valuation approaches for distributed energy resources improve within grid modernization proceedings, system planners will have increasing opportunity to better leverage energy efficiency in a cost-effective way to reduce demand in areas and times of highest value.

Also contributing to this innovative push toward better leveraging of distributed resources is an ongoing search for new ways to combine public resources and private capital to help finance efficiency and clean energy. Green banks—public finance authorities aimed at accelerating clean energy market growth—continue to make waves as more state and local offshoots crop up across the United States, helping to make efficient use of private capital by addressing issues with scale and standardization of financing terms. As of September 2018, six states have green banks: California, New York, Connecticut, Hawaii, Nevada, and Rhode Island. NY Green Bank, having already driven nearly $1.4 billion in clean energy investment in the state by the start 2018, unveiled plans to raise an additional $1 billion from the private sector for financing clean energy projects, and to work with other state stakeholders to establish local green banks in other states. Meanwhile, Washington, DC signed legislation in June 2018 to establish its own, first-ever green bank.

Property Assessed Clean Energy (PACE) continued its push into new markets as well. As of May 2018, 33 states have passed PACE-enabling legislation, with active programs running in 20 of them and in Washington, DC. Other states, including Delaware, Pennsylvania, and South Dakota, also saw movement on potential PACE-enabling legislation in 2018, demonstrating the growing interest in the financing tool as a way to transform markets. According to PACENation, roughly $4.3 billion in home upgrades and $555 million in commercial projects have been financed through PACE since 2009. PACE did, however, suffer a setback in late 2017 when it was announced the Federal Housing Administration would reverse course and discontinue the agency's insurance of mortgages for homes with

PACE assessments, due to concern regarding lack of consumer protections. Yet it is anticipated that the decision will not have a significant impact on the market, especially as more states like California step in to pass PACE consumer protection laws.

Amid this experimentation, we continue to see energy efficiency deliver big savings and a variety of benefits. Although incremental energy savings in the utility sector have flattened overall in recent years, states continue to prove that they can reach high levels of savings using innovative strategies. Several states in the Northeast have shown that electricity savings of 2%—and even as high as 3%—are possible. And across the country, states are increasingly emphasizing energy efficiency's role in resilience efforts, be it through CHP, lower peak load, or more durable and sustainable buildings.

The role of states in strengthening fuel efficiency in the transportation sector was also in the spotlight this year as the federal government proposed plans in August to freeze previously established national vehicle efficiency standards for 2022–2025. The move drew greater attention to the leadership of California, which under a Clean Air Act waiver has been allowed to maintain stronger standards that have served as a model for those at the federal level. Twelve states and the District of Columbia currently use California's standards, soon to be joined by Colorado. California also maintains a zero emissions standard—similarly adopted by nine states and DC—requiring an increase in sales of plug-in hybrid, battery electric, and fuel-cell vehicles from 2018–2025. As the EPA and US DOT move forward with proposed plans, these state-level commitments to efficiency will be vital to maintaining national progress on fuel economy and tailpipe emissions.

Strengthening efficiency in the buildings sector was also a focus of many states in 2018, with several actively working toward adoption of new building energy codes. Garnering a great deal of attention was California, which in May adopted a first-of-its-kind code that will require new single-family homes and low-rise apartment buildings to have solar power—part of a mandate that new homes and commercial buildings be net-zero energy by 2020 and 2030, respectively. That same month, Pennsylvania voted to update its commercial and residential building energy codes to the 2015 IECC, including some provisions from the 2018 IECC; this decision to strengthen standards represents the first update to the state's code since 2009. Other states reviewing the 2018 IECC include Iowa, Illinois, Minnesota, Delaware, Washington, Nevada, New Hampshire, and Vermont.

The changing policy landscape and technological advances promise to bring a host of new challenges and opportunities in the coming years. These include long-awaited federal light bulb standards due to take effect in 2020, likely eliminating much of the low-hanging fruit utilities have historically relied on to drive up savings. Yet many promising technology opportunities continue to emerge, including smart technologies, advanced water-heating measures, and methods for better controlling plug loads, as do program strategies such as midstream market approaches. At the same time, the increasing attractiveness of renewable energy and storage resources is prompting dynamic discussions about the role energy efficiency can play in distribution system planning processes through geographically targeted programs and efforts to better understand and value the locational and temporal values of efficiency. While it remains to be seen what the energy system of the future will look like, it is certain that efficiency has the potential to provide substantial value to those

seeking to reduce energy costs, save customers money, and accelerate the transition to a clean energy economy.

DATA LIMITATIONS

The scoring framework used in this report is our best attempt to represent the myriad efficiency metrics as a quantitative score. Any effort to convert state spending data, energy savings data, and adoption of best-practice policies across six policy areas into one state energy efficiency score has obvious limitations. One of the most pronounced constraints is access to recent, reliable data on the results of energy efficiency. Because many states do not gather data on the performance of energy efficiency policy efforts, we use a best-practices approach to score some policy areas. As an example, it is difficult to score states on building energy code compliance rates given that many do not collect the relevant data, and also because of the variations in code stringency among states. In an effort to better quantify projected impacts of adopted codes, the current *Scorecard* transitioned this year toward using modeled energy performance values based on analysis of state-specific code amendments by the New Buildings Institute. However the actual, measurable success of these codes in reducing energy consumption is unclear without a way to verify implementation. As data become more readily available, we will continue to explore ways to incorporate a more quantitative assessment of compliance in future *Scorecard*s.

As in the past, we face a similar difficulty in scoring state-backed financing and incentive programs for energy efficiency investments. Though many states have seemingly robust programs aimed at residential and commercial consumers, few are able to relay information on program budgets or energy savings resulting from such initiatives. As a result, we can offer only a qualitative analysis of these programs. This lack of quantitative data is growing more pronounced as many states begin pouring financial resources into green banks. Without comparable results on dollars spent and rigorously evaluated energy savings, it is impossible to assess these programs with the same scrutiny that we bring to bear on utility programs.

POTENTIAL NEW METRICS

We have described relevant potential future metrics or revisions to existing metrics in several chapters of this year's *State Scorecard*. While we believe our data collection and scoring methodology are comprehensive, there is always room for modifications. As the energy efficiency market continues to evolve and data become more available, we will continue to adjust each chapter's scoring metrics. Here, we present some additional metrics that currently fall outside the scope of our report but nonetheless indicate important efficiency pathways.

State efficiency programs that fall outside utility-sector and public benefits programs are an area in which we continue to revise our data request; our goal is to find ways to transition to a more comprehensive and quantitative assessment. We hope to recognize state government and regulatory efforts to enable home and business owners to finance energy efficiency improvements through on-bill financing and other innovative incentive programs. One possible metric by which to compare state financial incentives is the level and sustainability of budgets for these programs. This information is available in some cases, but gathering it for all programs will continue to present challenges. We may also be able to compare state

energy efficiency R&D efforts on the basis of budgets and staffing levels, but data availability is again an issue.

Transportation electrification was an especially hot topic in 2018, with many utilities undertaking proceedings to explore the opportunities and challenges associated with a dramatic increase in electric vehicle adoption and their potential impacts on load growth and the electric grid. The role of utilities in helping facilitate this transition is an important ongoing conversation as questions abound regarding appropriate rate design, ownership of charging infrastructure, and coordination among utility, state, and local actors. As best practices continue to emerge, we hope to capture these efforts in future iterations of our transportation policies chapter.

As discussed in Chapter 6, states are increasingly leveraging private capital through mechanisms such as green banks and PACE financing to harness the free market to fund energy efficiency and clean energy. Here, too, we would like to expand the *Scorecard* to measure the progress of these programs. For example, we would like to better capture efforts to combine public and ratepayer funds to stimulate private investments in clean energy projects. However, as mentioned, these efforts are currently impeded by the absence of protocols for measuring and verifying energy savings when it comes to private financing. Non-ratepayer programs—public and private alike—often have less rigorous EM&V protocols than do utility-run programs. So, while we currently credit these incentives, our ability to do so in a quantitative manner will depend on the quality of available energy savings data.

Internet-connected devices, smart meters, and other intelligent efficiency technologies are proliferating in many states. These devices help overcome informational and motivational barriers to consumer uptake of energy efficiency. Similarly, a new industry is emerging that uses social marketing and social media to encourage consumers to save energy—such as by giving customers frequent feedback on their energy use and tailored energy-saving tips. Data-focused policies—such as state data privacy policies, disclosure of building energy use, and data-access policies such as the industry-led Green Button standard—can help this promising energy efficiency area grow. The *State Scorecard* began collecting information on data-access policies in 2015 and continued to do so this year. Although we have yet to quantify progress on data access in a scoring methodology, given the rapid advances many states are making in this area, we will continue to examine how our scoring can account for these achievements in future *Scorecards*.

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Appendix A. Respondents to Utility and State Energy Office Data Requests

State	Primary state energy office data request respondent	Primary public utility commission data request respondent
Alabama	Maureen Neighbors, Director, Energy Division, Alabama Department of Economic and Community Affairs	—
Alaska	—	Anne Marie Jensen, Process Coordinator, Regulatory Commission of Alaska
Arizona	—	—
Arkansas	Mitchell Simpson, Director, Arkansas Energy Office	Robert Booth, Rate Case Analyst, Arkansas Public Service Commission
California	Bill Pennington, Deputy Division Chief, Efficiency and Renewable Energy Division, California Energy Commission	Amy Reardon, Senior Regulatory Analyst, California Public Utility Commission
Colorado	Kathleen Staks, Executive Director, Colorado Energy Office	Seina Soufiani, Engineer, Colorado Public Utilities Commission, Department of Regulatory Agencies
Connecticut	Michele Melley, Associate Research Analyst, Connecticut Department of Energy and Environmental Protection	Michele Melley, Associate Research Analyst, Connecticut Department of Energy and Environmental Protection
Delaware	Emily St. Clair, Energy Planner III, Delaware Department of Natural Resources and Environmental Control	Emily St. Clair, Energy Planner III, Delaware Department of Natural Resources and Environmental Control
District of Columbia	Marshall Duer-Balkind, Program Analyst, District Department of Energy & Environment	Ben Plotzker, Technical Energy Analyst, Vermont Energy Investment Corporation
Florida	Kelley Smith Burk, Director, Office of Energy, Florida Department of Agriculture and Consumer Services	Tripp Coston, Economic Supervisor, Conservation, Florida Public Service Commission
Georgia	Kristofor Anderson, Senior Program Manager, Georgia Environmental Finance Authority	Jamie Barber, Energy Efficiency and Renewable Energy Manager, Georgia Public Service Commission
Hawaii	—	David Parsons, Chief of Policy and Research, Hawaii Public Utilities Commission
Idaho	Katie Pegan, Idaho Governor's Office of Energy and Mineral Resources	Cassandra Koerner, Utility Analyst, Idaho Public Utilities Commission
Illinois	—	David Brightwell, Economist, Illinois Commerce Commission
Indiana	—	
Iowa	Adrienne Ricehill, Program Manager, Iowa Economic Development Authority	Brenda Biddle, Utility Specialist, Iowa Utilities Board
Kansas	—	—
Kentucky	Lee Colten, Assistant Director, Kentucky Department for Energy Development and Independence	Lee Colten, Assistant Director, Kentucky Department for Energy Development and Independence

State	Primary state energy office data request respondent	Primary public utility commission data request respondent
Louisiana	Paul Miller, Director, Technology Assessment Division, Louisiana Department of Natural Resources	—
Maine	Lisa Smith, Senior Planner, Governor's Energy Office	Jack Riordan, Strategic Initiatives, Efficiency Maine
Maryland	Kent Mottice, Policy Manager, Maryland Energy Administration	Amanda Best, Assistant Director, Energy Analysis and Planning Division, Maryland Public Service Commission
Massachusetts	Lyn Huckabee, Residential Energy Efficiency Program Coordinator, Massachusetts Department of Energy Resources	Lyn Huckabee, Residential Energy Efficiency Program Coordinator, Massachusetts Department of Energy Resources
Michigan	Robert Jackson, Director, Michigan Energy Office	Karen Gould, Staff, Energy Efficiency Section, Michigan Public Service Commission
Minnesota	Anthony Fryer, Conservation Improvement Program Coordinator, Minnesota Department of Commerce	Anthony Fryer, Conservation Improvement Program Coordinator, Minnesota Department of Commerce
Mississippi	Sumesh Arora, Director of Energy & Natural Resources Division, Mississippi Development Authority	Vicki Munn, Electric, Gas & Communications Division, Mississippi Public Utilities Staff
Missouri	Brenda Wilbers, Program Director, Division of Energy, Department of Economic Development	John Rogers, Utility Regulatory Manager, Missouri Public Service Commission
Montana	Garrett Martin, Senior Energy Analyst, Montana Energy Office	Robin Arnold, Policy Analyst, Montana Public Service Commission
Nebraska	David Bracht, Director, Nebraska Energy Office	David Bracht, Director, Nebraska Energy Office
Nevada	Robin Isaacs, Energy Program Manager, Nevada Governor's Office of Energy	Cristina Zuniga, Economist, Nevada Public Utility Commission
New Hampshire	—	Jim Cunningham, Utility Analyst, New Hampshire Public Utility Commission
New Jersey	Melissa Zito, Senior Analyst, TRC Solutions	Sherri Jones, Assistant Director, Division of Economic Development & Emerging Issues, New Jersey Board of Public Utilities
New Mexico	Harold Trujillo, Bureau Chief, Energy Technology and Engineering, New Mexico Energy Office	John Reynolds, New Mexico Public Regulation Commission
New York	Robert Bergen, New York State Energy Research and Development Authority (NYSERDA)	Allison Rose, New York State Energy Research and Development Authority (NYSERDA)
North Carolina	Russell Duncan, Energy Assurance Manager, North Carolina Department of Environmental Quality	Jack Floyd, Engineer, Electric Division, Public Staff, North Carolina Utilities Commission

State	Primary state energy office data request respondent	Primary public utility commission data request respondent
North Dakota	Norlyn Schmidt, Transportation Planner, North Dakota Department of Transportation	Sara Cardwell, Public Utility Analyst, North Dakota Public Service Commission
Ohio	—	Kristin DuPrée, Rates & Analysis Department, Public Utilities Commission of Ohio
Oklahoma	Jeremy Bennett, Energy Policy Advisor, Office of the Secretary of Energy & Environment	Kathy Champion, Regulatory Analyst, Oklahoma Corporation Commission
Oregon	Warren Cook, Manager, Energy Efficiency and Conservation, Oregon Department of Energy; Erik Havig, Planning Section Manager, Oregon Department of Transportation	Warren Cook, Manager, Energy Efficiency and Conservation, Oregon Department of Energy; Jean-Pierre Batmale, Senior Utility Analyst, Oregon Public Utility Commission; Allison Robbins Mace, Manager, Energy Efficiency Planning & Evaluation, Bonneville Power Administration
Pennsylvania	Libby Dodson, Energy Program Specialist, Department of Environmental Protection	Joseph Sherrick, Supervisor, Policy and Planning, Pennsylvania Public Utility Commission
Rhode Island	Carrie Gill, Program Services Officer, Rhode Island Office of Energy Resources	Todd Bianco, Principal Policy Associate, Rhode Island Public Utility Commission
South Carolina	—	—
South Dakota	—	Darren Kearney, Utility Analyst, South Dakota Public Utilities Commission
Tennessee	Shauna Basques, Communications Coordinator/Energy Analyst, Tennessee Department of Environment and Conservation	Kyle Lawson, Manager, Tennessee Valley Authority
Texas	William (Dub) Taylor, Director, State Energy Conservation Office, Comptroller of Public Accounts	Amy Martin, Vice President Consulting, Frontier Associates
Utah	Shawna Cuan, Energy Efficiency and Programs Manager, Governor's Office of Energy Development	Carol Revelt, Executive Staff Director, Utah Public Service Commission
Vermont	Kelly Launder, Assistant Director, Vermont Public Service Department	Barry Murphy, Energy Program Specialist, Vermont Public Service Department
Virginia	Barbara Simcoe, State Energy Program Manager, Virginia Division of Energy, Department of Mines, Minerals, and Energy	—
Washington	Michael Furze, Assistant Director, Energy Division, Washington Department of Commerce	Jennifer Snyder, Regulatory Analyst, Washington State Utilities & Transportation Commission
West Virginia	Tiffany Bailey, Energy Development Specialist, West Virginia Division of Energy	Randall Short, West Virginia Public Service Commission

State	Primary state energy office data request respondent	Primary public utility commission data request respondent
Wisconsin	Vanessa Durant, Grant Specialist, Public Service Commission of Wisconsin	Joe Fontaine, Focus on Energy Performance Manager, Public Service Commission of Wisconsin
Wyoming	—	—

Appendix B. Electric Efficiency Program Spending per Capita

State	2017 electric efficiency spending ($ million)	$ per capita
Vermont	64.0	102.42
Massachusetts	620.6	91.11
Rhode Island	83.4	78.95
Connecticut	153.9	43.03
Oregon	158.6	38.75
Washington	281.8	38.67
Idaho	64.6	38.35
California	1,412.1	35.98
Iowa	112.3	35.82
Maryland	201.5	33.50
Minnesota	165.0	29.89
Illinois	349.1	27.27
Maine	31.1	23.36
Arkansas	68.6	22.96
New York	450.1	22.80
Michigan	220.4	22.20
District of Columbia	13.9	20.41
New Hampshire	26.1	19.55
Kentucky	84.7	19.09
Delaware	18.2	19.06
New Mexico	38.7	18.60
Wyoming	10.5	17.88
North Carolina	180.9	17.82
Colorado	96.2	17.36
Nevada	51.0	17.34
Utah	51.4	16.85
Oklahoma	66.0	16.82

State	2017 electric efficiency spending ($million)	$ per capita
Arizona	115.4	16.65
Missouri	100.0	16.41
Ohio	186.9	16.09
Hawaii	20.8	14.55
Indiana	87.0	13.12
Pennsylvania	164.1	12.84
New Jersey	113.5	12.69
Montana	13.0	12.43
Wisconsin	70.6	12.22
Texas	257.7	9.25
Florida	190.3	9.23
Mississippi	27.6	9.23
Tennessee	52.5	7.89
West Virginia	14.2	7.75
South Carolina	29.8	6.01
Georgia	55.5	5.38
Nebraska	10.2	5.34
South Dakota	4.4	5.08
Alabama	16.2	3.33
Louisiana	7.3	1.57
Virginia	0.1	0.02
Alaska	—	0.00
Kansas	—	0.00
North Dakota	—	0.00
US total	**6,611.7**	**20.25**
Median	**96.2**	**23.36**

Appendix C. Large Customer Self-Direct Programs by State

State	Availability	Description
Arizona	Customers of Arizona Public Service Company (APS), Tucson Electric Power Company (TEP), and Salt River Project (SRP)	APS: Large customers using at least 40 million kWh per calendar year can elect to self direct energy efficiency funds. Customers must notify APS each year if they wish to participate, after which 85% of the customer's demand-side management contribution will be reserved for future energy efficiency projects. Projects must be completed within two years. Self-direct funds are paid once per year, once the project is completed and verified by APS. TEP: To be eligible for self-direct, a customer must use a minimum of 35 million kWh per calendar year. SRP: SRP makes self-direct available only to very large customers using more than 240 million kWh per year. For all utilities, a portion of the funds they would have otherwise contributed to energy efficiency is retained to cover self-direct program administration, management, and evaluation costs.
Colorado	Customers of Xcel Energy and Black Hills	Xcel: The self-direct program is available to commercial and industrial (C&I) electric customers who have an aggregated peak load of at least 2 MW in any single month and an aggregated annual energy consumption of at least 10 GWh. Self-direct program customers cannot participate in other conservation products offered by the company. Rebates are paid based on actual savings from a project, up to $525 per customer kW or $0.10 per kWh. Rebates are given for either peak demand or energy savings, but not both and are limited to 50% of the incremental cost of the project. Xcel uses raw monitoring results and engineering calculations to demonstrate actual energy and demand savings. Black Hills: To participate in the C&I self-direct program, customers must have an aggregated peak load greater than 1 MW in any single month and aggregated annual energy usage of 5,000 MWh. Rebates and savings are calculated on a case-by-case basis, with rebate values calculated as either 50% of the incremental cost of the project or $0.30 per kWh savings, whichever is lower.
Idaho	Customers of Idaho Power	Idaho Power offers its largest customers an option to self direct the 4% energy efficiency rider that appears on all customers' bills. Customers have three years to complete projects, with 100% of the funds available to fund up to 100% of project costs. Self-direct projects are subject to the same criteria as projects in other efficiency programs.
Illinois	Statewide for natural gas customers based on North American Industry Classification System (NAICS) code; pilot program for ComEd electric customers	Self-direct is generally applicable to customers of natural gas utilities subject to the Illinois Energy Efficiency Portfolio Standard. The North American Industry Classification System's (NAICS) threshold code number is 22111 or any such code number beginning with the digits 31, 32, or 33, and annual usage in the aggregate of 4 million therms or more in the affected gas utility's service territory or with aggregate usage of 8 million therms or more in the state. Customers must agree to set aside for their own use in implementing energy efficiency 2% of the customer's cost of natural gas, composed of the customer's commodity cost and the delivery service charges paid to the gas utility, or $150,000, whichever is less. For evaluation, the Illinois Department of Commerce and Economic Opportunity has the ability to audit compliance and take remedial action for noncompliance.

State	Availability	Description
Michigan	Statewide	Self-direct is available statewide. Customers must have had an annual peak demand in the preceding year of at least 1 MW in the aggregate at all sites. Customers may use the funds that would otherwise have been paid to the utility provider for energy efficiency programs; however they must submit the portion of the energy efficiency funds that would have been collected and used for low-income programs to their utility provider. Customers then calculate the energy savings achieved and provide the funds to their utility provider. The percentage of eligible customers statewide is not calculated; however in 2009 there were 77 large customers who self directed. By 2014 that number had dropped to 24.
Minnesota	Statewide	Minnesota offers a self-direct option, with a full exemption from assigned cost-recovery mechanism (CRM) fees, to customers with 20 MW average electric demand or 500,000 MCF of gas consumption. Customers must also show that they are making "reasonable" efforts to identify or implement energy efficiency and that they are subject to competitive pressures that make it helpful for them to be exempted from the CRM fees. Participating customers must submit new reports every five years to maintain exempt status. The utility is not involved in self-direct program administration; the state Department of Commerce manages self-direct accounts and is the arbiter of whether a company qualifies for self-direct and is satisfying its obligations.
Montana	Statewide (all regulated public utilities)	Customers with average monthly demand of 1,000 kW can self direct universal systems benefits (USB) funds. Self-direct customers are reimbursed for their annual energy efficiency expenditures up to the amount of their annual total of USB rate payments to their utility. The transaction occurs directly between the customer and the utility, and the latter tabulates and summarizes self-directed funds annually. This does not include specifics or evaluation of efficiency projects. Evaluation of savings claims is not required.
New Jersey	Statewide	Eligible customers must have contributed at least $300,000 in energy efficiency fee funds during the previous fiscal year. Customers can aggregate multiple buildings or sites together to meet the threshold. The facilities must also have a total annual billed peak demand of 400 kW or greater to ensure projects are large enough, since the program was designed for only the state's largest commercial and industrial customers. Participants submit a Draft Energy Efficiency Plan (DEEP), which gives the program an overview of the proposed project and serves as a basis for reserving incentives. The incentive structure returns 90% of a participant's New Jersey's Clean Energy Program (NJCEP) fund contribution from the previous fiscal year, unless that amount exceeds 75% of total project costs or $0.33 per projected kWh savings.

State	Availability	Description
New Mexico	Statewide in the territories of three investor-owned utilities (IOUs)	Self-direct is available statewide. Customers who use more than 7,000 MWh annually may administer their own energy efficiency projects (Southwestern Public Service). They receive an exemption of, or a credit for, an amount equal to expenditures that they have made at their facilities on and after January 1, 2005. Evaluation is required. Public Service Company of New Mexico reported three self-direct programs in 2015. Southwestern Public Service (SPS) reported no participants in either 2014 or 2015 and did not foresee any 2016 participants. El Paso Electric reported no participants in 2014.
New York	Statewide (all six electric utilities)	To be eligible, individual customers must have a 36-month average demand of 2 MW or greater. Customers with an aggregated 36-month average demand of 4 MW or greater will also be eligible if one or more of the accounts aggregated has at least a 36-month average demand of 1 MW. Upon enrollment, participants are assigned an Energy Savings Account (ESA) to collect their fee contributions for efficiency assessed on their utility bills, which would otherwise be allocated to the general pool for utility-administered energy efficiency programs. The utility manages the ESA and may retain up to 15% for program administration and measurement and verification (M&V). The program runs on a three-year cycle, and participants will have access to at least 85% of their energy efficiency fee contributions to fund-eligible projects during that time. Before projects are implemented, participants provide a Project Plan—including details on expected costs, savings, baseline calculation, M&V plan, and schedule—for the utility to review and approve.
Oregon	Customers of Portland General Electric, PacifiCorp, Idaho Power, and Emerald People's Utility District (PUD)	The self-direct option for the Public Purpose Charge is required for two of the three investor-owned utilities. This program is uniform statewide across all impacted utilities. One consumer-owned utility has chosen to design and run a self-direct program. Programs cover approximately 80% of the electric customers in Oregon. Eligible sites must demonstrate an average demand of over 1 MW in the prior year to enter and remain in the program. Participants in the three participating programs have the proposed projects technically reviewed by the Oregon Department of Energy. In two programs, expenditures toward qualified projects are used as credit to offset future Public Purpose Charges. The credit is applied on-bill. In the third program, the utility has a set-aside program in combination with credit toward future Public Purpose Charges. These funds are provided by check and/or on-bill. The Oregon Department of Energy conducts a technical review of claimed savings prior to project construction. It reviews a sampling of projects for actual performance. Of the estimated 230 eligible sites, 17 are participating. Utilities do not publish the percentage of eligible load saved. Total savings for 2015 were 2,743,000 kWh.

State	Availability	Description
Vermont	Statewide for both electric and natural gas customers	For electric energy efficiency, three self-direct options are available statewide: the Self-Managed Energy Efficiency Program (SMEEP), the Customer Credit Program (CCP), and Energy Savings Accounts (ESA). SMEEP is also available for the state's eligible gas customers. The SMEEP option requires prospective participants or their predecessors to have contributed $1.5 million to the Vermont Energy Efficiency Utility Fund (VEEUF) in 2008 or 2017 through the Energy Efficiency Charge (EEC) adder on their electric costs. Two customers meet that standard. The ESA option allows Vermont businesses that pay an EEC in excess of $5,000 per year (or an average of $5,000 per year over three years) to use a portion of their EEC to support energy efficiency projects in their facilities. For CCP, eligible customers must be ISO 14001 certified and meet several conditions similar to ENERGY STAR® for industrial facilities. Natural gas energy efficiency is available only for transmission and industrial electric and natural gas ratepayers who have a minimum of $1.5 million in customer efficiency charges for electric use. In addition, the Vermont Public Service Board lets eligible Vermont business customers self-administer energy efficiency through an ESA or the CCP. Customers still pay these funds into the VEEUF; the customers recoup the funds upon completion of an eligible energy efficiency measure. For natural gas, ESA and CCP participants can access a percentage of the funds paid into the VEEUF to undertake approved energy efficiency measures. For the SMEEP electric program, eligible customers must demonstrate that they have a comprehensive energy management program with annual objectives, or that they have achieved ISO 14001 certification. These customers must report to the Public Service Board, detailing the measures undertaken, the estimated energy and cost savings, and any related costs. The Board then reviews and approves the reports. The ESA account operates through Efficiency Vermont; the related savings are reported and verified through the savings verification mechanism. For CCP, eligible customers must be ISO 14001 certified and meet several conditions similar to ENERGY STAR for industrial facilities. Savings are verified through existing mechanisms.
Washington	All utilities have the option to develop self-direct options for industrial and commercial customers, but of the IOUs, only Puget Sound Energy has developed a self-direct program	Puget Sound Energy's self-direct program is available only to industrial or commercial customers on electric rate-specific rate schedules. The self-direct program operates on a four-year cycle comprising two phases: noncompetitive and competitive. During the noncompetitive phase, customers have exclusive access to their energy efficiency funds, which are collected over the four-year period. When this phase ends, any unused funds are pooled together and competitively bid on by the members of the self-direct program. Customers receive payment in the form of a check once the project is complete and verified. Participating customers do not receive any rate relief when they complete energy efficiency investments. The utility pre- and post-verifies 100% of the projects, including a review and revision of savings calculations to determine incentive levels. The program is included in the third-party evaluation cycle like any other utility conservation program.

State	Availability	Description
Wisconsin	Statewide	A self-direct option is open to customers that meet the definition of a large energy customer according to the 2005 Wisconsin Act 141. Under the self-direct option, a true-up at the end of the year returns contributions to participating customers for use on energy efficiency projects. Evaluation is required under Public Service Commission Administrative Code 137, with evaluation plans reviewed by that commission. This option has been available since 2008, but no customers have participated to date.

Appendix D. State Energy Efficiency Resource Standards

State Year(s) enacted Authority Applicability (% sales affected)	Description	Avg. incremental electric savings target per year (2016 onward)	Stringency	Reference	Score
Arizona 2010 Regulatory Electric and nat. gas IOUs, co-ops (~59%)	Electric: Incremental savings targets began at 1.25% of sales in 2011, ramping up to 2.5% in 2016–20 for cumulative annual electricity savings of 22% of retail sales, 2% of which may come from peak demand reductions. Natural gas: ~0.6% annual savings (for cumulative savings of 6% by 2020). Co-ops must meet 75% of targets.	2.5%	Binding	Docket No. RE-00000C-09-0427, Decision 71436 Docket No. RE-00000C-09-0427, Decision 71819 Docket No. RG-00000B-09-0428, Decision 71855	3.0
Arkansas 2018 Regulatory Electric and nat. gas IOUs (~53%)	Electric: Incremental targets for PY 2020–22 of 1.2% of 2018 retail sales for electric IOUs. Natural gas: Annual incremental reduction target of 0.50% for 2020–22 for natural gas IOUs.	1.2%	Opt-out	Order No. 43, Docket No. 13-002-U Order No. 17, Docket No. 08-144-U Order No. 1, Docket No. 13-002-U Order No. 7, Docket No. 13-002-U Order No. 31, Docket No. 13-002-U	1.5
California 2004, 2009, and 2015 Legislative Electric and nat. gas IOUs (~78%)	Electric: Average incremental savings targets of 1% of retail sales electricity. In October 2015, California enacted SB 350, calling on state agencies and utilities to work together to double cumulative efficiency savings by 2030. Natural gas: Incremental savings target of 0.56%. Utilities must pursue all cost-effective efficiency resources.	1.0%	Binding	CPUC Decision 04-09-060 CPUC Decision 08-07-047 CPUC Decision 14-10-046 AB 995 SB 350 (10/7/15) AB 802 (10/8/15)	1.5

State Year(s) enacted Authority Applicability (% sales affected)	Description	Avg. incremental electric savings target per year (2016 onward)	Stringency	Reference	Score
Colorado 2007 and 2017 Legislative Electric and nat. gas IOUs (~57%)	Electric: Black Hills follows Public Service Company of Colorado (PSCo) incremental savings targets of 0.8% of sales in 2011, increasing to 1.35% of sales in 2015. For 2015–20, PSCo had been required to achieve incremental savings of at least 400 GWh per year; starting in 2019, this was increased to 500 GWh. HB17-1227 extends programs and calls for 5% energy savings by 2028 compared to 2018. Natural gas: Savings targets commensurate with spending targets (at least 0.5% of prior year's revenue).	1.6%	Binding	Decision No. C18-0417 Proceeding No. 17A-0462EG Colorado Revised Statutes 40-3.2-101, et seq.; Docket No. 12A-100E Dec. R12-0900; Docket No. 10A-554EG Docket No. 13A-0686EG Dec. C14-0731; HB17-1227	2.0
Connecticut 2007 and 2013 Legislative Electric and nat. gas IOUs (~94%)	Electric: Average incremental savings of 1.51% of sales from 2016 to 2018. Natural gas: Average incremental savings of 0.61% per year from 2016 to 2018. Utilities must pursue all cost-effective efficiency resources.	1.5%	Binding	Public Act No. 07-242 Public Act No. 13-298 2016–18 Electric and Natural Gas Conservation and Load Management Plan	2.0
Hawaii 2004 and 2009 Legislative Electric Statewide goal (100%)	In 2009, transitioned away from a combined RPS-EERS to a stand-alone EEPS goal to reduce electricity consumption by 4,300 GWh by 2030 (equal to ~30% of forecast electricity sales, or 1.4% annual savings).	1.4%	Binding	HRS §269-91, 92, 96 HI PUC Order, Docket No. 2010-0037	1.0
Illinois 2007 and 2016 Legislative Electric and nat. gas utilities with more than 100,000 customers, Illinois DCEO (~88%)	Electric: Incremental savings targets vary by utility, averaging 1.77% of sales from 2018 to 2021, 2.08% from 2022 to 2025, and 2.05% from 2026 to 2030. SB 2814 also sets a rate cap of 4%, allowing targets to be adjusted downward should utilities reach spending limits. Natural gas: 8.5% cumulative savings by 2020 (0.2% incremental savings in 2011, ramping up to 1.5% in 2019).	1.7%	Cost cap	SB 1918 Public Act 96-0033 § 220 ILCS 5/8-103 Case No. 13-0495 Case No. 13-0498 S.B. 2814	2.0

State Year(s) enacted Authority Applicability (% sales affected)	Description	Avg. incremental electric savings target per year (2016 onward)	Stringency	Reference	Score
Iowa 2009 Legislative Electric and nat. gas IOUs (75%)	Legislative changes to Chapter 1135 modified previous policies. Electric: Incremental savings targets vary by utility from ~1.1–1.2% annually through 2018. Natural gas: Incremental savings targets vary by utility, ~0.66–1.2% annually through 2018.	0.6%	Binding	SB 2386 Iowa Code § 476 Iowa Code Chapter 1135 Public Utilities Docket No. EEP-2012-0001 Docket No. EEP-2018-0001 Docket No. EEP-2018-0002 Docket No. EEP-2018-0003	1.0
Maine 2009 Legislative Electric and nat. gas Efficiency Maine (100%)	Electric: Savings of 20% by 2020, with incremental savings targets of ~ 1.6% per year for 2014–16 and ~2.4% per year for 2017–19. Natural gas: Incremental savings of ~0.2% per year for 2017–19. Efficiency Maine operates under an all cost-effective mandate.	2.4%	Opt-out	Efficiency Maine Triennial Plan (2014–16) Efficiency Maine Triennial Plan (2017–19) HP 1128 – LD 1559	2.5
Maryland 2008 and 2015 Legislative through 2015, regulatory thereafter Electric IOUs (99%)	15% per-capita electricity use reduction goal by 2015 (10% by utilities, 5% achieved independently). 15% reduction in per capita peak demand by 2015 compared to 2007. After 2015, targets vary by utility, ramping up by 0.2% per year to reach 2% incremental savings.	2.0%	Binding	Maryland Public Utility Companies Code § 7-211 Maryland PSC Docket Nos. 9153–9157 Order No. 87082	2.0
Massachusetts 2009 Legislative Electric and nat. gas IOUs, co-ops, munis, Cape Light Compact (~86%)	Electric: Average incremental savings of 2.93% of electric sales for 2016–18. Natural gas: Average incremental savings of 1.24% per year for 2016–18. All cost-effective efficiency requirement.	2.9%	Binding	DPU 15-160 through DPU 15-169 (Massachusetts Joint Statewide Three-Year Electric and Gas Energy Efficiency Plan 2016–18) MGL ch. 25, § 21	3.0
Michigan 2008 and 2016 Legislative Electric and nat. gas Statewide goal (100%)	Electric: 1.0% incremental savings. Natural gas: Incremental savings of 0.75%. Targets carry forward in perpetuity for most utilities, but end in 2021 for non-rate regulated utilities (approximately 10% of state electric load).	1.0%	Binding	MGL ch. 25, § 21; Act 295 of 2008 S.B. 438	1.5

State Year(s) enacted Authority Applicability (% sales affected)	Description	Avg. incremental electric savings target per year (2016 onward)	Stringency	Reference	Score
Minnesota 2007 Legislative Electric and nat. gas IOUs, co-ops with more than 5,000 customers, and munis with more than 1,000 customers (~97%)	Electric: 1.5% incremental savings in 2010 and each year thereafter. Senate File 1456 signed in May 2017 exempts some rural utilities from meeting energy efficiency requirements through the Conservation Improvement Program (CIP). Natural gas: 0.75% incremental savings per year in 2010–12; 1% incremental savings in 2013 and each year thereafter.	1.5%	Binding	Minn. Stat. § 216B.241 SF 1456	2.0
Nevada 2005 and 2009 Legislative Electric IOUs (~62%)	20% of retail electricity sales to be met by renewables and energy efficiency by 2015, and 25% by 2025. Energy efficiency may meet a quarter of the standard through 2014, but allowances phase out by 2025. New targets are pending under SB 150, signed June 2017, directing the Nevada Public Utilities Commission to set new savings goals for NV Energy.	0.4%	Binding	NRS 704.7801 et seq.; Docket: 17-08023 - Investigation and rulemaking to implement Senate Bill 150 (2017)	0
New Hampshire 2016 Regulatory Electric and nat. gas Statewide goal (100%)	Electric: 0.8% incremental savings in 2018, ramping up to 1% in 2019, and 1.3% in 2020. Natural gas: 0.7% in 2018, 0.75% in 2019, and 0.8% in 2020.	1.0%	Binding	NH PUC Order No. 25932, Docket DE 15-137	1.5
New Jersey 2018 Legislative Electric and nat. gas Statewide goal (100%)	Electric: 2% of average annual usage in the prior three years within five years of implementation of a utility's electric energy efficiency program. Natural gas: 0.75% of the average annual usage in the prior three years within five years of implementation of a gas energy efficiency program.	1.5%	Binding	A3723 (2018)	2

State Year(s) enacted Authority Applicability (% sales affected)	Description	Avg. incremental electric savings target per year (2016 onward)	Stringency	Reference	Score
New Mexico 2008 and 2013 Legislative Electric IOUs (68%)	5% reduction from 2005 total retail electricity sales by 2014, and 8% reduction by 2020.	0.6%	Binding	NM Stat. § 62-17-1 et seq.	0.5
New York 2008 and 2016 Regulatory Electric and nat. gas Statewide goal (100%)	New York State Energy Plan 2025 target of 185 TBtu savings. Electric: Under the Reforming the Energy Vision (REV) proceedings, utilities filed efficiency transition implementation plans (ETIPS) with incremental targets varying from 0.4% to 0.9% for the period 2016–18. In January 2017, the PSC authorized NYSERDA's Clean Energy Fund (CEF) framework, which outlines a minimum 10-year energy efficiency goal of 10.6 million MWh measured in cumulative first-year savings. Natural gas: Utilities have filed proposals for varying incremental targets with incremental savings averaging 0.28% for the period 2016–18.	2.0%	Binding	NY PSC Order, Case 07-M-0548 NY PSC Case 14-M-0101 NY PSC Case 14-M-0252 2015 New York State Energy Plan NYSERDA and New York DPS (2018) NY PSC Order authorizing the Clean Energy Fund framework	1.0
North Carolina 2007 Legislative Electric Statewide goal (100%)	Renewable Energy and Energy Efficiency Portfolio Standard (REPS) requires renewable generation and/or energy savings of 6% by 2015, 10% by 2018, and 12.5% by 2021 and thereafter. Energy efficiency is capped at 25% of target, increasing to 40% in 2021 and thereafter.	0.4%	Opt-out	NC Gen. Stat. § 62-133.8 04 NCAC 11 R08-64, et seq.	0
Ohio 2008 and 2014 Legislative Electric IOUs (~89%)	Beginning in 2009, incremental savings of 0.3% per year, ramping up to 1% in 2014 and 2% in 2021. Savings targets resumed in 2017 following a "freeze" (S.B. 310) in 2015–16 that allowed utilities that had achieved 4.2% cumulative savings to reduce or eliminate program offerings.	1.0%	Binding	ORC 4928.66 et seq. SB 221 SB 310	1.0

State Year(s) enacted Authority Applicability (% sales affected)	Description	Avg. incremental electric savings target per year (2016 onward)	Stringency	Reference	Score
Oregon 2010 Regulatory Electric and nat. gas Energy Trust of Oregon (~70%)	Electric: Incremental targets average ~1.3% of sales annually for the period 2015–19. Natural gas: 0.3% of sales annually for the period 2015–19	1.3%	Binding	Energy Trust of Oregon 2015–19 Strategic Plan Grant Agreement between Energy Trust of Oregon and OR PUC	1.5
Pennsylvania 2004 and 2008 Legislative Electric Utilities with more than 100,000 customers (~93%)	Varying targets have been set for IOUs amounting to yearly statewide incremental savings of 0.8% for 2016–20. EERS includes peak demand targets. Energy efficiency measures may not exceed an established cost cap.	0.8%	Cost cap	66 Pa. C.S. § 2806.1 PUC Order Docket No. M-2008-2069887 PUC Implementation Order Docket M-2012-2289411 PUC Final Implementation Order Docket M-2014-2424864	0.5
Rhode Island 2006 Legislative Electric and nat. gas IOUs, munis (~99%)	Electric: Incremental savings of 2.5% in 2015, 2.55% in 2016, and 2.6% in 2017. EERS MW targets. Natural gas: Incremental savings of 1% in 2015, 1.05% in 2016, and 1.1% in 2017. Utilities must acquire all cost-effective energy efficiency.	2.6%	Binding	RIGL § 39-1-27.7 Docket No. 4443	3.0
Texas 1999 and 2007 Legislative Electric IOUs (~73%)	20% incremental load growth in 2011 (equivalent to ~0.10% annual savings); 25% in 2012, and 30% in 2013 and onward. Peak demand reduction targets of 0.4% compared to previous year. Energy efficiency measures may not exceed an established cost cap.	0.2%	Cost cap, opt-out	SB 7 HB 3693 Substantive Rule § 25.181 SB 1125	0

State Year(s) enacted Authority Applicability (% sales affected)	Description	Avg. incremental electric savings target per year (2016 onward)	Stringency	Reference	Score
Vermont 2000 Legislative Electric Efficiency Vermont, Burlington Electric (100%)	Average incremental electricity savings of ~2.1% per year for the period 2015–17. EERS includes demand response targets. Energy efficiency utilities must set budgets at a level that would realize all cost-effective energy efficiency.	2.1%	Binding	30 VSA § 209 VT PSB Docket EEU-2010-06 Efficiency Vermont Triennial Plan 2015–17 (2016 Update)	2.5
Washington 2006 Legislative Electric IOUs, co-ops, munis (~81%)	Biennial and 10-year goals vary by utility. Law requires savings targets to be based on the Northwest Power Plan, which estimates potential incremental savings of ~1.5% per year through 2030 for Washington utilities. All cost-effective conservation requirement.	1.5%	Binding	Ballot Initiative I-937 Energy Independence Act, ch. 19.285.040 WAC 480-109-100 WAC 194-37 Seventh Northwest Power Plan (adopted 2/10/16)	1.5
Wisconsin 2011 Legislative Electric and nat. gas Statewide goal (100%)	Electric: Focus on Energy targets include incremental electricity savings of ~0.81% of sales per year for 2015–18. Natural gas: Incremental savings of 0.6% for 2015–18. Energy efficiency measures may not exceed an established cost cap.	0.8%	Cost cap	Order, Docket No. 5-FE-100: Focus on Energy Revised Goals and Renewable Loan Fund (10/15) Program Administrator Contract, Docket No. 9501-FE-120, Amendment 2 (3/16) 2005 Wisconsin Act 141	1

Appendix E. Tax Incentives for High-Efficiency Vehicles

State	Tax incentive
Arizona	Electric vehicle (EV) owners in Arizona pay a significantly reduced vehicle license tax—$4 for every $100 in assessed value—as part of the state's Reduced Alternative Fuel Vehicle License Tax program.
California	AB 118 targets medium- and heavy-duty trucks in a voucher program which has as its goal to reduce the up-front incremental cost of purchasing a hybrid vehicle. Vouchers for up to $117,000 are available, depending on vehicle specifications, and are paid directly to fleets that purchase hybrid trucks for use within the state. California also offers rebates of up to $5,000 for light-duty zero-emission EVs and plug-in hybrid EVs on a first-come, first-served basis.
Colorado	On May 4, the Colorado legislature approved HB 1332, a bill that dramatically improves the state's alternative fuel vehicle tax credits. It sets a flat $5,000 credit for the purchase of a light-duty electric vehicle and makes the credits assignable to a car dealer or finance company effectively turning the credit into a point-of-sale incentive.
Connecticut	Connecticut's Hydrogen and Electric Automobile Purchase Rebate Program provides as much as $3,000 for the incremental cost of the purchase of a hydrogen fuel cell electric vehicle (FCEV), an all-electric vehicle, or a plug-in hybrid EV. Rebates are calculated on the basis of battery capacity. Vehicles with a battery capacity of 18 kWh or more earn $3,000, while those with capacities between 7 kWh and 18 kWh earn $1,500. Vehicles with batteries smaller than 7 kWh are eligible for a rebate of $750.
Delaware	As part of the Delaware Clean Transportation Incentive Program, the following rebates are available: • $3,500 for battery EVs under $60,000 MSRP • $1,500 for plug-in hybrid EVs and EVs with gasoline range extenders under $60,000 MSRP • $1,000 for battery and plug-in hybrid EVs over $60,000 MSRP
District of Columbia	The District of Columbia offers a reduced registration fee and a vehicle excise tax exemption for owners of all vehicles with an EPA-estimated city fuel economy of at least 40 miles per gallon.
Georgia	An income tax credit is available to individuals who purchase new commercial medium- or heavy-duty vehicles that run on alternative fuels including electricity. Medium-duty vehicles qualify for a credit up to $12,000, while heavy-duty vehicles can earn a credit of up to $20,000.
Guam	A rebate of up to 10% of the base price of a plug-in vehicle is available to residents and businesses.
Louisiana	Louisiana offers an income tax credit equivalent to 50% of the incremental cost of purchasing an EV under the state's alternative-fuel vehicle tax credit program. Alternatively, taxpayers may claim the lesser of 10% of the total cost of the vehicle or $3,000.
Maryland	Purchasers of qualifying all-electric and plug-in hybrid-electric light-duty vehicles may claim up to $3,000 against the vehicle excise tax in Maryland, depending on the vehicle's battery weight.
Massachusetts	The Massachusetts Offers Rebates for EVs (MOR-EV) program offers rebates of up to $2,500 to customers purchasing plug-in EVs.
New Jersey	All zero emission vehicles (ZEVs) in New Jersey are exempt from state sales and use taxes.

State	Tax incentive
New York	Pursuant to legislation passed in April 2016, NYSERDA developed a rebate program for zero emission vehicles that launched in March 2017. Rebates of up to $2,000 per vehicle are available for battery EVs, plug-in hybrid EVs, and fuel cell vehicles. New York also started the New York Truck Voucher Incentive Program in 2014. Vouchers of up to $60,000 are available for the purchase of hybrid and all-electric class 3–8 trucks.
Oregon	The Oregon Clean Vehicle Rebate Program offers rebates of $1,500–2,500 toward the purchase of a new hybrid or battery electric vehicle, depending on battery capacity. Rebates of $2,500 are available to low- and moderate-income households for the purchase of new and used EVs. All eligible vehicles must have a base MSRP of less than $50,000.
Pennsylvania	The Alternative Fuels Incentive Grant Program offers rebates to assist eligible residents in purchasing new alternate fuel vehicles (AFV). Qualified electric vehicles earn a rebate amount of $1,750.
Puerto Rico	In 2012, Puerto Rico amended the Internal Revenue Code to allow an excise tax reimbursement of up to 65% for buyers of hybrid and plug-in hybrid vehicles. The reimbursement ranges from $2,000 to $8,000 and is available through 2016. The excise tax is waived altogether for buyers of all-electric vehicles.
Texas	Electric vehicles weighing 8,500 pounds or less and purchased after September 1, 2013, are eligible for a $2,500 rebate.
Utah	Until December 2020, taxpayers are eligible for tax credits for the purchase of qualifying electric heavy-duty vehicles. Vehicles purchased in 2018 are eligible for a $20,000 tax credit. The tax credit amount is being gradually reduced from $25,000 in 2017 to $15,000 by 2020.
Washington	Electric vehicles are exempt from state motor vehicle sales and use taxes under the Alternative Fuel Vehicle Tax Exemption Program.

Source: DOE 2018a

Appendix F. State Transit Funding

State	FY 2015 funding	2015 population*	Per capita transit expenditure
Illinois	$3,536,569,161	12,862,051	$274.96
Alaska	$185,858,364	737,979	$251.85
Massachusetts	$1,649,889,696	6,794,002	$242.85
New York	$4,786,084,700	19,819,347	$241.49
Connecticut	$515,278,413	3,593,862	$143.38
Maryland	$815,472,457	6,000,561	$135.90
Delaware	$116,794,507	944,107	$123.71
Pennsylvania	$1,532,172,650	12,791,124	$119.78
District of Columbia	$546,129,790	5,000,000	$109.23
California	$2,898,424,596	39,032,444	$74.26
Minnesota	$403,773,000	5,483,238	$73.64
Rhode Island	$50,612,785	1,055,916	$47.93
New Jersey	$357,738,903	8,960,001	$39.93
Virginia	$298,898,733	8,366,767	$35.72
Michigan	$263,768,319	9,918,170	$26.59
Wisconsin	$110,737,500	5,759,744	$19.23
Vermont	$8,496,969	624,455	$13.61
Florida	$271,179,216	20,268,567	$13.38
Washington	$85,568,222	7,152,818	$11.96
Oregon	$37,439,321	4,016,537	$9.32
Indiana	$59,140,747	6,610,596	$8.95
North Dakota	$6,449,468	754,859	$8.54
North Carolina	$84,843,069	10,041,769	$8.45
Tennessee	$47,220,000	6,590,726	$7.16
Iowa	$14,274,001	3,118,473	$4.58
Wyoming	$2,596,155	586,102	$4.43

State	FY 2015 funding ($million)	2015 population	Per capita transit expenditure
Kansas	$11,000,000	2,905,789	$3.79
New Mexico	$6,643,800	2,082,264	$3.19
Nebraska	$4,872,884	1,893,564	$2.57
Colorado	$14,000,000	5,440,445	$2.57
Oklahoma	$5,750,000	3,904,353	$1.47
West Virginia	$2,476,279	1,839,767	$1.35
South Carolina	$6,000,000	4,892,423	$1.23
Arkansas	$3,531,248	2,975,626	$1.19
Texas	$30,341,068	27,454,880	$1.11
Louisiana	$4,955,000	4,671,211	$1.06
South Dakota	$770,000	854,036	$0.90
Maine	$1,147,845	1,327,787	$0.86
New Hampshire	$998,983	1,330,134	$0.75
Ohio	$7,300,000	11,606,027	$0.63
Mississippi	$1,613,000	2,985,297	$0.54
Kentucky	$1,713,412	4,422,057	$0.39
Montana	$334,820	1,028,317	$0.33
Georgia	$3,047,836	10,199,533	$0.30
Missouri	$1,530,875	6,072,640	$0.25
Idaho	$312,000	1,649,324	$0.19
Alabama	$0	4,850,858	$0.00
Arizona	$0	6,802,262	$0.00
Hawaii	$0	1,426,320	$0.00
Nevada	$0	2,883,057	$0.00
Utah	$0	2,984,917	$0.00

* Population figures represent total area served by transit system. *Source:* AASHTO 2017.

Appendix G. State Transit Legislation

State	Description	Source
Alabama	Alabama Act 2018-161 requires the Alabama Department of Economic and Community Affairs to create, oversee, and administer the Alabama Public Transportation Trust Fund, establishing a path to increase public transportation options in the state.	legiscan.com/AL/bill/SB85/2018
Arkansas	Passed in 2001, Arkansas Act 949 established the Arkansas Public Transit Fund, which directs monies from rental vehicle taxes toward public transit expenditures.	www.arkleg.state.ar.us/assembly/2001/R/Acts/Act949.pdf
California	California's Transportation Development Act provides two sources of funding for public transit: the Location Transportation Fund (LTF) and the State Transit Assistance (STA) Fund. The general sales tax collected in each county is used to fund each county's LTF. STA funds are appropriated by the legislature to the state controller's office. The statute requires that 50% of STA funds be allocated according to population and 50% be allocated according to operator revenues from the prior fiscal year.	www.dot.ca.gov/hq/MassTrans/State-TDA.html
Colorado	Colorado adopted SB1 in 2018, which significantly expands state funding for transit. SB1 creates a new multimodal options fund dedicated to public transit and bicycle and pedestrian infrastructure and operations.	leg.colorado.gov/bills/sb18-001
Florida	House Bill 1271 allows municipalities in Florida with a regional transportation system to levy a tax, subject to voter approval, that can be used as a funding stream for transit development and maintenance.	www.myfloridahouse.gov/sections/Bills/billsdetail.aspx?BillId=44036
Georgia	The Transportation Investment Act, enacted in 2010, allows municipalities to pass a sales tax for the express purpose of financing transit development and expansion.	gsfic.georgia.gov/transportation-investment-act
Hawaii	Section HRS 46-16.8 of the Hawaii Revised Statutes allows municipalities to add a county surcharge to state tax; the surcharge is then funneled toward mass transit projects.	www.capitol.hawaii.gov/hrscurrent/Vol02_Ch0046-0115/HRS0046/HRS_0046-0016_0008.htm
Illinois	House Bill 289 allocates $2.5 billion for the creation and maintenance of mass transit facilities from the issuance of state bonds.	legiscan.com/gaits/text/70761
Indiana	House Bill 1011 specifies that a county or city council may elect to provide revenue to a public transportation corporation from the distributive share of county adjusted gross income taxes, county option income taxes, or county economic development income taxes. An additional county economic development income tax no higher than 0.3% may also be imposed to pay the county's contribution to the funding of the metropolitan transit district. Only six counties within the state may take advantage of this legislation.	legiscan.com/IN/text/HB1011/id/673339

State	Description	Source
Iowa	The Iowa State Transit Assistance Program devotes 4% of the fees for new registration collected on sales of motor vehicle and accessory equipment to support public transportation.	www.iowadot.gov/transit/funding.html
Kansas	The Transportation Works for Kansas legislation was adopted in 2010 and provides financing for a multimodal development program in communities with immediate transportation needs.	votesmart.org/bill/11412/30514/transportation-works-for-kansas-program%20%28T-Works%20for%20Kansas%20Program%29
Maine	The Maine Legislature created a dedicated revenue stream for multimodal transportation in 2012. Through sales tax revenues derived from taxes on vehicle rentals, Maine's Multimodal Transportation Fund must be used for the purposes of purchasing, operating, maintaining, improving, repairing, constructing, and managing the assets of nonroad forms of transportation.	www.mainelegislature.org/legis/statutes/23/title23sec4210-B.html
Massachusetts	Section 35T of Massachusetts general law establishes the Massachusetts Bay Transportation Authority State and Local Contribution Fund. This account is funded by revenues from a 1% sales tax.	malegislature.gov/Laws/GeneralLaws/PartI/TitleII/Chapter10/Section35t
Michigan	The Michigan Comprehensive Transportation Fund funnels both vehicle registration revenues and auto-related sales tax revenues toward public transportation and targeted transit demand management programs.	www.legislature.mi.gov/(S(hlkm5k45i240utf2mb0odtzt))/mileg.aspx?page=getObject&objectName=mcl-247-660b
Minnesota	House File 2700, adopted in 2010, is an omnibus bonding and capital improvement bill that provides $43.5 million for transit maintenance and construction. The bill also prioritized bonding authorization so that appropriations for transit construction for fiscal years 2011 and 2012 would amount to $200 million.	wdoc.house.leg.state.mn.us/leg/LS86/CEH2700.1.pdf
New York	In 2010, New York adopted Assembly Bill 8180, which increased certain registration and renewal fees to fund public transit. It also created the Metropolitan Transit Authority financial assistance fund to support subway, bus, and rail.	www.ncsl.org/issues-research/transport/major-state-transportation-legislation-2010.aspx#N
North Carolina	In 2009, North Carolina passed House Bill 148, which called for the establishment of a congestion relief and intermodal transportation fund.	www.ncleg.net/sessions/2009/bills/house/pdf/h148v2.pdf
Oregon	Oregon has a Lieu of State Payroll Tax Program that provides a direct ongoing revenue stream for transit districts that can demonstrate equal local matching revenues from state agency employers in their service areas.	www.oregonlegislature.gov/citizen_engagement/Reports/2008PublicTransit.pdf
Pennsylvania	Act 44 of House Bill 1590, passed in 2007, allows counties to impose a sales tax on liquor or an excise tax on rental vehicles to fund the development of county transit systems.	www.legis.state.pa.us/WU01/LI/LI/US/HTM/2007/0/0044..HTM

State	Description	Source
Tennessee	Senate Bill 1471, passed in 2009, calls for the creation of a regional transportation authority in major municipalities. It allows these authorities to set up dedicated funding streams for mass transit either by law or through voter referendum.	state.tn.us/sos/acts/106/pub/pc0362.pdf
Utah	Utah's comprehensive transportation funding bill, passed in 2015, allows counties to implement a 0.25% local sales tax to fund locally identified transportation needs. 40% of all revenues collected using this mechanism must be awarded to the county transit agency.	le.utah.gov/~2015/bills/static/HB0362.html
Virginia	House Bill 2313, adopted in 2013, created the Commonwealth Mass Transit Fund, which will receive approximately 15% of revenues collected from the implementation of a 1.5% sales and use tax for transportation expenditures.	lis.virginia.gov/cgi-bin/legp604.exe?131+ful+CHAP0766
Washington	In 2012, Washington adopted House Bill 2660, which created an account to provide grants to public transit agencies to preserve transit service.	apps.leg.wa.gov/documents/billdocs/2011-12/Pdf/Bills/Session%20Laws/House/2660.SL.pdf
West Virginia	In 2013, the West Virginia Commuter Rail Access Act (Senate Bill 03) established a special fund in the state treasury to pay track access fees accrued by commuter rail services operating within West Virginia borders. The funds have the ability to roll over from year to year and are administered by the West Virginia State Rail Authority.	www.legis.state.wv.us/Bill_Status/bills_text.cfm?billdoc=SB103%20SUB1%20ENR.htm&yr=2013&sesstype=RS&i=103

Appendix H. State Progress toward Public Building Energy Benchmarking

State	Percentage benchmarked
California	100% of state-owned, executive branch facilities, benchmarked since 2013
Connecticut	42% of state buildings, 100% of the Connecticut Technical High School system, 100% of several K–12 school districts, 100% of Connecticut Community Colleges
Delaware	80%
District of Columbia	Approximately 97% of government-owned floor area
Florida	20% of state-owned or leased facilities with more than 5,000 square feet of air-conditioned space
Hawaii	Over 29 million square feet of public facilities
Maryland	100% of state facilities
Massachusetts	100% of about 80 million square feet of state-owned facilities
Michigan	88% of state-owned facilities
Mississippi	95% of agencies covered by the energy and cost data reporting requirements under the Mississippi Energy Sustainability and Development Act of 2013
Missouri	Approximately 50% of square footage managed by the Office of Administration and the Department of Corrections
Nevada	86% of total state building square footage
New Hampshire	95% of state-owned building square footage
New Mexico	Approximately 20%
North Carolina	100% of state-owned buildings and community college buildings
Oregon	100% of state-owned and occupied buildings greater than 5,000 square feet
Rhode Island	100% of all state, municipal, and public school square footage
Tennessee	23% of state-owned buildings
Utah	Approximately 15% of state government building square footage
Vermont	70% of the state-owned and operated building space that the ENERGY STAR® Portfolio Manager is capable of benchmarking
Washington	55% of state agency square footage, 30% of college square footage, 17% of university square footage

Not all states with benchmarking requirements provided the percentage of buildings benchmarked. All states listed above, except Missouri, require benchmarking in public facilities. Missouri has a voluntary benchmarking program.

Appendix I. State Energy Savings Performance Contracting: Investments and Savings

State	Investments 2017 ($ million)	2017 incremental electricity savings for all active ESCO projects	2017 annual savings from active projects
California	16		Over 3,000,000 kWh
Connecticut		Incremental savings achieved between 2013 and 2016 include Eversource Municipal Projects: 23,057,135 kWh; United Illuminating Municipal Projects: 1,065,389 kWh; Yankee Municipal Projects: 438,215 therms.	
Delaware	7.6		
Georgia			$3.7 million in savings in FY2017
Massachusetts	3.8 (local)	$406,000	Over $20 million in annual cost savings from all projects (local)
Nevada			36,188,000 kWh
New Jersey	91		$6,915,436 (for projects started in 2017 only)
North Carolina	56	$52 million	
Pennsylvania	28		
Rhode Island	7.8 (one entity with active ESPC)	17,880,894 kWh (one entity with active ESPC)	
Utah	6.19	955,794 kWh	At least 955,794 kWh
Virginia	77	2,000,000 kWh	22,200,000 kWh
West Virginia	45.4	9,460,000 kWh	20,000,000 kWh

We excluded ESPC program budgets as well as projected energy and cost savings from states in order to focus on investments and cost and energy savings already achieved.

Appendix J. Total Energy and Cost Savings from State Financial Incentives

State	Title	Low income-targeted	Program administrator	Program-level energy savings	Program-level monetary savings ($)
Alabama	AlabamaSAVES Revolving Loan Program	No	Alabama Department of Economic and Community Affairs	703,474 kWh for projects completed in 2017	$84,656 for projects completed in 2017
Alabama	WISE (Worthwhile Investments Save Energy) Home Energy Program	No	Nexus Energy Center	184,370 kWh	$18,234
California	Bright Schools Program	No	California Energy Commission	1,504,645 kWh, 3,945 therms	$318,900 (includes kWh and therm savings)
California	California Clean Energy Jobs Act (Prop 39 K–12 Program)	Yes	California Energy Commission	462,991,977 kWh (estimated for all projects approved through 2017)	$86 million (includes kWh, therm, propane, and fuel oil savings)
California	Energy Conservation Assistance Act (ECAA)	No	California Energy Commission	6,815,386 kWh	$858,555
California	Energy Conservation Assistance Act—Education Subaccount (ECAA-Ed)	No	California Energy Commission	1,252,743 kWh	$295,418
California	Property Assessed Clean Energy (PACE) Loss Reserve Program	No	California Alternative Energy and Advanced Transportation Financing Authority (CAEATFA)	Over 818 million kWh/year (estimated)	
California	Sales and Use Tax Exclusion for Advanced Transportation and Alternative Energy Manufacturing Program	No	California Alternative Energy and Advanced Transportation Financing Authority (CAEATFA)		$763,680,000 in estimated fiscal benefits to the state

State	Title	Low income-targeted	Program administrator	Program-level energy savings	Program-level monetary savings ($)
Colorado	Agricultural Energy Efficiency Program	No	Colorado Energy Office	330,251 kWh	
Colorado	Energy Savings for Schools		Colorado Energy Office	1,494,750 kWh	
Colorado	Colorado Commercial Property Assessed Clean Energy (PACE)	No	Colorado Energy Office	11,527,557 kWh since program inception	$17,187,966 since program inception
Delaware	Home Energy Loan Program	No	Sustainable Energy Utility	587,000 kWh	$702,767 (FY2017)
Delaware	Energy Efficiency Investment Fund Rebates	No	Department of Natural Resources and Environmental Control	3,477,000 kWh	
Delaware	Energize Delaware Farm Program	No	Sustainable Energy Utility	47,000 kWh, 948,160 MMBtus	$25,975 (FY2017)
Florida	Farm Energy and Water Efficiency Realization (FEWER) program	No	Office of Energy	116,473 MMBtus (identified energy savings)	
Maine	Advanced Building Program	No	Efficiency Maine Trust	6,128.50 MMBtus (lifetime savings)	$57,179 (lifetime savings)
Maine	Efficiency Maine Residential Home Energy Savings Program	No	Efficiency Maine Trust	1,940,590 MMBtus (lifetime)	$16,405,840 (lifetime)
Maine	Low-Income Initiatives	Yes	Efficiency Maine Trust	378,205 MMBtus (lifetime)	$3,808,116 (lifetime)
Maine	Efficiency Maine C&I Prescriptive Incentive Program	No	Efficiency Maine Trust	618,161 MMBtus (lifetime)	$5,270,426 (lifetime)
Maine	Efficiency Maine Custom Program	No	Efficiency Maine Trust	3,125,654 MMBtus (lifetime)	$19,239,991 (lifetime)

State	Title	Low income-targeted	Program administrator	Program-level energy savings	Program-level monetary savings ($)
Maryland	MD Smart Energy Communities Grant	No	Maryland Energy Administration (MEA)	929,001 kWh/yr. in savings anticipated when all FY17 projects are fully complete	$103,398
Maryland	Commercial and Industrial Grant Program	No	Maryland Energy Administration (MEA)	3,637,800 kWh/yr anticipated once FY18 projects are fully implemented	$418,340.57/yr anticipated once fully implemented
Maryland	Mathias Agricultural Energy Efficiency Grant Program	No	Maryland Energy Administration (MEA)	Estimated annual electric savings: 125.49 MWh; Estimated annual non-electricity savings: 5,976 MMBtus	Projected annual energy cost savings: $87,394.50
Maryland	Be SMART Multifamily Efficiency Loan Program	Yes	Maryland Department of Housing and Community Development	100,000 kWh	$15,000 in utility cost savings
Maryland	Jane E. Lawton Conservation Loan Program	No	Maryland Energy Administration (MEA)	109,353 kWh estimated for FY17 projects	$13,887.83 for FY17
Maryland	MARBIDCO Rural Business Energy Efficiency Program	No	MARBIDCO	128,243 kWh saved annually	$32,425 saved annually
Maryland	State Agency Loan Program	No	Maryland Energy Administration (MEA)	1,667,539 kWh and 1,779 MMBtus estimated in annual savings for FY17 projects	$178,949 in annual energy savings for FY17 projects
Missouri	Energy Loan Program	No	Missouri Department of Economic Development (DED) Division of Energy (DE)	10,101,195 kWh	$11.7 million (FY2017); $12.2 million (FY2018)

State	Title	Low income-targeted	Program administrator	Program-level energy savings	Program-level monetary savings ($)
Nebraska	Dollar and Energy Savings Loans	No	State Energy Office	76,669 kWh (residential projects only)	$844,944 (residential projects only)
Nevada	Home Energy Retrofit Opportunities for Seniors (HEROS)	Yes	State Energy Office	873,335 kWh	$927/home
Nevada	Green Building Tax Abatement (GBTA) Program	No	Governor's Office of Energy	244,204,679 kWh	
Nevada	Direct Energy Assistance Loan (DEAL) Program	No	Governor's Office of Energy	305,184 kWh	
Nevada	Performance Contracting Audit Assistance Program (PCAAP)	No	State Energy Office	41,000,000 kWh	$5,400,000
New York	Green Jobs Green New York	No	NYSERDA	32,645,000 kWh generation, 8,275,000 kWh savings, 357,853 MMBtus	$11.8 million in customer bill savings
New York	Cleaner Greener Communities	No	NYSERDA	Annual estimate: 1,218,453 MMBtus	Annual estimate: $13,485,105
New York	Home Performance with ENERGY STAR®	No	NYSERDA	239,000 kWh, 48,365 MMBtus	$1.1 million in customer bill savings
New York	Charge NY	No	NYSERDA		Anticipated benefits include: 5 million in leveraged private capital per year, 400 publicly accessible charging stations, 600 additional PEVs purchased, three customer engagement/awareness campaigns launched, three industry partnerships formed

State	Title	Low income-targeted	Program administrator	Program-level energy savings	Program-level monetary savings ($)
New York	EmPower New York	Yes	NYSERDA	36,310 MMBtus	$823,000 in customer bill savings
Oregon	Energy Conservation Tax Credits—Competitively Selected Projects (Personal)	No	Oregon Department of Energy	17,692,000 kWh; 320,000 therms	$3,387,806
Oregon	Energy Conservation Tax Credits - Competitively Selected Projects (Corporate)	No	Oregon Department of Energy	4,125,027 kWh; 1,103,811 therms	$24,190,179
Oregon	Energy Conservation Tax Credits—Small Premium Projects (Corporate)	No	Oregon Department of Energy	1,477,597 kWh; 4,886 therms	$123,680
Oregon	Industrial Self Direct of Public Purpose Funds	No	Oregon Department of Energy	882,329	$166,774
Pennsylvania	Sustainable Energy Finance Program	No	Pennsylvania Treasury Department	118,500,000 kWh over expected payback period	$30,600,000 in gross energy savings over expected payback period

State	Title	Low income-targeted	Program administrator	Program-level energy savings	Program-level monetary savings ($)
Pennsylvania	Alternative Fuels Incentive Grant	No	DEP administers this grant program under the Alternative Fuels Incentive Act (Nov. 29, 2004, P.L. 1376, No. 178).	1.5 million gasoline gallon equivalent	
Pennsylvania	Small Business Advantage Grant Program	No	Small Business Ombudsman Office, Department of Environmental Protection	4,459,284 kWh	
Pennsylvania	Green Energy Loan Fund	No	The Reinvestment Fund	23,423,017 kWh total for 2017; 79,919 MMBtu in gas savings for 2017	$3,523,453 per year
Rhode Island	Efficient Buildings Fund	No	RI Infrastructure Bank (RIIB), Office of Energy Resources	5,856 MWh (2017 annual savings); 60,923 therms (2017 annual savings)	$2,062,000 (2017 annual savings)
Rhode Island	Block Island Saves	No	Office of Energy Resources	1,705 MWh (2017 annual savings); 2,481 MMBtu avoided over life of improvements	$593,915 lifetime utility bill savings from projects implemented in 2017
Rhode Island	LED Streetlight Program	No	Office of Energy Resources	8,208,282 kWh annually for 2017 projects	$1,313,325 annually for 2017 projects
Tennessee	Energy Efficient Schools Initiative (EESI)—Grants	No	EESI	41 million kWh per year	$4,100,000 per year

State	Title	Low income-targeted	Program administrator	Program-level energy savings	Program-level monetary savings ($)
Tennessee	Pathway Commercial Energy Efficiency Loan Program (EELP)	No	Pathway Lending Community Development Financial Institution	5,761,110 kWh from 2017 loans	$661,830 from 2017 loans
Tennessee	Energy Efficient Schools Initiative (EESI)—Loans	No	EESI	7,034,956 kWh annual savings for eight new FY2017 loans	$7,703,000 estimated for FY2017
Utah	State Building Energy Efficiency Fund	No	Building Performance Program Director		$150,801
Utah	Guaranteed Energy Savings Performance Contracting	No	Governor's Office of Energy Development and Division of Facilities Construction and Management	955,794 kWh annually	$6,700,000 annually
West Virginia	Partnership between WV Office of Energy and West Virginia University School of Engineering	No	State Energy Office	6,300,000 kWh	$1,300,000

We excluded individual program budgets from the table because this metric did not allow for a state-by-state comparison of financial incentives. We attempted to collect incentive participation data, but most state respondents were unable to quantify the total number of eligible participants for each program. As a result, we could not express participation as a percentage, and we excluded these data from the table.

Appendix K. State Efficiency Spending and Savings Targets for Low-Income Customers

State	Spending/savings requirements for low-income energy efficiency programs
California	CA Public Utilities Code Section 382(e) sets a goal to provide low-income energy efficiency measures to 100% of eligible and willing customers by 2020. A. 14-11-007 (2016) strengthened the goal and updates interpretation of the "willing and feasible to participate (WFTP)" factor.
Connecticut	Utilities are required to allocate the limited income budgets in parity with the revenues that are expected to be collected from that sector. Per Public Act 11-80, Section 33, Connecticut establishes a goal of weatherizing 80% of homes. This goal is not specific to low-income customers, but activity in the low-income program helps the companies achieve this goal. Also, as part of the performance management incentive (PMI) calculation, the utilities are required to spend at least 95% of the low-income budget. Electric, natural gas, oil, and propane savings metrics also fall under the low-income program attached to the PMI calculation. Utilities are required to allocate budgets to low-income programs in parity with revenues expected to be collected from that sector.
Delaware	Delaware established legislative energy savings targets in 2009 with the adoption of SB 106, although these have yet to be implemented. The legislation sets up a Sustainable Energy Trust Fund to collect charges assessed by energy providers in service of energy savings goals. SB 106 specifies that 20% of assessment be provided to the Weatherization Assistance Program. Electric utility restructuring legislation passed in 1999 specifies that Delmarva Power and Light collect 0.095 mills per kWh (approximately $800,000 annually) from customers to be forwarded to the Department of Health and Social Services, Division of State Service Centers to be used to fund low-income fuel assistance and weatherization programs. To make low-income energy efficiency programs more accessible, a Guidance Document was drafted in 2016 as part of the merger settlements approved by the PSC between Exelon and Delmarva Power and Light to allocate $4 million of the funds toward low-income customer energy efficiency programs. This Guidance Document applies to DPL customers and funds are available to support organizations delivering energy efficiency programs to low-income ratepayers. Organizations that receive grants to run low-income energy efficiency programs will increase energy efficiency measures for low-income Delaware households, increase statewide electric and gas savings, engage and inform low-income households about the benefits of energy efficiency, develop a community-based approach to address energy efficiency issues in low-income housing by mobilizing public and private sector resources, and ensure to the greatest extent feasible that job training, employment, and contracting generated by this grant will be directed to low-income persons. All settlement-funded low-income programs must be officially recommended by the EEAC and approved by the PSC.
District of Columbia	The Clean and Affordable Energy Act (CAEA) of 2008 established a separate Energy Assistance Trust Fund (EATF) to fund: "(1) the existing low-income programs in the amount of $3.3 million annually; and (2) the Residential Aid Discount subsidy in the amount of $3 million annually." For the 2017–21 program cycle the low-income spending requirement was adjusted to 20% of expenditures.

State	Spending/savings requirements for low-income energy efficiency programs
Illinois	In December 2016, the Illinois State Legislature passed the Future Energy Jobs Bill (SB 2814). The legislation directs utilities to implement low-income energy efficiency measures of no less than $25 million per year for electric utilities that serve more than 3 million retail customers in the state (ComEd), and no less than $8.35 million per year for electric utilities that serve less than 3 million but more than 500,000 retail customers in the state (Ameren).
Maine	LD-1559, passed in June 2013, states that Efficiency Maine Trust shall "target at least 10% of funds for electricity conservation collected under subsection 4 or 4-A or $2,600,000, whichever is greater, to programs for low-income residential consumers, as defined by the board by rule."
Massachusetts	In the late 1990s, Massachusetts restructuring law established a low-income conservation fund through a 0.25 mills per kWh charge on every electric customer's bill, while a conservation charge on natural gas customers' bills has funded natural gas low-income energy efficiency programs. In 2010, the program received additional funding through the 2008 Green Communities Act, which required that 10% of electric utility program funds and 20% of gas program funds be spent on comprehensive low-income energy efficiency and education programs. The legislation further directed that these programs be implemented through the low-income weatherization assistance program (WAP) and fuel assistance program network with the objective of standardizing implementation among all utilities. In addition to the WAP-coordinated programs that directly serve low-income clients, the utilities fund the Low-Income Multifamily Retrofit Program, which provides cost-effective energy efficiency improvements to multifamily buildings, including nonprofit and public housing authorities. The program is targeted at one- to four-unit residential buildings where at least 50% of the units are occupied by low-income residents earning at or below 60% of area median income. Eligible projects involve efficiency upgrades for buildings with currently high energy consumption, specifically for space heating, hot water, air sealing, and insulation of building envelopes, lighting, and appliances.
Michigan	SB 438, approved in December 2016, extended the state's 1% annual energy savings requirement for utilities through 2021. The bill does not specify a minimum required level of spending or savings for low-income energy efficiency programs, other than to direct that distribution customers' funding responsibilities for low-income residential programs be proportionate to the distribution customers' funding of the total energy optimization (EO) program: "The established funding level for low-income residential programs shall be provided from each customer rate class in proportion to that customer rate class's funding of the provider's total energy optimization programs."
Minnesota	Municipal gas and all electric utilities must spend at least 0.2% of their gross operating revenue from residential customers on low-income programs. Legislation in 2013 raised the minimum low-income spending requirement for gas IOUs from 0.2% to 0.4% of their most recent three-year average gross operating revenue from residential customers.

State	Spending/savings requirements for low-income energy efficiency programs
Montana	SB 150, passed in 2015, made changes to the state's system benefit fund, increasing a public utility's minimum funding level for low-income energy and weatherization assistance and clarifying that eligible projects can be located on tribal reservations. SB 150 increases a public utility's minimum annual funding requirement for low-income energy and weatherization assistance from 17% to 50% of the public utility's annual electric universal systems benefits (USB) level. A cooperative utility's minimum annual funding requirement for low-income energy assistance remains at 17% of its annual USB funding level.
Nevada	In July 2001, Nevada passed AB 661, which created the Nevada Fund for Energy Assistance and Conservation (FEAC) through a universal energy charge (UEC) assessed on retail customers of the state's regulated electric and gas utilities. Nevada's Energy Assistance Code specifies the UEC is 3.30 mills per therm of natural gas and 0.39 mills per kWh of electricity purchased by these customers. NRS 702.270 requires that 25% of the money in the FEAC must be distributed to the Nevada Housing Division for programs of energy conservation, weatherization, and energy efficiency for eligible households. In June 2017, SB 150 was signed into law, which, in addition to directing the Public Utilities Commission to establish annual energy savings goals for NV Energy, also requires utilities to set aside 5% of efficiency program budgets for low-income customers.
New Hampshire	In August 2016, the New Hampshire Public Utilities Commission approved a settlement agreement establishing a statewide energy efficiency resource standard (EERS). The agreement provides for an increase in the minimum low-income share of the overall energy efficiency budget from 15.5% to 17%.
New Mexico	The state's energy efficiency targets, first established in 2005 within the Efficient Use of Energy Act, were amended in 2013 with the passage of HB 267. The legislation calls for an 8% reduction of energy consumption as a percentage of sales by 2020 and also directs that no less than 5% of the amount received by the public utility for program costs shall be specifically directed to energy efficiency programs for low-income customers.
New York	The January 2016 PSC Order authorizing the Clean Energy Fund Framework requires that NYSERDA must invest at least $234.5 million of Market Development funds in low- to moderate-income (LMI) initiatives over the initial three-year period. The new policy is intended to limit energy costs for low-income residents to no more than 6% of household income.
Oklahoma	Under OAC 165:35-41-4, all electric utilities under rate regulation of the Oklahoma Corporation Commission (OCC) must propose, at least once every three years, and be responsible for the administration and implementation of a demand portfolio of energy efficiency and demand response programs within their service territories. The regulations specify that demand portfolios address programs for low-income and hard-to-reach customers "to assure proportionate Demand Programs are deployed in these customer groups despite higher barriers to energy efficiency investments."
Oregon	Legislation (Senate Bill 1149) requiring electric industry restructuring for the state's largest investor-owned utilities was signed into law in July 1999. The law established an annual expenditure by the utilities of 3% of their revenues to fund "Public Purposes," including energy efficiency, development of new renewable energy, and low-income weatherization. Per the legislation, 13% of the public purpose charge would be allocated to low-income weatherization through the Energy Conservation Helping Oregonians (ECHO) program.

State	Spending/savings requirements for low-income energy efficiency programs
Pennsylvania	In June 2015, the Pennsylvania Public Utility Commission (PUC) issued an implementation order for Phase III of the Energy Efficiency and Conservation (EE&C) Program, setting five-year cumulative targets of 5.1 million MWh, equivalent to about 0.77% incremental savings per year through 2020. The order also requires each utility to obtain a minimum of 5.5% of their total consumption reduction target from the low-income sector.
Texas	As amended by SB 1434 in June 2011, Substantive Rule § 25.181 states "…each utility shall ensure that annual expenditures for the targeted low-income energy efficiency program are not less than 10% of the utility's energy efficiency budget for the program year."
Vermont	Efficiency Vermont (EVT), the state's energy efficiency utility established in 1999, is funded through a systems benefits charge on all utility customers' bills. Most of the costs of the electric efficiency measures implemented by EVT and the community-based weatherization agencies are paid for by EVT, with any remaining balances covered by the federal Weatherization Assistance Program (WAP). Other funding for WAP comes from the state's Weatherization Trust Fund, which was created in 1990 through legislative enactment of a gross-receipts tax of 0.5% on all non-transportation fuels sold in the state. As specified by Vermont Law, 50% of the net proceeds from the sale of carbon credits through the Regional Greenhouse Gas Initiative (RGGI) are deposited into a fuel efficiency fund to provide energy efficiency services to residential consumers who have incomes up to and including 80% of the state median income.
Virginia	The 2018 Grid Modernization and Security Act (SB966) requires that at least 5% of energy efficiency programs benefit low-income, elderly, and disabled individuals.
Wisconsin	The Reliability 2000 Law, passed in 1999, created a program for awarding grants to provide assistance to low-income households for weatherization and other energy conservation services, payment of energy bills, and the early identification and prevention of energy crises. The law specifies that 47% of total low-income funds must be dedicated to weatherization. The legislation required the Department of Administration to collect $24 million for low-income public benefits services the first year and to calculate a low-income need target in subsequent years. This low-income need target is calculated based on the estimated number of low-income families (households at or below 150% of the poverty level) multiplied by the estimated need per eligible household.

Appendix L. Cost-Effectiveness Rules for Utility Low-Income Efficiency Programs

State	Special cost-effectiveness provisions for low-income energy efficiency programs
Arizona	Since 2011 Arizona Administrative Code Title 14, Chapter 2, Article 24 (R14-2-2412) has directed that "an affected utility's low-income customer program portfolio shall be cost effective, but costs attributable to necessary health and safety measures shall not be used in the calculation."
Arkansas	Arkansas does not require program-level cost effectiveness for low-income programs.
California	California applies the Energy Savings Assistance Program Cost Effectiveness test (ESACET) and the Total Resource Cost (TRC) test to the low-income program. These tests incorporate nonenergy benefits and are used for informational purposes only, with no set minimum threshold for cost effectiveness.
Colorado	Decision No. C08-0560 directs the Colorado Public Service Commission to pursue all cost-effective low-income demand-side management (DSM) programs, "but to not forego DSM programs simply because they do not pass a 1.0 TRC test." It also directs that, in applying the TRC to low-income DSM programs, "the benefits included in the calculation shall be increased by 20%, to reflect the higher level of non-energy benefits that are likely to accrue from DSM services to low-income customers." This was increased further to 50% for low-income measures and products in April 2018 under Decision No. C18-0417. To avoid unintended impacts to calculations of benefits pursuant to performance incentives, the decision also allows utilities to exclude these costs in these determinations: "To address this concern we find that the costs and benefits associated with any low-income DSM program that is approved and has a TRC below 1.0 may be excluded from the calculation of net economic benefits. Further, the energy and demand savings may be applied toward the calculation of overall energy and demand savings, for purposes of determining progress toward annual goals."
Connecticut	Connecticut has established formal rules and procedures for evaluation, which are stated in Public Act 11-80 and Evaluation Rules and Roadmap. The Program Administrator test has been the primary cost-effectiveness test in Connecticut. However the TRC test is the primary test only for the Home Energy Solutions Limited-Income program. Connecticut regulators have repeatedly approved non-cost-effective low-income programs.
Delaware	The Evaluation, Measurement, and Verification (EM&V) Committee in 2016 recommended specific net-energy impacts, or net-energy benefits for low-income programs. These net-energy benefits include weatherization-reduced arrearages and participant health and safety benefits. Specific values were also applied to the net-energy benefits and are locked in for three years. These net-energy benefits were unanimously recognized and approved by the Energy Efficiency Advisory Council (EEAC).
District of Columbia	While no specific rules are in place for low-income programs per se, programs that are not cost effective may be included in the DC Sustainable Energy Utility's (DCSEU) portfolio as long as the overall portfolio is cost effective based on the Societal Cost test. A 10% adder is applied to program benefits to account for additional nonenergy benefits including comfort, noise reduction, aesthetics, health and safety, ease of selling/leasing home or building, improved occupant productivity, reduced work absences due to reduced illnesses, ability to stay in home/avoid moves, and macroeconomic benefits.

State	Special cost-effectiveness provisions for low-income energy efficiency programs
Florida	Program-level cost effectiveness is not required, although the majority of IOU-administered low-income programs in Florida pass both the TRC and Ratepayer Income Measure (RIM) cost-effectiveness tests.
Idaho	In April 2013, the PUC largely adopted its staff's recommendations from an October 2012 report regarding methodology for evaluating low-income weatherization assistance programs (LIWAP) and the criteria for increased funding (Order No. 32788, Case No. GNR-E-12-01). In this order, the PUC determined that a utility "may, but need not, include a 10% conservation preference adder for their low-income weatherization programs," but that if the utility believes the adder would make its cost-effectiveness calculations inconsistent, then the company need not use the adder. The PUC encouraged the utilities to include nonenergy benefits of LIWAPs when calculating cost effectiveness, but declined to construct a "specific cost-effectiveness test for low-income programs at this time." Instead, the PUC vowed to continue reviewing LIWAPs on a case-by-case basis.
Illinois	Section 8-103B (Energy Efficiency and Demand-Response Measures) of SB 2814 excludes low-income energy efficiency measures from the need to satisfy the TRC test: "The low-income measures described in subsection (c) of this Section shall not be required to meet the total resource cost test."
Indiana	Under Senate Bill 412 and Indiana Code 8-1-8.5-10(h) an electricity supplier may submit its energy efficiency plan to the commission for a determination of the overall reasonableness of the plan either as part of a general basic rate proceeding or as an independent proceeding. A petition submitted may include a home energy efficiency assistance program for qualified customers of the electricity supplier whether or not the program is cost effective.
Iowa	According to IAC 199 - 35.8(2), "Low-income and tree-planting programs shall not be tested for cost effectiveness, unless the utility wishes to present the results of cost-effectiveness tests for informational purposes."
Kansas	Low-income programs are not required to pass strict benefit–cost analysis so long as they are found to be in the public interest and supported by a reasonable budget.
Kentucky	Requirements for low-income programming are similar to those governing other programmatic offerings, and these were established by precedent in a 1997 proceeding surrounding the approval of LG&E's DSM program portfolio. The rules for benefit–cost tests are stated in Case No. 1997-083. These benefit–cost tests are required for total program-level screening, with exceptions for low-income programs, pilots, and new technologies. The commission also found in Case No. 97-083 that "If [a] filing fails any of the traditional [cost-effectiveness] tests, LG&E and its Collaborative may submit additional documentation to justify the need for the program."
Maine	Maine has not had specific cost-effectiveness guidelines in place for low-income programs. However the cost-effectiveness test for all programs provides for consideration of nonenergy benefits including "reduced operations and maintenance costs, job training opportunities and workforce development, general economic development and environmental benefits, to the extent that such benefits can be accurately and reasonably quantified and attributed to the program or project."

State	Special cost-effectiveness provisions for low-income energy efficiency programs
Maryland	In Order No. 87082 the PUC requires cost-effectiveness screening for limited-income programs, but indicated the programs may still be implemented without satisfying the test, stating: "We accept the recommendation of the Coalition that, while cost-effectiveness screening of the limited income sub-portfolio shall be required in the same manner as with respect to the other EmPower sub-portfolios, the results of the limited-income sub-portfolio screening shall serve as a point of comparison to other jurisdictions and past programmatic performance rather than as the basis for precluding certain limited-income program offerings."
Massachusetts	Massachusetts relies on the TRC test as its primary test for DSM programs, but specifically calculates additional benefits from low-income programs in its benefit–cost ratio. DPU 08-50-B specifies that an Energy Efficiency Plan must include calculations of non-electric benefits, specifically those related to: "(A) reduced costs for operation and maintenance associated with efficient equipment or practices; (B) the value of longer equipment replacement cycles and/or productivity improvements—associated with efficient equipment; (C) reduced environmental and safety costs, such as those for changes in a waste stream or disposal of lamp ballasts or ozone-depleting chemicals; and (D) all benefits associated with providing energy efficiency services to Low-Income Customers." In 2010, in its 2010–12 Three-Year Plan Order, the Massachusetts Department of Public Utilities (DPU) ordered the program administrators to conduct a more thorough analysis of nonenergy impacts through evaluation studies. The DPU, with few exceptions, approved these studies. A study for the Massachusetts Program Administrators, conducted by NMR Group, incorporates findings from a review of the Non-Energy Impacts (NEI) literature to quantify nonenergy benefits (NEB), including NEBs for low-income programs.
Michigan	Sec. 71 (4)(g) of SB 438 appears to exempt low-income programs from demonstrating cost effectiveness. To demonstrate that the provider's energy waste reduction programs, excluding program offerings to low-income residential customers, will collectively be cost effective, SB 438 states: "An energy waste reduction plan shall…demonstrate that the provider's energy waste reduction programs, excluding program offerings to low-income residential customers, will collectively be cost effective."
Minnesota	The rules for benefit–cost tests are stated in MN Statutes 261B.241 and Rule 7690.0550. The benefit–cost tests are required for portfolio, total program, and customer project-level screening with exceptions for low-income programs. Subd 7(e) of 216B.241 directs that "costs and benefits associated with any approved low-income gas or electric conservation improvement program that is not cost effective when considering the costs and benefits to the utility may, at the discretion of the utility, be excluded from the calculation of net economic benefits for purposes of calculating the financial incentive to the utility. The energy and demand savings may, at the discretion of the utility, be applied toward the calculation of overall portfolio energy and demand savings for purposes of determining progress toward annual goals and in the financial incentive mechanism."
Mississippi	Mississippi does not require program-level cost effectiveness for low-income programs.
Montana	Montana specifies the TRC as its primary test for decision making. The benefit–cost tests are required for the individual measure level for program screening, but there are exceptions for low-income programs, pilots, and new technologies.

State	Special cost-effectiveness provisions for low-income energy efficiency programs
Nevada	Nevada Housing Division for programs of energy conservation, weatherization, and energy efficiency for eligible households do not require a cost–benefit analysis. 2017 legislation established that low-income programs do not have to pass cost effectiveness screening as long as the portfolio of all DSM programs passes.
New Hampshire	With respect to nonenergy benefits for low-income programs, as noted in Order No. 23,574, both low-income programs and educational programs could still be approved by the Commission even if they do not surpass a 1.0 benefit–cost ratio given their additional hard-to quantify benefits."
New Jersey	Implementation of a low-income energy efficiency program is required by New Jersey statute N.J.S.A. 48:3-61. The New Jersey Board of Public Utilities does not require Comfort Partners Program to meet any cost-effectiveness tests.
New Mexico	The Utility Cost test (UCT) is conducted in New Mexico and is considered to be the primary test for decision making and evaluating program cost effectiveness. HB 267 directs that "…In developing this test for energy efficiency and load management programs directed to low-income customers, the commission shall either quantify or assign a reasonable value to reductions in working capital, reduced collection costs, lower bad-debt expense, improved customer service effectiveness and other appropriate factors as utility system economic benefits." It was later codified in New Mexico Administrative Code that: "In developing the utility cost test for energy efficiency and load management measures and programs directed to low-income customers, unless otherwise quantified in a commission proceeding, the public utility shall assume that 20% of the calculated energy savings is the reasonable value of reductions in working capital, reduced collection costs, lower bad-debt expense, improved customer service, effectiveness, and other appropriate factors qualifying as utility system economic benefits" [17.7.2.9 NMAC - Rp. 17.7.2.9 NMAC, 1-1-15].
New York	New York screens programs at the measure level and requires each to have a TRC score of at least 1.0 with some exceptions. It appears that New York's TRC test does not explicitly address nonenergy benefits of low-income programs. However the New York Public Service Commission (PSC) has generally recognized and considered low-income specific benefits in deciding on funding for utility low-income programs. For example, in a 2010 Order, the commission approved a low-income program with a TRC ratio of 0.91, finding that "As a general principle, all customers should have reasonable opportunities to participate in and benefit from Energy Efficiency Portfolio Standard (EEPS) programs. It is also important that supplemental funding be provided to address gas efficiency measures in this program."
North Carolina	North Carolina low-income programs are generally not required to meet cost-effectiveness thresholds in order that utilities would provide energy efficiency programs to a sector of the population that would likely not otherwise participate in energy efficiency.
Oklahoma	Oklahoma Administrative Code (OAC) 165:35-41-4 directs that demand programs targeted to low-income or hard-to-reach customers may have lower threshold cost-effectiveness results than other efficiency programs.

State	Special cost-effectiveness provisions for low-income energy efficiency programs
Oregon	The rules for benefit–cost tests are stated in Docket UM 551, Order 94-590, which lays out a number of situations where the PUC may make exceptions to the standard societal test calculation. Order 15-200, signed June 23, 2015, concerns Idaho Power Company's request for cost-effective exceptions to its DSM programs. The commission adopted the recommendation of staff that cost-effectiveness requirements in Order 95-590 do not apply to low-income weatherization programs, such as the Weatherization Assistance for Qualified Customers Program (WAQC).
Pennsylvania	In Order M-2015-2468992, the PUC specifies 2016 Total Resource Cost test requirements. Pennsylvania relies on the TRC test and considers it to be its primary cost-effectiveness test. A benefit–cost test is required for portfolio-level screening. The commission requires that the electric distribution companies provide benefit and cost data for both low-income and estimated non-low-income residential program savings in their annual reports and that TRC tests be calculated for all low-income programs and all residential programs. However the commission does not require a separate PA TRC test calculation for the low-income sector.
South Carolina	South Carolina does not require program-level cost effectiveness for low-income programs.
Texas	In an order adopted September 28, 2012, the commission directed that low-income programs would not be required to meet the cost-effectiveness standard in Substantive Rule § 25.181, but rather would only need to meet standards required by the Savings-to-Investment ratio (SIR) methodology. All measures with an SIR of 1.0 or greater qualify for installation. The SIR is the ratio of the present value of a customer's estimated lifetime electricity cost savings from energy efficiency measures to the present value of the installation costs, inclusive of any incidental repairs, of those energy efficiency measures.
Utah	The rules for benefit–cost tests are stated in Docket No. 09-035-27. Utah uses the TRC test, Utility Cost test (UCT), Participant Cost test (PCT), and Ratepayer Impact Measure (RIM). Approval of individual DSM programs or portfolios of programs should be based on an overall determination that the program or portfolio is in the public interest after consideration of all five tests and the passage of the threshold test, the UCT. In addition, Utah also utilizes the PacifiCorp TRC (PTRC) test, which follows the Northwest convention of adding 10% to the avoided costs to account for unquantified environmental and transmission and distribution impacts.
Vermont	Vermont specifies the Societal Cost test to be its primary test for decision making. A 15% adjustment is applied to the cost-effectiveness screening tool for low-income customer programs.
Virginia	Virginia does not require program-level cost effectiveness for low-income programs.

State	Special cost-effectiveness provisions for low-income energy efficiency programs
Washington	Per WAC 480-109-100, low-income weatherization is not included in the portfolio or sector-level cost-effectiveness analysis. Companies may implement low-income programs that have a TRC ratio of 0.67 or above. The rules for benefit–cost tests are directed by the Energy Independence Act of 2006, codified in Chapter 194-37 WAC, which specifies that the TRC test include all nonenergy impacts that a resource or measure may provide that can be quantified and monetized. Washington also applies an additional 10% benefit to account for non-quantifiable externalities, consistent with the Northwest Power Act. In Docket UE-131723, signed March 12, 2015, the commission revised the rule language to allow, rather than require, utilities to pursue low-income conservation that is cost effective consistent with the procedures of the Weatherization Manual finding that, "…in recognition that low-income conservation programs have significant nonenergy benefits, we find it appropriate for utilities to maintain robust low-income conservation offerings despite the unique barriers these programs face."
Wisconsin	Administrative code requires programs for residential and nonresidential program portfolios to each pass portfolio-level cost-effectiveness. One of the established reasons for setting portfolio-level testing rather than program- or measure-level testing is to provide more flexibility for low-income programs.