



November 1, 2019

Pennsylvania Public Utility Commission
Attn: Secretary Rosemary Chiavetta
Commonwealth Keystone Building, Second Floor
400 North Street
Harrisburg, Pennsylvania 17120

Re: 2021 Total Resource Cost (TRC) Test
Tentative Order of September 19, 2019 at Docket No. M-2019-3006868

Dear Secretary Rosemary Chiavetta:

The Building Performance Association appreciates this opportunity to provide comments on the Pennsylvania Public Utility Commission's September 19, 2019 Tentative Order on the 2021 Total Resource Cost (TRC) at Docket No. M-2019-3006868. We are pleased to be joined in submitting these comments by both Pennsylvania based non-profit organizations and national non-profit organizations with active chapter operations and extensive membership in Pennsylvania. These joint comments are respectfully submitted by [PennFuture](#), the [Pennsylvania Chapter of the Sierra Club](#), the [Clean Air Council](#), the [Philadelphia Solar Energy Association](#), [NRDC](#) and the [Building Performance Association](#).

Background on the Building Performance Association

The Building Performance Association (BPA) is a membership-driven 501(c)(6) industry association focused on the home and building performance industry - delivering improved energy efficiency, health, safety, and environmental outcomes. BPA supports home performance contractors, state and regional organizations, weatherization agencies and training centers, manufacturers and local non-profits focused on residential and commercial energy efficiency. BPA was formed through the re-alignment of Efficiency First, Home Energy Magazine and the Home Performance Coalition and is affiliated with the Building Performance Institute, Inc. (BPI).

BPA's members and affiliates provide the "nuts and bolts" of efficiency upgrades to homes and buildings across Pennsylvania and the United States. We are proud of the high-quality services that members and affiliates deliver and the skilled jobs that they create in communities across Pennsylvania. We see firsthand every day that Pennsylvanians value the energy efficiency

programs that add new insulation in homes, upgrade lighting in schools, and install new equipment in manufacturing facilities and help residents and businesses save money on their utility bills. BPA also helps to train Pennsylvania's skilled home performance workforce. For example, on September 30th to October 1st 2019, BPA hosted 427 home performance contractors, industry representatives and stakeholders at the **Pennsylvania Home Performance Conference & Trade Show** in State College, Pennsylvania.

Energy Efficiency and Jobs – Pennsylvania Has Great Potential for Improvement

Our joint comments are intended to share what we witness in states across the country: *that properly designed and implemented energy efficiency and demand response (EE/DR) programs save money, create jobs, and provide a broad mix of benefits to all customers.* BPA's members and affiliates base their businesses models on the proposition that energy efficiency is the lowest cost, most predictable and most immediate method to meet energy system demands. State and national research studies have confirmed that energy efficiency also delivers reliability and resiliency benefits, lowers costs for customers, provides health and comfort benefits to consumers and helps keep utility rates low in the long term.

Energy efficiency policy is an important tool for creating local jobs, a critical “non-energy” impact that we believe should be considered in all matters before the Pennsylvania Public Utility Commission, and particularly in rulemakings (such as Docket No. M-2019-3006868) where broader state policy issues are being weighed and considered.

Consider that, according to the September 2019 [Energy Efficiency Jobs in America](#) report, energy efficiency, as a market sector, employed **2.3 million Americans**, in whole or in part, in the design, installation, and manufacture of energy efficiency products and services, and was the fastest growing jobs sector in energy, accounting for half of the entire energy industry's job growth (151,700 jobs) in 2018. *In other words, nationwide - energy efficiency sits at the top of the list of job creators in the energy business sector.*

The 2019 [Energy Efficiency Jobs in America](#) is just part of a growing body of research that puts energy efficiency at the forefront of job creation across the U.S. For example, in January 2017, the U.S. Department of Energy (DOE) released its [2nd Annual U.S. Energy and Employment Report \(USEER\)](#), a comprehensive analysis of U.S. energy jobs. The [2017 USEER Jobs Report](#) found that **2.2 million Americans** were employed in the design, installation, and manufacture of energy efficiency products and services in 2016; that more than 133,000 new energy efficiency jobs were created in the U.S. in 2016; and that U.S. energy efficiency employers projected the highest job growth rate (9%) in 2017-2018 in all energy sectors surveyed.

However, Pennsylvania is not fully tapping into this economic engine. According to [Energy Efficiency Jobs in America](#), Pennsylvania's 68,820 energy efficiency jobs are approximately one half of the per capita employment rate of Maryland (See Attachment A). In other words, Maryland, with less than half of the population of Pennsylvania, has more energy efficiency jobs than Pennsylvania. In fact, ***Pennsylvania is currently ranked 41st in the nation*** in per capita employment in the energy efficiency job creation category (See Attachment A). We believe that the Pennsylvania TRC Manual, a guide for deploying one of the largest Commonwealth investments in energy efficiency, can be significantly improved and should be more focused on the economic development benefits of those investments.

We believe that job creation and economic development impacts are and should be critical considerations in the policy making deliberations of all Pennsylvania state agencies, offices and commissions. The Tentative Order does not sufficiently address the economic development potential of energy efficiency. We believe that the opportunity cost of excluding economic development considerations from this proceeding and other proceedings before the Commission are significant. As the per capita job creation rates displayed in Attachment A suggest, state energy efficiency policy priorities can have a dramatic impact on business growth and related employment opportunities.

General Comment - Application of the National Standard Practice Manual to the Pennsylvania Total Resource Cost Test Would Allow the Commission to "Test Its Test"

We salute the Pennsylvania Public Utility Commission (PA PUC) for its references to the [National Standard Practice Manual](#) (NSPM) as part of its general review of "new industry literature on benefit cost analysis" (See Tentative Order at page 7) and in a specific reference in its "Effective Useful Life" analysis (See Tentative Order at 11). One of the goals of the [National Efficiency Screening Project](#) (NESP) for the development of a National Standard Practice Manual was to provide a reference book for Utility Commission staff, Commissioners and regulators across the country.

However, the NSPM also provides a blueprint for any state to conduct an objective, step by step analysis of whether their state's cost effectiveness testing approaches are meeting their intended policy goals. BPA and other members of the [NESP](#) have worked with numerous states and provided technical assistance to Utility Commissions and relevant state Agencies across the country on applying the NSPM to "test their test." [Case studies](#) of states that have worked with the NESP on a full, comprehensive NSPM analysis, such as Minnesota, Arkansas, Rhode Island and New Hampshire are available online at the [NESP web site](#). Additional information on state approaches and cost effectiveness testing reforms was added to the [NESP state database](#) in August 2019.

Please note that the NSPM is designed specifically to include states that already have a statutorily mandated cost effectiveness test. The most commonly applied approach from the 1983 California Standard Practice Manual is the Total Resources Cost test. As many as 30 states apply some version of a TRC and those 30 states take a wide variety of approaches. The NSPM is designed to allow any of those 30 states to “test their test.” Act 129’s definition of the TRC is notably vaguely as compared to how some other states define their TRC. BPA certainly believes that the Pennsylvania definition of the TRC *leaves a lot of room for interpretation as* Act 129 simply states:

"Total resource cost test." A standard test that is met if, over the effective life of each plan not to exceed 15 years, the net present value of the avoided monetary cost of supplying electricity is greater than the net present value of the monetary cost of energy efficiency conservation measures.

Studying how each of the 30 states define and apply their version of the TRC does not reveal a consensus on what a “true” or “standard” TRC might look like. This is understandable given the wide diversity of state policies on energy, economic development, environmental and climate change policy. Instead, what the NSPM offers the PA PUC is a handbook that:

- Defines policy-neutral *principles* for cost-effectiveness analyses
- Establishes a framework for selecting and developing a *primary test* – or *refining current test to better align w/policy goals*
- Provides guidance on *key inputs*

We respectfully request that the PA PUC commence a process that applies the NSPM to the Act 129 Total Resource Cost test. A full NSPM analysis of the TRC is certainly allowed by Act 129. In fact, as Act 129 places “caps” or limits on the amount of funding that may be applied towards energy efficiency programs, getting the TRC cost effectiveness test “right” in the Commonwealth is even more critical. Act 129’s “caps” on spending requires the PA PUC to make sure that spending is being deployed in the most cost-effective manner that reflects Commonwealth policy priorities.

Our general comment on the Tentative Order is that the PA PUC should pause - and undertake (either in Phase IV or in the future) a more thorough, NSPM driven review of its TRC and its approach to cost effectiveness testing. Our specific comments are listed below and track four of the NSPM Principles - Transparency, Symmetry, Hard to Quantify Benefits and Policy Goals. The NSPM Principles state:

National Standard Practice Manual Principles

Efficiency as a Resource	EE is one of many resources that can be deployed to meet customers’ needs, and therefore should be compared with other energy resources (both supply-side and demand-side) in a consistent and comprehensive manner.
Policy Goals	A jurisdiction’s primary cost-effectiveness test should account for its energy and other applicable policy goals and objectives. These goals and objectives may be articulated in legislation, commission orders, regulations, advisory board decisions, guidelines, etc., and are often dynamic and evolving.
Hard-to-Quantify Impacts	Cost-effectiveness practices should account for all relevant, substantive impacts (as identified based on policy goals,) even those that are difficult to quantify and monetize. Using best-available information, proxies, alternative thresholds, or qualitative considerations to approximate hard-to-monetize impacts is preferable to assuming those costs and benefits do not exist or have no value.
Symmetry	Cost-effectiveness practices should be symmetrical, where both costs and benefits are included for each relevant type of impact.
Forward-Looking Analysis	Analysis of the impacts of resource investments should be forward- looking, capturing the difference between costs and benefits that would occur over the life of the subject resources as compared to the costs and benefits that would occur absent the resource investments.
Transparency	Cost-effectiveness practices should be completely transparent, and should fully document all relevant inputs, assumptions, methodologies & results.

Specific Comment – Transparency – The Tentative Order Leaves Critical Policy Issues Unaddressed – These Issues Require Additional Justification or Analysis

- **Non-Energy Impacts**

The Tentative Order does not address the reasons it uses to exclude consideration of many non-energy impacts that are factored into testing in other states that use the TRC. The Tentative Order suggests consistency with prior TRC Manual policy without any other considerations or citations for their exclusion. Page 37 of the Tentative Oder proposes that:

consistent with prior TRC Test Orders, the TRC Test will not include societal benefits such as carbon dioxide emissions reductions or other environmental benefits, decreased universal service program costs, reduced uncollectible expenses, or any other non-energy impacts (NEIs) beyond the quantifiable fossil fuel, water, and O&M impacts detailed elsewhere in this section. *See 2016 TRC Test Order* at 8-16.

The 2016 TRC Test Order at page 14 stated:

Except as specifically detailed below with respect to the benefits of avoided costs of fossil fuels and water, *we will not include non-electric benefits as part of the 2016 TRC Test.*

The 2019 Tentative Order and the 2016 TRC Order lack transparency on the question of why PA PUC proposes an exclusion of non-energy or “non-electric” benefits. For reasons explained below under the NSPM Symmetry Principle – cost effectiveness testing that excludes benefits while including costs can often result in flawed results. Excluding whole categories of impacts or benefits from energy efficiency programs is a fundamental policy choice that should be supported and explained in the 2019 Tentative Order and/or the 2016 TRC Order. Failing to offer a rationale for such a fundamental policy choice that is different from many states applying the TRC does not meet the Transparency Principle described in the NSPM.

- **Frequency of TRC Manual Updates and PA TRM Update**

We salute the PA PUC for its administration of Phases I through Phase III of Act 129 implementation and its preparations for Phase IV. However, best practices of states that administer ratepayer funding through cost effectiveness testing demonstrates that annual updates promote more effective deployment of energy efficiency funding. We strongly urge the PA PUC to devote more time, attention and resources to its updates of the TRC Manual and the Pennsylvania Technical Reference Manual (PA TRM). *At a minimum, annual updates to the PA TRM should be required to keep consistent with rapid changes in the private marketplace.* These critical policy issues are not addressed in the Tentative Order and should be considered and explained as part of the Docket No. M-2019-3006868 proceedings.

We believe that the current approach of updating the TRC Manual and the PA TRM every four or five years is inadequate to keep up with a rapidly changing home performance marketplace. BPA’s members and affiliates know that if they were trying to sell customers four or five-year-old technologies, they would be out of business. New technologies that are already introduced and prevalent in the marketplace (smart meters, smart thermostats, whole home retrofits for heat pump installation, etc.) are at risk of being ignored or unaccounted for in cost effectiveness testing guidance documents like the TRC Manual and PA TRM (if they are updated only every four or five years).

It is almost certain that new technologies will emerge in the marketplace before a Phase V is scheduled to be implemented in the future. By selecting a four- or five-year update cycle, the PA PUC is choosing to base its policy decisions upon outdated technology and potentially ignore new data collection systems related to building sciences. The PA PUC’s decision to select a four to five-year time frame for updates to the TRC Manual and PA TRM is a

fundamental policy decision that the Tentative Order should address to provide transparency. We believe that this is another example of a policy issue that could benefit from an NSPM review of the PA TRC.

- **An NSPM Review of the PA TRM Could Add Transparency**

Several states are moving toward web based technical resource manuals to facilitate peer review, lower administration costs and greatly improve accuracy. We strongly suggest that the PA PUC conduct a stakeholder driven process on how best to update and further reforms its PA TRM in the future. The availability of updated and accurate data and information in the PA TRM would greatly improve application of the PA TRC in the Commonwealth. New York is one state where best practices on technical resource manual updates may provide a good best practice roadmap for Pennsylvania.

Specific Comment – Symmetry – The Tentative Order Should Apply Costs and Benefits in a Balanced Manner

Application of the NSPM’s Principle of Symmetry could help the PA PUC better address one of the cost effectiveness testing policy choices discussed above. When including costs in one part of the TRC test, decisions to exclude benefits should be clearly considered and explained. One critical principle described in the [National Standard Practice Manual](#) is Symmetry:

For each type of impact included in a cost-effectiveness test, it is important that both the costs and the benefits be included in a symmetrical way. Otherwise, the test may be skewed and provide misleading results.

For starters, this means that all utility system costs (i.e., costs of running efficiency programs) and all utility system benefits (see Chapter 6 for a more detailed discussion of the range of utility system benefits) should be included in cost-effectiveness analyses. In addition, if a jurisdiction’s applicable policy goals dictate that impacts on efficiency program participants be included in its cost- effectiveness test, then both costs borne by those participants and benefits received by those participants should be included...

Similarly, if a jurisdiction’s applicable policies dictate that other categories of impacts should be included in its cost-effectiveness test—whether other fuel, water, low income, environmental, public health, economic development, and/or other impacts—then all incremental negative (cost) and positive (benefit) impacts should be captured in the test.

On June 22, 2015, the PA PUC decided to “*not include non-electric benefits as part of the 2016 TRC Test*” (See 2016 TRC Test Order at page 14). It is not clear why these “non-electric benefits” were excluded. It is also not clear why the 2019 Tentative Order proposes to affirm that decision. According to the NSPM Symmetry Principle, the proposed 2019 PA TRC “may be skewed and provide misleading results” by excluding categories of quantifiable benefits.

BPA encourages the PA PUC to re-examine the basis for its 2015 decision on “non-electric benefits” and provide additional details why that position merits continued support in 2019. Many of the 30 states that apply some version of the TRC do include several non-energy impacts or benefits in their cost effectiveness testing evaluations to achieve balance or symmetry in their evaluations of energy efficiency programs.

***Specific Comment* - Hard To Quantify Benefits – Why Health Benefits Are Just One Example of Impacts That Are Easier to Quantify Since the PA PUC’s Decision to Exclude Them in 2015**

Historically, some states, including Pennsylvania, have been reluctant to include hard to quantify benefits of energy efficiency and demand response programs into their cost effectiveness testing because of a lack of research or data on those benefits. Most states agree that while some benefits are “greater than 0,” without reliable, robust data – these undefined benefits should not be included in cost effectiveness testing analysis.

One area of rapid change in research and data collection is the health benefits of energy efficiency programs. Since the PA PUC’s decision on the TRC in 2015, a growing body of research has developed demonstrating that energy efficiency also provides significant and quantifiable health benefits.

First, reducing energy demand in buildings avoids the need to generate electricity and to build additional power plants, thereby reducing greenhouse gases and other pollutants emitted through the combustion of fossil fuels. The air pollution caused by burning fossil fuels damages major organ systems in the human body, contributing to the leading causes of death in the US: cancer, chronic lung disease, heart disease, and strokes. Deploying energy efficiency can help to mitigate these health harms.

Second, Pennsylvanians realize significant health benefits from investing in utility energy efficiency programs as part of a broader energy efficiency strategy. According to [Saving Energy, Saving Lives: The Health Impacts of Avoiding Power Plant Pollution with Energy Efficiency](#) (ACEEE 2018), Pennsylvanians see health benefits, fewer premature deaths, fewer hospital admissions due to respiratory and cardiovascular illnesses, and costly lost work days as a result of energy efficiency programs. These benefits have quantifiable, data supported impacts that can be considered under the PA TRC.

Third, energy efficiency is an effective tool to create healthier indoor spaces. Leaky windows and poor insulation can lead to cold drafts and extreme temperatures in a home during summer and winter months, which can trigger asthma attacks and exacerbate other respiratory illnesses. Inefficient and malfunctioning appliances not only waste energy but may also degrade air quality through incomplete combustion or improper venting. Poorly sealed building envelopes make it easier for pests and moisture to infiltrate; both can harm respiratory health through mold growth and the introduction of allergens and disease. Targeted energy efficiency can mitigate all of these risks and make homes healthier, particularly for vulnerable populations such as low-income communities. Energy efficiency programs have improved the health and lives of Pennsylvanians who participated in weatherization programs in their communities. See [The Next Nexus: Exemplary Programs That Save Energy and Improve Health](#) (ACEEE 2018).

Fourth, economic development and business strategies that seek to capture the combined cost savings and health benefits of energy efficiency are spreading out rapidly across the country. The private sector marketplace is beginning to capture the benefits of “healthy home” improvements achieved directly and indirectly through home retrofit programs. Home performance contractors already know that energy efficiency retrofits can improve indoor environments, air quality and health outcomes, such as asthma, COPD, and other chronic respiratory conditions. Several business models that combine public and private sector participation to capture these health benefits are described in the August 2019 [Energy-Plus-Health Playbook](#).

The PA PUC should recognize that some of the traditionally hard to quantify benefits that result from residential retrofits are now defined and supported by comprehensive data. The PA PUC should re-examine its decision to exclude consideration of non-energy and “non-electric” benefits, particularly health benefits as they are no longer “hard to quantify.”

Specific Comment – Policy Goals – The PA PUC Should Align the Proposed TRC Approach In the Tentative Order with the Commonwealth’s Policy Goals

The first step of the NSPM process allows a jurisdiction to identify and articulate its applicable policy goals. Documenting applicable goals at the outset of “testing your test” is necessary to ensure that the cost-effectiveness test explicitly and properly accounts for a state’s goals. The NSPM sets forth an overview of the most common applicable policy goals but suggests that any state interested in pursuing the NSPM process, undertake a thorough review of their applicable policy goals (See Page 30 of the NSPM). Sample goals provided in the NSPM include:

- **Common Overarching Goals:** Provide safe, reliable, low-cost electricity and gas services; protect low-income and vulnerable customers; maintain or improve customer equity.
- **Efficiency Resource Goals:** Reduce electricity and gas system costs; develop least-cost energy resources; promote customer equity; improve system reliability and resiliency; reduce

system risk; promote resource diversity; increase energy independence (and reduce dollar drain from the jurisdiction); reduce price volatility.

- **Other Applicable Goals:** Support fair and equitable economic returns for utilities; provide reasonable energy costs for consumers; ensure stable energy markets; reduce energy burden on low-income customers; reduce environmental impact of energy consumption; promote jobs and local economic development; improve health associated with reduced air emissions and better indoor air quality.

We respectfully request that the PA PUC consider all of the Commonwealth's policy goals prior to approving the Tentative Order by conducting an NSPM review of the PA TRC. As noted above, we believe that there are several Commonwealth policies and statures that strongly suggest the PA PUC should consider the economic development impacts of its energy efficiency policies. While we have not performed a comprehensive review of Commonwealth policies, laws and regulations as recommended in Step 1 of the NSPM process, one "self-ratifying policy" does stand out as being worthy of consideration:

The environmental amendment to the Pennsylvania Constitution, article I, section 27, passed by the General Assembly and ratified by the voters on May 18, 1971, provides:

The people have a right to clean air, pure water, and to the preservation of the natural, scenic, historic, and esthetic values of the environment. Pennsylvania's public natural resources are the common property of all the people, including generations yet to come. As trustee of these resources, the Commonwealth shall conserve and maintain them for the benefit of all the people.¹

We recognize that the PA PUC has reviewed legal briefs suggesting that this Pennsylvania Environmental Rights Amendment creates within all state agencies a "judicially enforceable duty as a trustee to protect" the individual right to a clean environment promised to the citizens of Pennsylvania under *Robinson Township v. Commonwealth*, 83 A.3d 901 (Pa. 2013). Setting aside that legal argument for purposes of these comments, the NSPM suggests that a best practice for states seeking to reform and modernize their cost effectiveness testing approaches requires a *thorough examination of all applicable state law and regulations* to determine the policy goals of the PA TRC. Certainly, Article 1, Section 27 of the Pennsylvania Constitution and any other applicable Pennsylvania legal authority would be worthy of consideration under an NSPM, Step 1 review.

We respectfully request that the PA PUC consider conducting an NSPM, Step 1 style review of applicable Pennsylvania policy to better inform the development of the proposed TRC in the Tentative Order. We believe that many examples of Pennsylvania statutes, policies and regulations would be worthy of consideration by the PA PUC when reforming and updating the PA TRC. Article 1, Section 27 of the Pennsylvania Constitution is just one example of a foundational state policy to review and consider in any NSPM, Step 1 review.

Conclusion

We appreciate this opportunity to provide comments on the PA PUC’s September 19, 2019 Tentative Order on the 2021 Total Resource Cost (TRC) at Docket No. M-2019-3006868. We respectfully request that the PA PUC add transparency to the cost effectiveness testing approach employed by the Commonwealth, provide symmetry in the way it calculates costs and benefits of energy efficiency programs, include “non-energy” benefits that may be harder to quantify and account for all of the applicable policies and laws of the Commonwealth when devising the appropriate TRC test for Phase IV of Act 129 and beyond.

We respectfully request that the PA PUC consider working through the NSPM process to “test its test” and revise the PA TRC to better reflect Commonwealth policies and goals. Case studies of other states that have already taken the NSPM approach to cost effectiveness testing reforms appear at: <https://nationalefficiencyscreening.org/resources/case-studies/>. Please feel free to contact us via email should you have any questions about the research and policy information described in these comments.

Respectfully Submitted,



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Attachment A

US Energy Efficiency (EE) Employment Per Capita

State	Gross EE Jobs	Population	EE Jobs Per Capita	Per Capita Rank	Gross Jobs Rank
DC	12,807	702,455	0.0182	1	36
VT	11,035	626,299	0.0176	2	41
WY	7,528	577,737	0.0130	3	45
DE	12,514	967,171	0.0129	4	38
MA	86,473	6,902,149	0.0125	5	7
RI	12,773	1,057,315	0.0121	6	37
MD	70,530	6,042,718	0.0117	7	11
WI	63,141	5,813,568	0.0109	8	14
OR	42,547	4,190,713	0.0102	9	20
UT	31,798	3,161,105	0.0101	10	25
CT	35,597	3,572,665	0.0100	11	23
VA	78,670	8,517,685	0.0092	12	10
NH	11,733	1,356,458	0.0086	13	39
MI	85,061	9,995,915	0.0085	14	8
SD	7,496	882,235	0.0085	15	46
WA	63,877	7,535,591	0.0085	16	13
NC	86,559	10,383,620	0.0083	17	6
IN	55,090	6,691,878	0.0082	18	16
MN	46,191	5,611,179	0.0082	19	18
MT	8,673	1,062,305	0.0082	20	43
CA	318,542	39,557,045	0.0081	21	1
TN	53,006	6,770,010	0.0078	22	17
ND	5,425	760,077	0.0071	23	50
IL	89,469	12,741,080	0.0070	24	5
NE	13,533	1,929,268	0.0070	25	35
OH	81,676	11,689,442	0.0070	26	9
MO	41,845	6,126,452	0.0068	27	21
IA	20,587	3,156,145	0.0065	28	30

State	Gross EE Jobs	Population	EE Jobs Per Capita	Per Capita Rank	Gross Jobs Rank
ME	8,647	1,338,404	0.0065	29	44
NY	123,292	19,542,209	0.0063	30	3
AL	30,821	4,887,871	0.0063	31	26
AK	4,617	737,438	0.0063	32	51
AZ	43,418	7,171,646	0.0061	33	19
CO	34,342	5,695,564	0.0060	34	24
KS	17,287	2,911,505	0.0059	35	31
SC	29,984	5,084,127	0.0059	36	27
GA	61,193	10,519,475	0.0058	37	15
KY	25,530	4,468,402	0.0057	38	28
TX	162,816	28,701,845	0.0057	39	2
FL	118,412	21,299,325	0.0056	40	4
PA	68,820	12,807,060	0.0054	41	12
MS	15,403	2,986,530	0.0052	42	32
AR	15,147	3,013,825	0.0050	43	33
ID	8,747	1,754,208	0.0050	44	42
LA	22,152	4,659,978	0.0048	45	29
HI	5,850	1,420,491	0.0041	46	48
NJ	36,206	8,908,520	0.0041	47	22
WV	6,844	1,805,832	0.0038	48	47
NV	11,155	3,034,392	0.0037	49	40
OK	14,372	3,943,079	0.0036	50	34
NM	5,636	2,095,428	0.0027	51	49

Sources: Energy Efficiency Jobs in America published September 2019. Population numbers are US Census estimations for 2018

Unless otherwise stated, all data are from the 2019 U.S. Energy and Employment Report (March 2019), produced by the Energy Futures Initiative (EFI) in partnership with the National Association of State Energy Officials (NASEO) and collected and analyzed by BW Research Partnership (BWRP). The methodology for this report was adopted by the U.S. Dept. of Energy for its 2017 U.S. Energy and Employment Report (USEER), approved by the Office of Management and Budget and based upon data collected by the Bureau of Labor Statistics.