



# A New Tool to Improve Energy Efficiency Practices

The Database of State Efficiency Screening Practices (DSESP)

## Introduction to the DSESP: What It Is and Why We Need It

States invest in energy efficiency largely because it is a low-cost resource that can displace the need for traditional supply-side investments including electricity generation and transmission and distribution (T&D).<sup>1</sup> The energy and demand savings from efficiency also yield utility-system benefits including reduced risks and improved system reliability and resilience. These benefits can lead to broader non-utility impacts such as creating jobs, reducing fossil fuel use, and decreasing air pollution and other environmental impacts.

Regulators and utilities account for these costs and benefits using cost-effectiveness tests that inform utility and regulatory decision making about system operation and new resource investments.<sup>2</sup> According to the Regulatory Assistance Project, energy efficiency programs are considered cost effective when “the net cost of installing and maintaining measures that improve the efficiency of energy usage is less than the total cost of building, maintaining, and operating the generation, transmission, and distribution facilities that would otherwise be needed to supply enough energy to achieve the same end-use over the same lifetime.”<sup>3</sup> Only the energy efficiency resources that pass this bar may be implemented. That is why accurate cost-effectiveness testing is essential to realizing efficiency’s full benefits.

The National Efficiency Screening Project (NESP) created the Database of State Efficiency Screening Practices (DSESP) to inform key stakeholders about the assumptions and methods that states are currently using to assess the utility and non-utility impacts of energy efficiency. NESP developed the DSESP to help states use the 2017 National Standard Practice Manual (NSPM). The NSPM framework helps states identify relevant energy efficiency impacts; the DSESP assists in quantifying them. Together, these resources provide a framework for creating balanced and accurate cost-effectiveness tests.<sup>4</sup>

Synapse Energy Economics compiled the DSESP based on research on state practices as well as surveys and interviews with state agency staff, program administrators, and other stakeholders.<sup>5</sup> This tool can help states answer questions like “How do our practices compare to other states?” and “What can we learn from other state practices?”<sup>5</sup> The DSESP also features a list of guidance documents to inform state efforts in estimating a range of utility and non-utility energy efficiency system impacts. Reports, webinars, toolkits, and more are available on a range of related topics. They include US Environmental Protection Agency (EPA) guidance on quantifying the multiple benefits of energy efficiency, a new report by the National Association of Regulatory Utility Commissioners (NARUC) on valuing the resilience of distributed energy resources (DERs), ACEEE guidance on practices for quantifying utility system benefits of energy efficiency, and the ACEEE State Policy Database.<sup>6</sup>

The DSESP was first published in October 2018. A living document, it is updated regularly as new data are available and as efficiency screening practices change. As of June 2019 it covers 38 states.

### *This Topic Brief*

This topic brief highlights how the DSESP can advance energy efficiency as a resource and help states implement appropriate cost-effectiveness strategies. In it you will find information on the following:

- ▶ The types of information in the DSESP
- ▶ How states account for utility and non-utility impacts, with examples highlighting
  - ▷ Reliability benefits
  - ▷ Environmental benefits
  - ▷ States using the NSPM
  - ▷ Rhode Island’s state-specific test
- ▶ How key stakeholders can use the DSESP to improve cost-effectiveness policies, practices, and methodologies
  - ▷ Regulators
  - ▷ Nongovernmental organizations (NGOs) and advocates
  - ▷ Program administrators
  - ▷ Evaluators

<sup>1</sup> The DSESP presents the best available information on practices at the time of research, but in some cases may not be fully aligned with current policies.

## Information Included in the DSESP

Table 1 shows the data and resources that the DSESP provides to aid regulators and key stakeholders in obtaining information on cost-effectiveness testing practices, policies, and methodologies.

**Table 1. Information included in the DSESP**

DSESP section	Purpose
Methodology and overview	Explains the methodology for developing inputs to the DSESP and provides a database overview.
Definitions	Defines key terms used in the DSESP and in cost-effectiveness tests and applications more broadly; these key terms include utility system costs, utility system benefits, and non-utility system impacts.
Summary of states	Provides a summary view of state practices and methodologies, enabling comparison across all of the states in the DSESP. This section includes each state's primary and secondary tests as well as application practices such as additional assessment levels, discount rates, and analysis periods. It also shows the impacts that each state includes in its primary test.
View single state	Expands on the information in the Summary of States tab, including details on the discount rate and analysis period values, which costs are included, and the calculation method used for impacts. The section also lists policy and value sources for further study and reference.
Test and application	Identifies the cost-effectiveness tests, key test inputs, and the application of those tests in each state, as well as the level of assessment from measure to portfolio. The user can sort, filter, and compare state practices and methodologies.
Utility and non-utility system impacts	Summarizes the costs and benefits included in each state's primary cost-effectiveness test in the following categories: 1) categories of impacts included in the primary test for each state; 2) types of impacts included in the primary test; and 3) the method used to calculate impacts.
Guidance documents	Lists key resources for information related to the DSESP and cost-effectiveness practices.

In the following sections, we provide examples of what the DSESP tells us about states' practices in accounting for specific types of utility and non-utility system impacts, with a focus on reliability and environmental benefits, and on states using the NSPM.

## Accounting for Utility and Non-Utility Impacts

States account for different impacts in their cost-effectiveness tests. For example, every state in the DSESP other than Mississippi includes avoided energy costs, while only three states account for increased reliability. The DSESP features interactive maps that allow users to compare impacts. They show the differences between states as well as regional trends. For example, all New England states account for wholesale price suppression effects.\* Figure 1 shows states that include wholesale price suppression effects in their primary test; figure 2 shows how they are measured.

\* Wholesale price suppression effects measure reduced market clearing prices from energy efficiency resources.

Is the impact included in the primary test?

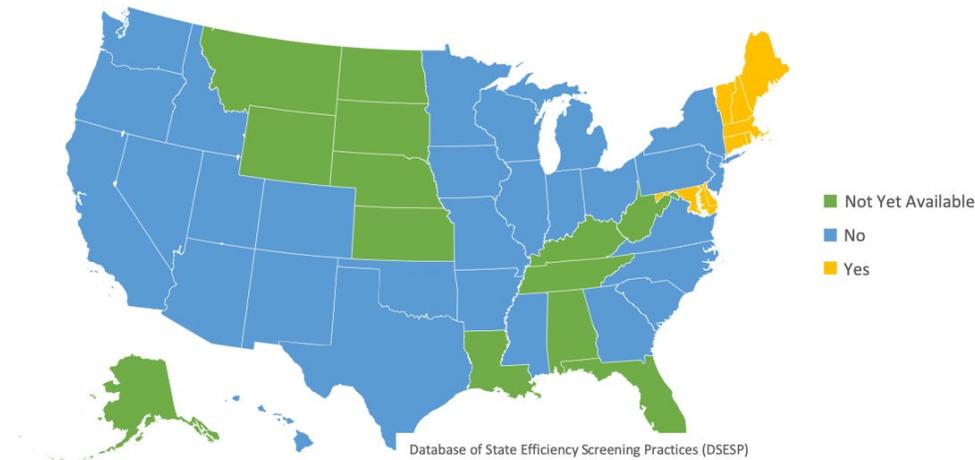


Figure 1. States that include wholesale price suppressions effects in their primary cost-effectiveness test

What method is used to calculate the impact?

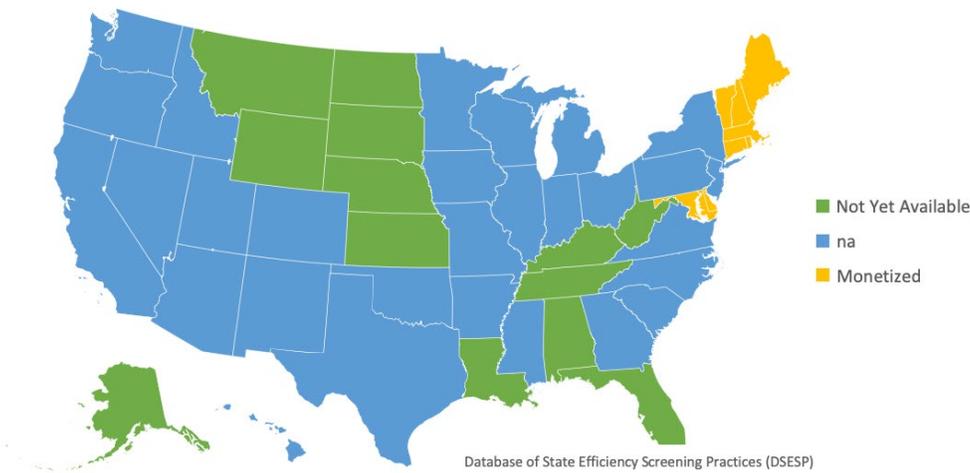


Figure 2. How states calculate wholesale price suppression effects

Whereas states that calculate wholesale price effects are concentrated in the Northeast, the measurement of efficiency's impact on productivity is much more varied across the country.\* Figures 3 and 4 show this latter impact and how it is measured.

Is the impact included in the primary test?

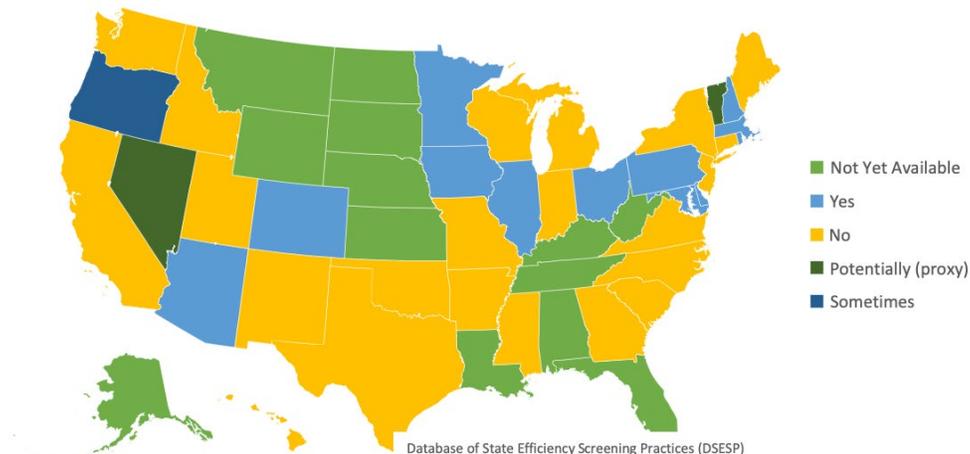
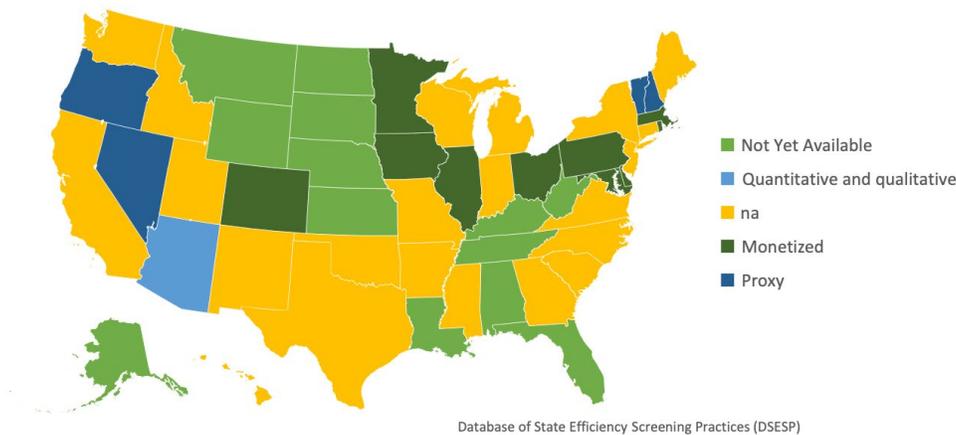


Figure 3. States that include productivity effects in their primary cost-effectiveness test

\* Productivity measures changes in labor costs, waste streams, and other impacts including product sales.

## What method is used to calculate the impact?

Figure 4. How states calculate productivity effects



An effective cost-effectiveness test accurately captures a resource's true costs and benefits within the statutory and regulatory context of a particular utility system. To do this properly requires up-to-date data and rigorous analysis; often, it also requires the quantification of hard-to-calculate factors. Energy efficiency is typically undervalued in resource screening practices because many of its benefits—such as environmental, reliability, health, water-saving, and economic development benefits—are not often included in cost-effectiveness tests, even though a state's policies may identify a range of participant and societal benefits.<sup>7</sup> In contrast, the DSESP shows that cost-effectiveness tests often do include the costs of energy efficiency, including utility and participant costs, which are typically more easily quantified. This asymmetry in treatment of costs and benefits causes bias in investment decisions because fewer energy efficiency resources pass cost-effectiveness screens than would be the case if the total net benefits to the system and its customers were fully quantified (or if, to ensure symmetry, the full costs were not included, for example by considering only a fraction of participant costs). This can lead to customers overpaying for more costly resources that may not provide the same benefits.

In the following sections, we highlight examples of specific costs, benefits, and other testing practices that states are including in their frameworks to appropriately reflect the value of energy efficiency as a resource. The DSESP itself provides additional information and resources including references to guidance documents on methodologies.

### *Utility System Benefits of Efficiency: Increased Reliability*

States and utilities increasingly recognize energy efficiency's contribution to creating and maintaining a reliable electric system. Grid reliability is critically important to utilities, which are required to meet reliability standards for the provision of electricity service—and face financial penalties when they fail to do so. The National Electric Reliability Corporation defines a reliable bulk power system as one that “is able to meet the electricity needs of end-use customers even when unexpected equipment failures or other factors reduce the amount of available electricity.”<sup>8</sup> Grid reliability includes factors such as resource adequacy (having enough resources to meet demand); operational security (the ability to withstand outages or other disturbances); maintaining voltage, frequency support, and other resources; and load balancing.

Energy efficiency reduces system demand and offsets the need for generation resources, thereby increasing grid reliability. Efficiency also relieves grid congestion at geographically targeted areas, reducing the need to upgrade or build new T&D infrastructure through what are often called *nonwires solutions*.<sup>\*</sup>

Grid operators and utilities have long recognized energy efficiency's various contributions to grid reliability but have struggled to quantify that value. Among the states in the DSESP, only Arizona, Massachusetts, and Rhode Island have cost-effectiveness frameworks that recognize increased reliability as a utility system benefit. As a best practice for cost-effectiveness screens, the test should capture all costs and all benefits. Recognizing this, there is good reason to include reliability in the calculation.

<sup>\*</sup> For additional information on how energy efficiency contributes to grid reliability, see [Keeping the Lights On: Energy Efficiency and Electric System Reliability](#).

The Arizona Administrative Code (AAC) requires that the incremental benefits of demand-side management measures—including energy efficiency—outweigh their costs, as calculated using the Societal Cost Test (SCT). The AAC also states that cost-effectiveness impacts may include “costs and benefits associated with reliability, improved system operations, environmental impacts, and customer service.”<sup>9</sup> Figure 5 shows the details of how Arizona includes reliability benefits in its cost-effectiveness testing in the DSESP’s single state view.

	Arizona		Policy Source	Value Source
Utility System Benefits	Increased Reliability	Yes	Supplement 17-3 to the Arizona Administrative Code  <a href="http://apps.azsos.gov/public_services/Title_14/14-02.pdf">http://apps.azsos.gov/public_services/Title_14/14-02.pdf</a>	See most recent APS DSM plan. Reliability mentioned on page 29 and 45 of document.  <a href="https://www.aps.com/library/communications1/DSMplan2018.pdf">https://www.aps.com/library/communications1/DSMplan2018.pdf</a>
	Benefits included	Costs and benefits associated with reliability		
	Calculation Method	Monetized		

Figure 5. Reliability benefits included in Arizona’s cost-effectiveness test

Arizona’s largest electric utility, Arizona Public Service (APS), did not calculate reliability benefits in its 2017 cost-effectiveness tests, but ran a T&D system pilot in 2018 that “seeks to provide information on benefits from improved system operation that can be gained by targeting demand side management at the substation level.” Data on results from the pilot are not yet available but will provide information on the reliability of load reductions at the substation level to inform future planning.<sup>10</sup>

As for the DSESP states, Rhode Island does not currently quantify a value for reliability in its testing. However National Grid Rhode Island uses New England’s 2018 *Avoided Energy Supply Components* (AESC) report for portions of its 2018 cost-effectiveness tests, and that report has a “Value of Improved Reliability” section. If included in the future, the value could be calculated using the cost to customers of not having power (value of lost load), the value of load reductions that offset generation needed for reserve margins not already included in capacity markets (generation component), and a value for efficiency’s effects on T&D infrastructure. The AESC report was able to quantify only the generation value, citing a lack of available data for the other components. It estimates a reliability value of \$0.65/kW-year for resources that cleared the capacity auction and \$6.60/kW-year for uncleared load reductions. This value is a “15-year levelized benefit of increasing generation reserves through reduced energy usage.”<sup>11</sup> National Grid may choose to include this value in future cost-effectiveness tests.

The DSESP shows that New York does not explicitly include increased reliability in its current cost-effectiveness testing. However, the DSESP does indicate that the state has introduced a relatively new benefit-cost analysis methodology for all distribution system resources, including energy efficiency, that could lead to the inclusion of reliability. This methodology aims to capture a more granular, accurate picture of a resource’s effects on the electric system, including time and locational value.

Each New York utility is required to file a benefit-cost handbook outlining the specific value of DERs to their systems. Many utilities have included information in their handbooks that would allow for future calculation of reliability benefits such as net avoided restoration costs and net avoided outage costs, as well as reliability benefits from avoided T&D losses. For example, NYSEG and Rochester Gas & Electric included reliability and resiliency benefits in their 2018 handbooks. Both utilities specify that the benefits will not be calculated for all DERs, and they do not mention whether it would apply to energy efficiency. The benefit calculation includes net avoided restoration costs and net avoided outage costs. Inputs to these include the cost of increased crew time and other expenses to restore outages, the reliability element’s marginal cost, the value of electricity service to customers, and the average demand for electricity. According to the handbook, the values should be customer specific rather than systemwide averages.<sup>12</sup>

Although energy efficiency’s reliability value is challenging to calculate, states and other groups are laying the groundwork to accurately assess it in the future. Resources cited in the DSESP—such as NARUC’s guidance, [The Value of Resilience for Distributed Energy Resources: An Overview of Current Analytical Practices](#) and ACEEE’s report, [Keeping the Lights On: Energy Efficiency and Electric System Reliability](#)—add to the state-specific information that users can reference. This value is becoming increasingly important with aging grid

infrastructure and higher penetrations of variable renewable resources on the grid.

### *Non-Utility System Benefits of Efficiency: Environmental Impact*

Cities, states, and countries are setting increasingly ambitious climate goals that are driving energy system players to decrease their environmental impact. Among other outcomes, reducing environmental impacts through energy efficiency can result in increased air quality, improved public health, and advancements toward climate goals. However, despite explicit state policy goals to reduce carbon emissions, many states fail to include a quantified value for environmental impacts in their cost-effectiveness tests.

Energy efficiency can displace electricity generation from fossil fuels such as coal and natural gas and yield benefits including reductions in air pollution and greenhouse gas emissions. By reducing reliance on fossil fuels, utilities can lower the cost of compliance with environmental regulations such as those for sulfur dioxide, nitrogen oxide, and carbon dioxide.<sup>13,14</sup> Environmental compliance policies may also aim to limit other criteria pollutants, greenhouse gas emissions, toxins, and water effluents and use.<sup>15</sup>

Although a range of measures have environmental benefits, only 15 out of 38 states represented in the DSESP include non-utility environmental impacts in their primary test. States that include this factor account for various environmental impacts. For example, the DSESP shows that New York includes impacts from SO<sub>2</sub>, NO<sub>x</sub>, and CO<sub>2</sub> in its cost-effectiveness test, while Rhode Island includes the social impact of carbon not already included in the electricity commodity forecast. Measurement tactics also vary by state, with some using a proxy value and others directly monetizing environmental benefits.

New York’s Reforming the Energy Vision (REV), initiated in 2014, includes ambitious goals: a 40% reduction in greenhouse gas emissions from 1990 levels, 50% electricity from renewable energy resources, and a 600 trillion Btu increase in statewide energy efficiency.<sup>16</sup> The impacts included in New York’s environmental impact test reflect these goals. Figure 6 shows details of the state’s inclusion of environmental impacts of energy efficiency in its cost-effectiveness testing from the DSESP single state view.

	New York	Notes	Policy Source	Value Source
Non-Utility System Impacts	<b>Environmental</b>	Yes	NYPSC, Order Establishing the Benefit Cost Analysis Framework, 2016. Appendix C.  <a href="https://drive.google.com/file/d/1ke9Qh34sOZ1MohmWwauRlseHvWcY7198/view?usp=sharing">https://drive.google.com/file/d/1ke9Qh34sOZ1MohmWwauRlseHvWcY7198/view?usp=sharing</a>	2017-2020 ETIPs for each utility  <a href="http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=15-M-0252">http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=15-M-0252</a>
	<i>Impacts included</i>	SO <sub>2</sub> , NO <sub>x</sub> , CO <sub>2</sub>		
	<i>Calculation Method</i>	Monetized		
	<i>Value</i>	See most recent plan (2017-2020)		
		Environment externalities include CO <sub>2</sub> . The value of avoided CO <sub>2</sub> is based on either the Clean Energy Standard Tier 1 Renewable Energy Credit (REC) price or Federal Societal Cost of Carbon (SCC) net of Regional Greenhouse Gas Initiative (RGGI) clearing price.  Utilities are to include SO <sub>2</sub> and NO <sub>x</sub> externalities to the extent that they are greater than reflected in LBMPs. To date, none have included.		

Figure 6. Environmental benefits included in New York’s cost-effectiveness test

Historically, states have struggled to quantify hard-to-measure or counterfactual impacts such as environmental benefits. New York addresses this challenge by outlining valuation procedures in state orders and plans. New York’s Clean Energy Standard (CES) mandate includes an evaluation and measurement strategy to accurately measure the value of CO<sub>2</sub> emission impacts of energy efficiency and DER resources.<sup>17</sup> The value of avoided SO<sub>2</sub> and NO<sub>x</sub> emissions is embedded in the location-based marginal pricing of avoided energy use as calculated in New York’s congestion and resource planning study, which aims to address control of these pollutants.<sup>18</sup>

Monetizing environmental impacts is typically the most specific way to evaluate environmental impacts. However improved environmental quality affects a wide range of interconnected benefits—such as improved public health, workplace environment, and air quality—that are hard to measure and monetize. To account for these difficult-to-measure benefits, some states use a proxy value instead. As the DSESP shows, New Hampshire uses a proxy to account for the environmental and public health impacts of energy efficiency. Figure 7 shows these details for New Hampshire in the DSESP single state view.

Figure 7. Environmental and health benefits included in New Hampshire’s cost-effectiveness test

New Hampshire		Policy Source	Value Source
Non-Utility System Impacts	<b>Environmental</b>	Yes	Public Utilities Commission of New Hampshire, "Order Establishing Guidelines for Post-Competition Energy Efficiency Programs," Order No. 23,574, November 1, 2000, page 14.  <a href="https://www.puc.nh.gov/Regulatory/Orders/2000ords/23574e.pdf">https://www.puc.nh.gov/Regulatory/Orders/2000ords/23574e.pdf</a>  <a href="https://www.puc.nh.gov/Regulatory/Docketbk/2017/17-136/LETTERS-MEMOS-TARIFFS/17-136_2018-01-12_NH_UTILITIES_REV_EERS_PLAN.PDF">https://www.puc.nh.gov/Regulatory/Docketbk/2017/17-136/LETTERS-MEMOS-TARIFFS/17-136_2018-01-12_NH_UTILITIES_REV_EERS_PLAN.PDF</a>
	<i>Impacts included</i>	Not specified as part of adder	
	<i>Calculation Method</i>	Proxy	
	<i>Value</i>	10%	
	<b>Public Health</b>	Yes	Public Utilities Commission of New Hampshire, "Order Establishing Guidelines for Post-Competition Energy Efficiency Programs," Order No. 23,574, November 1, 2000, page 14.  <a href="http://www.puc.nh.gov/Regulatory/Orders/2000ords/23574e.pdf">http://www.puc.nh.gov/Regulatory/Orders/2000ords/23574e.pdf</a>  <a href="https://www.puc.nh.gov/Regulatory/Docketbk/2017/17-136/LETTERS-MEMOS-TARIFFS/17-136_2018-01-12_NH_UTILITIES_REV_EERS_PLAN.PDF">https://www.puc.nh.gov/Regulatory/Docketbk/2017/17-136/LETTERS-MEMOS-TARIFFS/17-136_2018-01-12_NH_UTILITIES_REV_EERS_PLAN.PDF</a>
	<i>Impacts included</i>	Not specified as part of adder	
	<i>Calculation Method</i>	Proxy	
	<i>Value</i>	10%	

Figure 7. Environmental and health benefits included in New Hampshire's cost-effectiveness test

As outlined in the 2018–2020 New Hampshire Statewide Energy Efficiency Plan, New Hampshire utilities use a nonenergy impact adder of 10% of total electric, natural gas, and other fuel benefits.<sup>19</sup> The plan notes that this is a conservative proxy and that an evaluation, measurement, and verification (EM&V) working group has been appointed to study nonenergy impacts of efficiency over a three-year period in order to more accurately quantify the value of nonenergy benefits in future tests. The goal of the new approach is to reflect a more balanced way of quantifying hard-to-measure costs and benefits.

### States Using the NSPM

In the United States, cost-effectiveness screening practices have been shaped historically by traditional cost-effectiveness tests found in the California Standard Practice Manual (CaSPM).<sup>\*</sup> These tests include the Utility Cost Test (UCT), Total Resource Cost test (TRC), Societal Cost Test (SCT), Participant Cost Test (PCT), and Rate Impact Measure test (RIM). Each test varies based on the primary perspective considered (such as the program administrator, the program participant, or society at large); which metrics are calculated; and the baseline against which the metrics are measured.<sup>20</sup> In practice, states have employed various ad hoc modifications to these traditional tests because the testing frameworks can be limited and do not encourage the flexibility needed to address specific policy goals. Given this, in 2017 the NESF published the NSPM, which provides policy-neutral, objective guidance and foundational information that stakeholders can use to create an appropriate and jurisdiction-specific primary cost-effectiveness test, or *Resource Value Test* (RVT). An RVT may include a combination of the CaSPM tests as it aims to capture a jurisdiction's relevant policy goals and quantify all applicable benefits and costs.<sup>\*\*</sup> Cost-effectiveness methodologies should include costs and benefits symmetrically. For example, if a method accounts for reliability costs, it should also account for reliability benefits. Symmetric testing practices outlined in the NSPM help avoid bias and accurately represent energy efficiency as a resource.

The NSPM framework gives regulators, program administrators, and other parties core principles and a consistent way to create cost-effectiveness tests that align with their unique policy goals. However, until the DSESP was developed, there was no readily accessible source of information on how states were conducting their cost-effectiveness analyses, including how they were interpreting or modifying the CaSPM tests and whether (and to what extent) they were using the NSPM. The DSESP fills this information gap by providing

<sup>\*</sup> The CaSPM can be found at [calmac.org/events/SPM\\_9\\_20\\_02.pdf](http://calmac.org/events/SPM_9_20_02.pdf).

<sup>\*\*</sup>For information on the cost-effectiveness tests and the NSPM, see [aceee.org/research-report/uf22](http://aceee.org/research-report/uf22) and [nationalefficiencyscreening.org/wp-content/uploads/2017/05/NSPM\\_May-2017\\_final.pdf](http://nationalefficiencyscreening.org/wp-content/uploads/2017/05/NSPM_May-2017_final.pdf).

guidance documents on cost-effectiveness testing inputs, methodologies for calculating utility and non-utility impacts, and areas in which states do or do not consider certain impacts.

According to the DSESP, Arkansas, Connecticut, Minnesota, New Hampshire, Pennsylvania, Washington, and Rhode Island all have applied or are applying the NSPM in some way to review or “test” their current practice,\* although a state-specific test using NSPM principles may not be their primary test. Figure 8 shows how states covered in the DSESP are applying the NSPM.

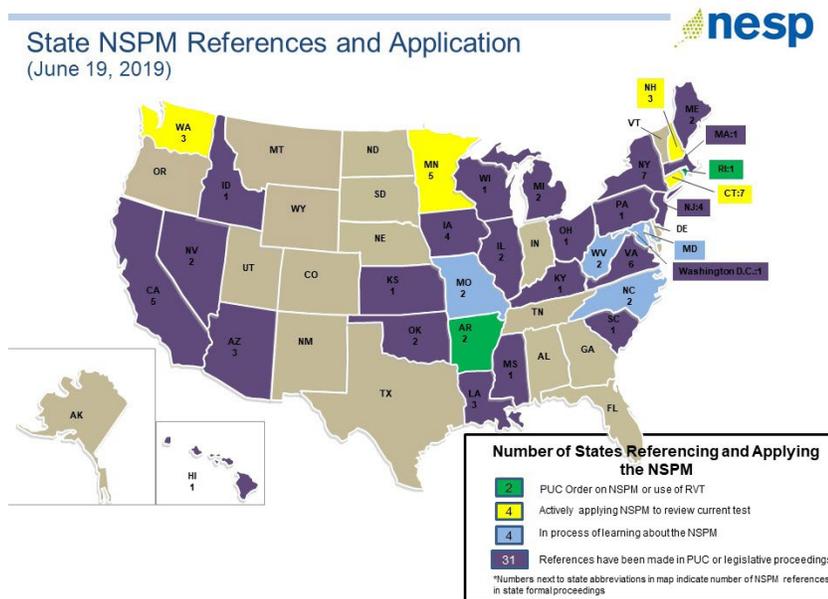


Figure 8. States applying the NSPM

In applying the NSPM, Arkansas is specifically working to address quantifying common carbon costs and addressing asymmetry of nonenergy impacts,, while Connecticut, Pennsylvania, Washington, and New Hampshire are aiming to use NSPM principles more broadly to accurately account for energy efficiency’s benefits. In New Hampshire, a consultant is collaborating with an EM&V working group on this topic as part of the Statewide Energy Efficiency Plan 2019 Update.

Rhode Island and Minnesota used the NSPM to develop their own cost-effectiveness tests. Currently, Minnesota’s test is proposed, leaving Rhode Island as the only state that currently uses a state-specific test. In the following section, we discuss Rhode Island’s state-specific test in more detail.

### The Rhode Island Test

In 2017, Rhode Island implemented the Rhode Island Test (RI Test), a new cost-effectiveness test developed using NSPM principles. The effort is part of the state’s wide-reaching Power Sector Transformation (PST) initiative, which aims to create a regulatory framework that supports a clean and flexible electric grid.<sup>21</sup> Governor Gina Raimondo launched the PST to help achieve her goals of economic stimulus through reduced energy costs, job creation, and increased investment in the power sector, as well as reduced carbon emissions.<sup>22</sup>

The RI Test “more fully reflects the policy initiatives of the state with regard to energy, its costs, benefits, and environmental and societal impacts.”<sup>23</sup> The DSESP provides details on each of the benefits and costs calculated in the test, including those that were previously included in the state’s TRC, which was also robust. Notably, the RI Test accounts for every utility system benefit listed in the DSESP, something no other state does. For the RI Test, the state also added new calculations for “non-embedded greenhouse gas reduction benefits,” “economic development benefits,” and “other emissions generated or reduced.” The RI Test was first

\* Case studies for some of these states can be found at: [nationalefficiencyscreening.org/resources/case-studies/](http://nationalefficiencyscreening.org/resources/case-studies/).

used in National Grid's 2018–2020 three-year energy efficiency plan.\* National Grid did not include health impacts in its calculations, however, because further analysis was required.<sup>24</sup> Figure 9 shows the details of how the RI Test's new factors are calculated.

Rhode Island		Policy Source	Value Source	
Non-Utility System Impacts	<b>Environmental</b>	Yes	RI Public Utilities Commission, "Least Cost Procurement Standards," July 28, 2018, §1.2.B.v.  <a href="http://www.ripuc.org/eventsactions/docket/4684-LCP-Standards_7-27-17.pdf">http://www.ripuc.org/eventsactions/docket/4684-LCP-Standards_7-27-17.pdf</a>	Synapse Energy Economics, "Avoided Energy Supply Components in New England: 2018 Report," June 1, 2018, Appendix B.  <a href="http://www.synapse-energy.com/project/avoided-energy-supply-costs-new-england">http://www.synapse-energy.com/project/avoided-energy-supply-costs-new-england</a>
	<i>Impacts included</i>	Social cost of carbon not embedded in projected energy market prices.		
	<i>Calculation Method</i>	Monetized		
	<i>Value</i>	Refer to most recent regional study for details		
	<b>Economic Development and Jobs</b>	Yes	RI Public Utilities Commission, "Least Cost Procurement Standards," July 28, 2018, §1.2.B.v.  <a href="http://www.ripuc.org/eventsactions/docket/4684-LCP-Standards_7-27-17.pdf">http://www.ripuc.org/eventsactions/docket/4684-LCP-Standards_7-27-17.pdf</a>	National Grid, "Annual Energy Efficiency Plan for 2018 Settlement of the Parties," Docket No. 4755, November 1, 2017, Attachment 4, pages 15-16.  <a href="http://www.ripuc.org/eventsactions/docket/4755-NGrid-EPPP2018_11-1-17.pdf">http://www.ripuc.org/eventsactions/docket/4755-NGrid-EPPP2018_11-1-17.pdf</a>
	<i>Impacts included</i>	Economic development		
	<i>Calculation Method</i>	Monetized		
	<i>Value</i>	Total measure costs multiplied by 0.72 for residential and 0.57 for C&I programs.		

Figure 9. Elements included in Rhode Island's primary test

In each year of National Grid's three-year plan, the RI Test increased the benefit–cost ratio for energy efficiency resources. Figure 10 shows National Grid's cost-effectiveness energy efficiency values for 2018–2020 under both the previous TRC test and the RI Test.<sup>25</sup>

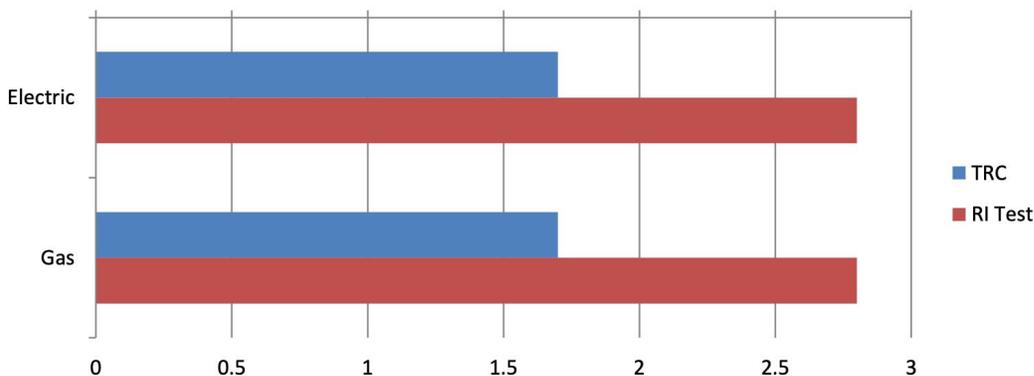


Figure 10. National Grid's cost-effectiveness energy efficiency values for 2018–2020 under the previous TRC test and the RI Test.

The principles used to calculate RI Test impacts follow certain best practices for cost-effectiveness testing. For example, the impetus for adopting a new test was to more accurately reflect the actual costs and benefits of delivering energy efficiency resources, which should be the goal of every cost-effectiveness test. For cases in which National Grid did not have adequate data, it did not include calculations for those factors—although, as the NSPM describes, there are many other ways to develop estimates for costs and benefits.<sup>26</sup>

## How Stakeholders Use the DSESP

A recent survey of the DSESP's more than 200 users shows that they include utility regulators and their staff; advocates and NGOs; program administrators and implementers; evaluators; and electric efficiency businesses, consultants, and software vendors. Figure 11 shows how survey respondents have used the DSESP to date.

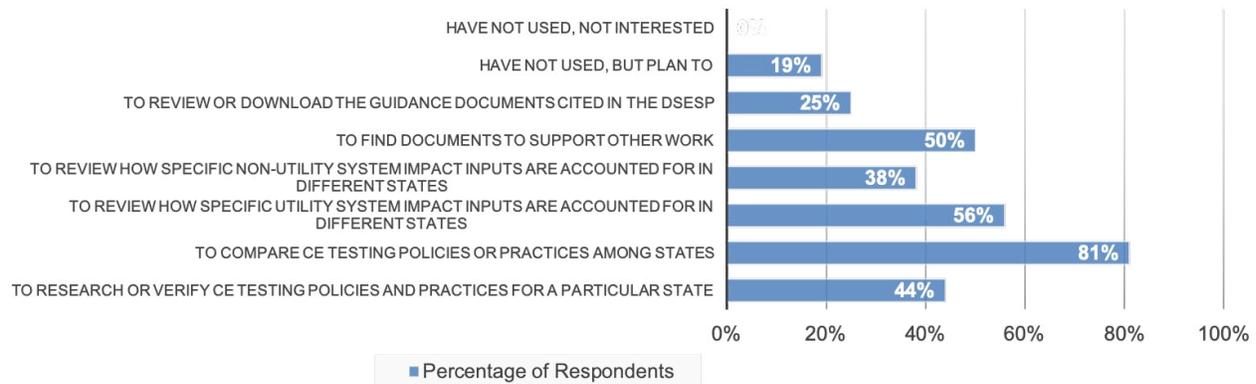


Figure 11. How users have employed the DSESP (n=16)

ACEEE and regional energy efficiency organizations are also using the DSESP to advance research on current state practices and to inform arguments to advance energy efficiency in proceedings across the country. ACEEE is using the DSESP to update the State Policy Database, which provides summaries of each state's cost-effectiveness practices.\* In the Northeast, advocates are using the DSESP to identify regional trends and as a resource for methods that quantify nonenergy impacts.<sup>27</sup> In the following, we outline how different groups are using and can use the DSESP to improve policy outcomes and advance their objectives; we also provide examples of how each group might do so.

## Regulators

Regulators are responsible for ensuring that utilities spend customer funds in a judicious and effective manner in providing safe, reliable, and affordable electricity and natural gas service. In this role, the regulatory commission and its staff often have the authority to formally approve or deny utility energy efficiency evaluation plans and products.<sup>28</sup> Approval of programs is typically dependent on whether or not a program has passed the relevant cost-effectiveness screen as determined by evaluators.

In the regulatory process, regulators and their staff may also have the authority to judge which cost-effectiveness test is used as the primary screen, to monitor assumptions and inputs used in the testing, and to ensure that utilities are meeting policy goals such as greenhouse gas emissions reductions or criteria pollutant reductions, which can influence the inputs to cost-effectiveness tests. For this reason, it is critical that regulators and their staff have a deep understanding of cost-effectiveness testing practices.

For regulators, both the NSPM and the DSESP are useful tools for quickly getting up to speed on cost-effectiveness testing in general. A survey of those who have downloaded the DSESP finds that regulators have used the DSESP to review how specific utility system impacts are accounted for in other states. Regulators can use the DSESP

- ▶ As context for common practice in the industry
- ▶ As a quick reference to the legislative mandates and underlying assumptions that inform cost-effectiveness testing in other states
- ▶ To compare their state's specific cost-effectiveness practices with those of other states
- ▶ To gain a deeper understanding of how to change or update the state's practices to meet policy goals

\* The State Policy Database can be accessed at [database.aceee.org/](http://database.aceee.org/).

## Regulators and Discount Rates

Regulators have the power to approve or reject energy efficiency programs based on a state's cost-effectiveness testing practices, applications, and methodologies. In doing so, regulators consider the discount rate applied to a state's cost-effectiveness calculations, which can have significant impact on the costs incurred. Discount rates are used to calculate the net present value of energy efficiency measures that provide savings into future years but that incur costs only in one year. They vary across states and across cost-effectiveness tests. For example, a state may apply a lower discount rate to their SCT than they apply to their UCT. Figure 12 shows the discount rates for the 29 states with discount rates included in the DSESP. Key points are:

- ▶ Average discount rate: 5.22%
- ▶ Median discount rate: 5.95%
- ▶ Minimum discount rate: 0.27%
- ▶ Maximum discount rate: 8.60%

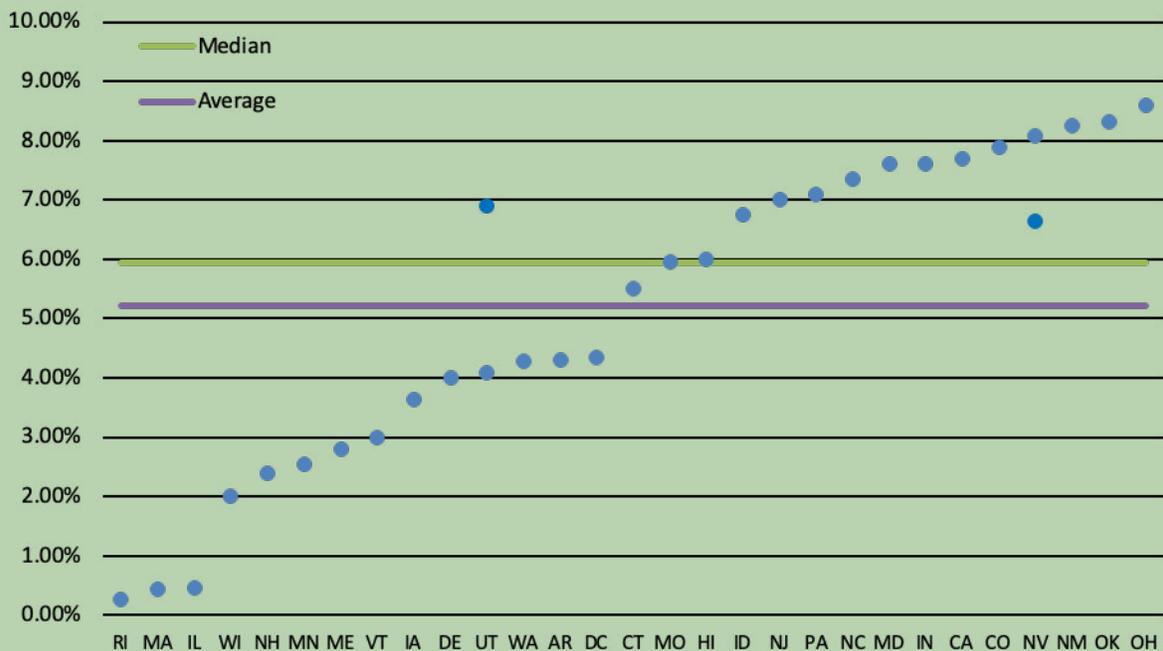


Figure 12. Discount rates for the 29 states with values included in the DSESP. The DSESP includes additional information on these discount rates, including use of nominal versus real dollars and the applicable cost-effectiveness test. *Source: Baatz 2015.\**

Regulators can use the information in the DSESP to inform their decisions about appropriate discount rates. Regulatory staff may find that visually representing discount rate data found in the DSESP across states, as above, is a quick way to compare their practices and methodologies to other states. By comparing state practices, regulatory staff can provide detailed information and recommendations on discount rates that best reflect the risk level of energy efficiency investments. For example, one report on best practices for cost-effectiveness testing suggests using a lower discount rate than the utility's weighted average cost of capital because energy efficiency investments are lower risk than traditional capital investments (Baatz 2015)\*. Regulators can use the DSESP to see which states use low-risk discount rates and to determine how their own discount rate compares.

\* Brendon Baatz, *Everyone Benefits: Practices and Recommendations for Utility System Benefits of Energy Efficiency* (Washington, DC: ACEEE, 2015). [aceee.org/research-report/u1505](http://aceee.org/research-report/u1505).

## Advocates and Nongovernmental Organizations (NGOs)

Advocates advance policies and policy implementation toward distinct goals such as achieving environmental gains, improving health outcomes, creating jobs, or promoting clean energy. NGOs similarly work to improve policy outcomes through research and outreach. These organizations may contract with utilities or program administrators, evaluators, or regulators to provide direct research or technical assistance services on a particular question, or they may conduct more general research. Additionally, NGOs inform legislative bills related to energy efficiency investments and their value to states. They can also directly intervene in the regulatory process to advocate for the use of certain cost-effectiveness practices or tests, to support claims or calculations, to suggest the inclusion of new participant or system impacts, or to suggest the use of different data or calculation methods such as discount rates.

Respondents to the survey about DSESP use confirmed that many downloaders are advocates, NGO employees, or consultants using the tool's data for research, comparison, and verification purposes. Comparative data, such as that in the DSESP, can aid researchers and advocates in their work by helping them

- ▶ Evaluate how particular states and utilities are performing in relation to others
- ▶ Build a case that certain benefits are measurable—or that quantification practices are feasible—because of their use in other jurisdictions
- ▶ Access underlying legislation, rulings, plans, filings, and underlying methodologies and assumptions to aid their research

### Advocating for Accurate Avoided Costs

Energy efficiency and environmental advocates are interested in utilities procuring all-cost-effective efficiency. To achieve this, it is critical that utilities accurately capture the avoided costs from energy efficiency such as avoided capacity, energy, and T&D. As the energy landscape changes and additional distributed generation comes online, utilities may propose to change how they calculate such avoided costs in their planning processes. In these cases, advocates can intervene to ensure that utilities are using accurate and appropriate avoided-cost calculation methodologies.

Stakeholders engaging with this issue can reference the DSESP to show comparative data on avoided-cost calculations and components in other states. For example, the DSESP shows that all of the 38 states studied except Mississippi include avoided marginal energy costs and avoided generating capacity costs, and 34 include avoided T&D costs. Additionally, the DSESP provides detailed information and references on how each state calculates these avoided costs. Advocates can use this information to compare a target state's methods to those of peer states and recommend a more appropriate methodology as needed. Figure 13 shows how Colorado and Wisconsin differ in calculation of avoided capacity energy and T&D costs in their cost-effectiveness tests. The DSESP also provides additional information and links to the policy and valuation sources.

State	Primary Test	Utility System Benefits		
		Avoided Marginal Energy Costs	Avoided Generating Capacity Costs	Avoided T&D Costs
Colorado	TRC	Yes	Yes	Yes
Wisconsin	TRC	Yes	Yes	No

Figure 13. Avoided cost calculations in Colorado and Wisconsin

## Program Administrators

Program administrators include utilities, private companies, and third-party independent administrators who plan, implement, and lead energy efficiency programs. Among their responsibilities are to develop program structure, set program goals, comply with regulations, and assess costs and benefits.

Program administrators are also responsible for conducting cost-effectiveness tests and accounting for costs and benefits as directed by their commission. In designing and implementing programs, administrators need to understand which benefits to maximize to improve program cost-effectiveness and demonstrate to regulators that their programs are advancing policy goals and appropriately using customer funds. Program administrators can use the DSESP to advance this work in a number of ways, including to

- ▶ Understand which impacts are included in their state's cost-effectiveness test, which calculation method is used, and the value of the impact (in some cases, the values are in state TRMs)
- ▶ View information on other state practices and studies to quantify various impacts to identify possible impact values (monetized or proxies) and/or underlying methods that could be useful for their own efforts to quantify additional benefits from their programs
- ▶ Quickly understand and compare other states' cost-effectiveness test practices and methods using the utility and non-utility system impacts and guidance documents sections

### Net Savings Impacts in California

California has long been a recognized energy efficiency leader, scoring in the top two in all *ACEEE State Scorecards*. In 2015, state legislation called for a doubling of energy savings in buildings by 2030 and for changes in how market effects are accounted for when measuring savings. This led a group of stakeholders—including investor-owned utility program administrators, evaluators, and regulators and staff at the California Public Utilities Commission (CPUC)—to consider whether to update the evaluation framework for energy efficiency.\* Both pieces of legislation have impacts on the baseline used for comparison and on the attribution of savings to energy efficiency programs; in response, the state is implementing new methods for calculating net savings and attributing them to programs. For example, the Technical Forum is a group of experts who have developed an electronic technical reference manual for California that gives stakeholders a consistent way to determine net savings for each efficiency measure. This evaluation framework in turn informs cost-effectiveness tests in the state.

Comparative data from the DSESP could have informed these policy changes. For example, figure 14 shows how four states included in the DSESP include free-ridership and spillover in their primary cost-effectiveness test. Such information can inform evaluators and stakeholder groups on the most common practices across the country.

State	Cost-Effectiveness Test & Application
	Free-ridership and Spillover
California	Free-ridership
Colorado	Free-ridership, non-participant spillover, and participant spillover
Michigan	Free-ridership, spillover, and market effects
Utah	Net-to-gross, with specific inputs not specified

Figure 14. Free ridership and spillover effects in four states' cost-effectiveness tests

\* Seth Nowak, Maggie Molina, and Martin Kushler, *Recent Developments in Energy Efficiency Evaluation, Measurement, Verification* (Washington, DC: ACEEE, 2017). [aceee.org/sites/default/files/publications/researchreports/u1712.pdf](https://www.aceee.org/sites/default/files/publications/researchreports/u1712.pdf).

## Evolving Evaluation Practices for New Policy Goals

Program administrators are facing pressure from policymakers to procure deeper energy efficiency savings in order to better align energy efficiency programs and evaluation practices with long-term resource planning and climate goals.\* To achieve this, administrators need to be more innovative with efficiency programs to capture deeper savings. One strategy for doing so is to pursue a market transformation (MT) strategy. MT is an overarching theory of change that aims to provide barrier-removing market interventions to accelerate the adoption of certain efficiency measures or behaviors, and then to remove those interventions as the market no longer needs them. MT is an explicit policy goal in some jurisdictions and a program strategy in others.

Evaluating MT programs poses unique challenges. Such programs operate on longer timelines than many short-term regulatory target and cost-effectiveness cycles, and they require real-time adaptive management as market barriers and preferences change.\*\* These effects may be difficult to isolate and verify over decades. As program administrators and policymakers increasingly pursue MT approaches to energy efficiency, evaluators must be able to accurately capture the costs and benefits of these programs in screening tests.

The DSESP provides information on which jurisdictions include MT impacts in their tests and how those impacts are calculated. This information may be helpful for evaluators whose states or utilities are beginning to implement MT programs. Figure 15 shows the states that the DSESP identifies as including MT approaches in their primary cost-effectiveness tests.

State	Primary Test	Utility System Benefits
		Market Transformation
Michigan	UCT	Yes
Rhode Island	State-specific test	Yes

Figure 15. Market transformation effects in cost-effectiveness tests

\* Rachel Gold and Seth Nowak, *Energy Efficiency Over Time: Measuring and Valuing Lifetime Energy Savings in Policy and Planning* (Washington, DC: ACEEE, 2019). [aceee.org/research-report/u1902](https://www.aceee.org/research-report/u1902).

\*\* Dan York, Hannah Bastian, Grace Relf, and Jennifer Amann, *Transforming Energy Efficiency Markets* (Washington, DC: ACEEE, 2017). [aceee.org/research-report/u1715](https://www.aceee.org/research-report/u1715).

Program administrators are interested in maximizing the benefits of their efficiency programs to ensure that resources pass cost-effectiveness screens and count toward legislative efficiency mandates. The information in the DSESP can help them understand which benefits to maximize and how their underlying evaluation methodologies, such as determining net savings, can impact calculated benefits.

## Evaluators

Evaluators are responsible for evaluating, measuring, and valuing utility and non-utility system impacts used in cost-effectiveness testing. Evaluations measure whether efficiency programs are being implemented as planned; their actual program impacts and effects; areas for program improvement; and whether programs are meeting requirements, including cost-effectiveness screens. Evaluators should understand cost-effectiveness testing policies, practices, and methodologies so that they can produce accurate and useful results that regulators, program administrators, advocates, and NGOs can rely on. In particular, evaluators need a deep understanding of the inputs to cost-effectiveness tests such as elements included in net savings (like free-ridership, spillover, and market effects), discount rates, the value or calculation method of any proxies that should be included, whether cost-effectiveness is determined at the measure or portfolio level, and the period of time that the evaluation will cover.

The DSESP offers evaluators information on which costs and benefits each state includes and the appropriate methods for calculating them. Evaluators can use the DSESP to

- ▶ Quickly reference a state's primary and secondary tests and see the impacts included in the primary test
- ▶ Understand state guidelines on quantifying impacts, and identify changes in methodologies

The DSESP also includes a wealth of guidance documents that can help all users.

## Conclusion

Energy efficiency creates multiple benefits beyond the utility system resource value; among these benefits are decreased environmental impacts, job creation, and improved public health. To realize these benefits, as articulated by state policies, and achieve energy efficiency's full potential as a resource, states must apply neutral and accurate cost-effectiveness tests that reflect their policy goals. The DSESP highlights the approaches that many states are taking, including those that are applying the principles and framework outlined in the NSPM, in their cost-effectiveness policies, practices, and methodologies.

Evaluation and cost-effectiveness practices are constantly evolving as policy goals shift and measurement and verification practices improve.<sup>29</sup> Regulators, advocates, NGOs, program administrators, and evaluators require up-to-date information to better capture cost-effective energy efficiency resources. Previously, such resources have been difficult to track down and, once found, information is often hidden in lengthy documents. The DSESP provides ready access to current data and guidance documents related to cost-effectiveness testing for stakeholders to drive their work forward. ACEEE is also using the DSESP to update its State Policy Database in order to give stakeholders additional access to the data.

The DSESP will continue to add information as cost-effectiveness practices evolve and as more states use the NSPM. It will cover additional states, give increased detail on state use of the NSPM, provide access to the most current studies and guidance documents, and add more methodology information for efficiency impacts. These impacts will include utility system impacts such as avoided costs, reduced risk, and increased resilience and reliability, as well as nonenergy benefits. As this topic brief illustrates, the DSESP will continue to play an essential role in advancing evidence-based cost-effectiveness testing for efficiency resources.

## Endnotes

- 1 ACEEE, "Energy Efficiency as a Resource," accessed April 2019. [aceee.org/topics/energy-efficiency-resource](https://www.aceee.org/topics/energy-efficiency-resource).
- 2 Ibid.
- 3 Jim Lazar, *Electricity Regulation in the US: A Guide, Second Edition* (Montpelier, VT: Regulatory Assistance Project, 2016). [www.raonline.org/wp-content/uploads/2016/07/rap-lazar-electricity-regulation-US-june-2016.pdf](http://www.raonline.org/wp-content/uploads/2016/07/rap-lazar-electricity-regulation-US-june-2016.pdf).
- 4 NESP (National Efficiency Screening Project), *National Standard Practice Manual For Assessing Cost-Effectiveness of Energy Efficiency Resources*. (2017). [nationalefficiencyscreening.org/national-standard-practice-manual/](http://nationalefficiencyscreening.org/national-standard-practice-manual/).
- 5 Julie Michals, "Gliding into the New Year..." *E4TheFuture Blog*, January 16, 2019. [e4thefuture.org/blog/gliding-into-the-new-year/](http://e4thefuture.org/blog/gliding-into-the-new-year/).
- 6 EPA (Environmental Protection Agency), *Quantifying the Multiple Benefits of Energy Efficiency and Renewable Energy: A Guide for State and Local Governments* (Washington, DC: EPA, 2018). [www.epa.gov/sites/production/files/2018-07/documents/epa\\_slb\\_multiple\\_benefits\\_508.pdf](http://www.epa.gov/sites/production/files/2018-07/documents/epa_slb_multiple_benefits_508.pdf). NARUC (National Association of Regulatory Utility Commissioners), *The Value of Resilience for Distributed Energy Resources: An Overview of Current Analytical Practices* (Washington, DC: NARUC, 2019). [pubs.naruc.org/pub/531AD059-9CC0-BAF6-127B-998CB5F02198](http://pubs.naruc.org/pub/531AD059-9CC0-BAF6-127B-998CB5F02198). Brendon Baatz, *Everyone Benefits: Practices and Recommendations for Utility System Benefits of Energy Efficiency* (Washington, DC: ACEEE, 2015). [aceee.org/research-report/ui1505](https://www.aceee.org/research-report/ui1505). ACEEE, "State Policy Database" (2019). [database.aceee.org/](https://database.aceee.org/).
- 7 Grace Relf, Dan York, and Martin Kushler, *Keeping the Lights on: Energy Efficiency and Electric System Reliability* (Washington, DC: ACEEE, 2018). [aceee.org/sites/default/files/publications/researchreports/ui1809.pdf](https://www.aceee.org/sites/default/files/publications/researchreports/ui1809.pdf).
- 8 Ibid.
- 9 Arizona Administrative Code, 14 A.A.C. 2 Supp. 18-3, Title 14. *Public Service Corporations; Corporations and Associations; Securities Regulation, Chapter 2. Corporation Commission—Fixed Utilities* (Phoenix: Arizona Corporation Commission, 2018). [apps.azsos.gov/public\\_services/Title\\_14/14-02.pdf](https://apps.azsos.gov/public_services/Title_14/14-02.pdf).
- 10 Arizona Public Service Company, *Application for Approval of Amended 2018 DSM Implementation Plan*, Docket No. E-01345A-17-0134, November 14 (Phoenix: Arizona Corporation Commission, 2017). [aps.com/library/communications1/DSMplan2018.pdf](https://aps.com/library/communications1/DSMplan2018.pdf).
- 11 Synapse (Synapse Energy Economics), *Avoided Energy Supply Components in New England: 2018 Report*, prepared for AESC 2018 Study Group (Cambridge, MA: Synapse, 2018). [synapse-energy.com/sites/default/files/AESC-2018-17-080.pdf](https://www.synapse-energy.com/sites/default/files/AESC-2018-17-080.pdf).
- 12 RG&E (Rochester Gas & Electric), *Benefit Cost Analysis (BCA) Handbook: Version 2.0*, Cases 16-M-0411 and 14-M-0101, July 26 (Albany: New York Public Service Commission, 2017). [dps.ny.gov/search/Home/ViewDoc/Find?id=%7B7C88876F-D3A8-4AB9-BB09-CFA857C-5791C%7D&ext=.pdf](https://www.dps.ny.gov/search/Home/ViewDoc/Find?id=%7B7C88876F-D3A8-4AB9-BB09-CFA857C-5791C%7D&ext=.pdf).
- 13 Christopher Russel, Brendon Baatz, Rachel Cluett, and Jennifer Amann, *Recognizing the Value of Energy Efficiency's Multiple Benefits* (Washington, DC: ACEEE, 2015). [aceee.org/sites/default/files/publications/researchreports/ie1502.pdf](https://www.aceee.org/sites/default/files/publications/researchreports/ie1502.pdf).
- 14 Ibid.
- 15 ACEEE, *Cost-Effectiveness Tests: Overview of State Approaches to Account for Health and Environmental Benefits of Energy Efficiency* (Washington, DC: ACEEE, 2018). [aceee.org/sites/default/files/he-ce-tests-121318.pdf](https://www.aceee.org/sites/default/files/he-ce-tests-121318.pdf).
- 16 NYSERDA (New York State Energy Research and Development Authority), "The Energy to Lead: 2015 New York State Energy Plan" (2015). [energyplan.ny.gov/](https://www.energyplan.ny.gov/).
- 17 New York Public Service Commission, *Order Establishing the Benefit Cost Analysis Framework*, Case 14-M-0101, January 21 (Albany: New York Public Service Commission, 2016). [drive.google.com/file/d/1ke9Qh34s0ZfMohmWwqrRlseHvWc7r198/view](https://www.drive.google.com/file/d/1ke9Qh34s0ZfMohmWwqrRlseHvWc7r198/view).
- 18 Ibid.
- 19 New Hampshire's Electric and Natural Gas Utilities, *New Hampshire Statewide Energy Efficiency Plan*, Docket DE 17-136, May 31 (Concord: New Hampshire Public Utilities Commission, 2017). [puc.nh.gov/Regulatory/Docketbk/2017/17-136/LETTERS-MEMOS-TARIFFS/17-136\\_2018-01-12\\_NH\\_UTILITIES\\_REV\\_EERS\\_PLAN.PDF](https://www.puc.nh.gov/Regulatory/Docketbk/2017/17-136/LETTERS-MEMOS-TARIFFS/17-136_2018-01-12_NH_UTILITIES_REV_EERS_PLAN.PDF).
- 20 National Action Plan for Energy Efficiency, *Understanding Cost-Effectiveness of Energy Efficiency Programs: Best Practices, Technical Methods, and Emerging Issues for Policy-Makers* (San Francisco: Energy and Environmental Economics, Inc. Montpelier, VT: Regulatory Assistance Project, 2008). [19january2017snapshot.epa.gov/sites/production/files/2015-08/documents/understanding-cost-effectiveness-of-energy-efficiency-programs-best-practices-technical-methods-and-emerging-issues-for-policy-makers.pdf](https://www.19january2017snapshot.epa.gov/sites/production/files/2015-08/documents/understanding-cost-effectiveness-of-energy-efficiency-programs-best-practices-technical-methods-and-emerging-issues-for-policy-makers.pdf).
- 21 Governor Gina Raimondo, "Letter to Chairperson Curran, Commissioner Grant, and Administrator McCleary," March 2, 2017. [ripuc.org/utilityinfo/electric/GridMod\\_ltr.pdf](https://www.ripuc.org/utilityinfo/electric/GridMod_ltr.pdf).
- 22 Ibid.
- 23 National Grid, *Overview of RI Test*, Docket No. 4684, September 13 (Warwick: Rhode Island Public Utilities Commission, 2017). [ripuc.org/eventsactions/docket/4684-NGrid-RI-Test-Tech%20Session\(9-13-17\).pdf](https://www.ripuc.org/eventsactions/docket/4684-NGrid-RI-Test-Tech%20Session(9-13-17).pdf).
- 24 Ibid.
- 25 National Grid, *Cost-Effectiveness Report: National Grid's 2018 Energy Efficiency and System Reliability Procurement Plan*, Docket No. 4756, November 17 (Warwick: Rhode Island Public Utilities Commission, 2017). [rijeermc.ri.gov/wp-content/uploads/2017/11/cost-effectiveness-report-2018\\_v3\\_2017-11-08.pdf](https://www.rijeermc.ri.gov/wp-content/uploads/2017/11/cost-effectiveness-report-2018_v3_2017-11-08.pdf).
- 26 Ibid.
- 27 E4TheFuture, "Sowing the Seeds of Change," May 14, 2019. [e4thefuture.org/blog/sowing-the-seeds-of-change/](http://e4thefuture.org/blog/sowing-the-seeds-of-change/).
- 28 Martin Kushler, Seth Nowak, and Patti Witte, *A National Survey of State Policies and Practices for the Evaluation of Ratepayer-Funded Energy Efficiency Programs* (Washington, DC: ACEEE, 2012). [aceee.org/sites/default/files/publications/researchreports/ui22.pdf](https://www.aceee.org/sites/default/files/publications/researchreports/ui22.pdf).
- 29 Seth Nowak, Maggie Molina, and Martin Kushler, *Recent Developments in Energy Efficiency Evaluation, Measurement, and Verification* (Washington, DC: ACEEE, 2017). [aceee.org/sites/default/files/publications/researchreports/ui1712.pdf](https://www.aceee.org/sites/default/files/publications/researchreports/ui1712.pdf).