

**A NATIONAL SURVEY OF  
STATE POLICIES AND PRACTICES  
FOR THE EVALUATION OF RATEPAYER-FUNDED  
ENERGY EFFICIENCY PROGRAMS**

**Martin Kushler, Seth Nowak, and Patti Witte**

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## ABOUT ACEEE

ACEEE is a nonprofit organization that acts as a catalyst to advance energy efficiency policies, programs, technologies, investments, and behaviors. For more information, see <http://www.aceee.org>. ACEEE fulfills its mission by:

- Conducting in-depth technical and policy assessments
- Advising policymakers and program managers
- Working collaboratively with businesses, public interest groups, and other organizations
- Organizing conferences and workshops
- Publishing books, conference proceedings, and reports
- Educating consumers and businesses

Projects are carried out by staff and selected energy efficiency experts from universities, national laboratories, and the private sector. Collaboration is key to ACEEE's success. We collaborate on projects and initiatives with dozens of organizations including federal and state agencies, utilities, research institutions, businesses, and public interest groups.

ACEEE is not a membership organization. Support for our work comes from a broad range of foundations, governmental organizations, research institutes, utilities, and corporations.

## EXECUTIVE SUMMARY

Regulation of retail electric and natural gas utilities has traditionally been a responsibility assigned to the individual states. This fragmentation is clearly evident in the dramatic differences among states in their approaches to the issue of ratepayer-funded energy efficiency programs, as has been documented in numerous prior ACEEE reports (e.g., Kushler & Witte 2000; Kushler, York & Witte 2004; Sciortino et al. 2011, etc.).

One by-product of those differences is the fact that there is a great diversity among the states in their approaches to the evaluation of ratepayer-funded energy efficiency programs. This inconsistency has been vexing to researchers and policymakers seeking to make comparisons among states in their reported energy efficiency program results. Among other things, this concern has led to a growing interest in the issue of whether a national “standard” for energy efficiency program evaluation should be established.

This study does not attempt to provide a definitive answer to that question. Rather, this project seeks to better inform the debate by providing the results of a comprehensive survey and assessment of the current “state of the practice” of utility-sector energy efficiency program evaluation across the 50 states and the District of Columbia.

As an initial step, our survey recruitment and screening determined that there were 44 states, plus the District of Columbia, which had formally approved ratepayer-funded energy efficiency programs and were therefore appropriate candidates for our survey. Those 45 jurisdictions thus became the population for this study. We were able to complete detailed surveys with 44 of those jurisdictions and gather partial information from the 45th.

The results of this study clearly confirm the widespread perception that there is a great diversity among the states in how they handle the evaluation of ratepayer-funded energy efficiency programs. This begins with the administration of the evaluation function itself, where just over a third of states (37%) feature utility administration, 36% feature administration by the utility regulatory commission or a combination of the commission and utilities, and over a quarter (27%) feature administration by some other government agency or third-party entity. Most states (79%) rely on independent consultants/contractors to conduct the actual evaluations, although a substantial minority (21%) use utility and/or government agency staff.

The legal foundation for evaluation also varies widely across the states with 45% having legislative mandates, 45% relying only on regulatory commission orders, and 10% reporting no formal state policy requirement.

After examining the administrative structures and policy foundations for evaluation in the states, the study examined many aspects relating to how states conduct their evaluations and the key assumptions employed. One area of particular interest was the issue of cost-effectiveness tests. We found that most states at least consider several or all of the five classic tests identified in the California Standard Practice Manual. These are the Total Resource Cost (TRC), Utility/Program Administrator (Utility/PACT), Participant, Societal Cost, and Ratepayer Impact Measure (RIM). However, in terms of a “primary” test for decision-making, most states currently use the TRC (71%). Six states rely on the Societal Cost test (15%) and five states rely on the Utility/PACT test (12%). Only one state considers the RIM test to be its primary cost-effectiveness test.

Another area of particular interest was the issue of the use of “net” vs. “gross” energy savings. Again, there was great diversity among the states, with just over a quarter (26%) using gross savings, just over half (53%) using net savings, and another nine states (21%) using both values (sometimes for different purposes). One noteworthy detail on these results regarding states that report that they use “net” savings, however, is that about a third of the states that report adjusting savings to account for “free riders” do not adjust for “free drivers/spillover.”

After presenting the core survey results in detail, the report goes on to discuss some of the practical implications of the findings and then wraps up with some overall conclusions and recommendations for how evaluation practices across the states might be improved.

Finally, the report also contains three appendices. Appendix A contains a blank copy of the survey instrument. Appendix B contains several tables showing the individual state responses on a number of key variables. Appendix C provides a state-by-state catalogue of links to state policies and rules regarding the evaluation of ratepayer-funded energy efficiency programs, wherever the survey respondents were able to provide such citations.

## INTRODUCTION

### Background

One distinguishing characteristic of the electricity system in the United States is that regulation of retail utilities has been a responsibility of the individual states. With few exceptions, federal policymakers have tended to defer to that separation of powers. In many respects, each state is its own little “kingdom” when it comes to designing the details of how the retail utilities within its borders are regulated.

State approaches to the issue of whether and how to provide ratepayer-funded energy efficiency programs are a classic example of this independence. As has been detailed in numerous prior ACEEE reports (e.g., Kushler & Witte 2000; Kushler, York & Witte 2004), there is substantial variability across the 50 states among the policies and administrative frameworks for utility-sector energy efficiency programs.<sup>1</sup>

#### *Implications for Program Evaluation*

Evaluation of the impacts of energy efficiency programs is broadly recognized as an essential component of any utility-sector energy efficiency policy. Yet at the same time, the methodologies and assumptions used in actual evaluations and reporting of results vary widely across the states. Others have noted this problem, such as the report published by Lawrence Berkeley National Laboratory in 2010 (Messenger et al. 2010), which gathered data on certain key evaluation parameters across 14 leading states. ACEEE is very familiar with this problem, because we regularly conduct national reviews of utility-sector energy efficiency programs and activities in the states (e.g., the annual ACEEE *State Energy Efficiency Scorecard* reports). As an example, the 2011 *Scorecard* report notes:

“States use different methodologies for determining program savings, and we acknowledge that this can produce some inequities when comparing states...Absent a more consistent methodology across states, we must rely upon the states’ most accurate reporting of energy savings due to programs. Important caveats to the data are noted in the footnotes beneath the table.” (Sciortino et al. 2011, pp. 15-16).

In current practice, substantial differences exist among states in things like the treatment and measurement of free riders, spillover, net savings, deemed savings, and non-energy benefits. These differences make it difficult to interpret comparisons among states in reported energy efficiency results, and preclude the ability to make true “apples to apples” comparisons.

Similarly, when state policymakers and regulators engage in the task of establishing or expanding utility-sector energy efficiency policies and programs in their states, they are confronted with the challenge of deciding among various approaches to these issues. What are the pros and cons of various evaluation approaches? What are the trade-offs? What are other states doing?

Concerns about this issue of lack of consistency among state approaches to evaluation have fostered periodic discussion about whether it would be possible and/or desirable to establish a “national standard” for energy program evaluation. Indeed, this has been a subject of debate in the evaluation community for many years. In this project, we do not seek to provide a conclusive answer to that question, but believe that having good up-to-date information on current practices across the states could help inform that debate.

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<sup>1</sup> By “utility-sector” energy efficiency programs, we mean energy efficiency programs for utility customers that are funded through utility rates (whether embedded in rates or as a separate tariff rider or demand-side management [DSM] surcharge, or other type of “public benefits charge”), whether such programs are administered by utilities, government agencies, or third parties. This report uses the terms “utility sector” and “ratepayer funded” interchangeably in this regard.

## **Purpose of this Project**

Broadly stated, the purpose of this project is to provide a comprehensive assessment of the current “state of the practice” of utility-sector energy efficiency program evaluation across the 50 states and the District of Columbia. Toward that end, we have conducted a detailed survey of all states with active utility ratepayer-funded energy efficiency programs in order to establish an up-to-date database on how each state is handling various aspects of energy program evaluation and the reporting of results.

More specifically, this project has three basic objectives:

- 1) To document the current situation regarding energy efficiency program evaluation and reporting in the states in order to provide an accurate baseline for discussions about potential solutions to the “discrepancy” problem;
- 2) To discuss some of the most important (and sometimes controversial) factors that vary across states, and where appropriate, offer some recommendations about preferred practices; and
- 3) To reflect upon what the observed data suggest in terms of the need for, and feasibility of, establishing some type of “national standard” for energy efficiency program evaluation and reporting.

## **Organization of this Report**

The next section of this report briefly describes the methodology used in this study. After that, we provide a comprehensive presentation of all of the survey results. Following those basic descriptive results, we have a discussion of our assessment of the implications of the findings for improving state approaches to evaluation, measurement, and verification (EM&V), and for the issue of possible pursuit of a national evaluation standard. We then wrap up the report with some overall conclusions and recommendations. In addition, in the appendices we provide a copy of the survey instrument, some summary tables showing individual state results for a number of key variables, and a state-by-state listing of links to individual state evaluation policies and rules, where available.

## **METHODOLOGY**

This project was designed to incorporate a “census” survey of all 50 states and the District of Columbia. ACEEE used its existing records, together with initial direct inquiries, to identify appropriate individuals to survey within each of the 51 jurisdictions. Typically, these were staff persons within the utility regulatory commissions in each state.

ACEEE staff then conducted detailed telephone interviews, supplemented with e-mail correspondence where necessary, to obtain survey responses from each of the 51 jurisdictions. Some of the key issues addressed include:

- What statutory/regulatory requirements exist for evaluation in that state
- Who conducts the evaluations; who administers the evaluation process
- Whether there is any public involvement in the process
- Whether the state requires gross savings and/or net savings
- How the state treats the issues of free-ridership and spillover
- Which benefit/cost tests are considered, and which are prioritized
- What discount rate(s) and other assumptions are used in benefit-cost calculations
- How the state calculates “avoided costs” for the purposes of benefit/cost assessments
- Whether the state uses “deemed savings,” and how that is accomplished



- Whether evaluation results are used in
  - \* Program cost recovery
  - \* Calculation of incentives/penalties for utilities
  - \* Qualification for, and/or calculation of, lost revenue recovery

A copy of the survey instrument is provided in Appendix A.

After the interviews were completed, the initial survey results were sent back to the interviewees for review, and to provide an opportunity for corrections or elaboration. Following that process, the survey data were tabulated and analyzed by ACEEE staff.

The next section of this report presents a summary of the results of this national survey.

## **RESULTS**

This section of the report presents the basic numerical results of the survey. In order to provide a succinct summary of overall results, the data in this section are presented in summary form across all jurisdictions. Appendix B provides state-by-state results for many of the key variables.

In the subsequent Discussion and Conclusion sections, we will examine key results in more detail, discuss some of their practical implications, and offer some recommendations.

### **Identifying States with Ratepayer-Funded Energy Efficiency Programs**

As a threshold consideration, in order for our survey on energy efficiency program evaluation to be relevant, it is necessary that there actually be utility ratepayer-funded energy efficiency programs in that state. In what might be considered the first “result” of the study, we found that a total of 44 states (plus the District of Columbia) had some level of formally approved ratepayer-funded energy efficiency programs in operation. Thus the “population” for this census survey is those 45 jurisdictions.<sup>2</sup> The results presented in this report are drawn from those 45 jurisdictions.<sup>3</sup>

### **Administration of the Evaluation Function**

The initial set of survey questions focused on the organizational structure within which the evaluation of ratepayer-funded energy efficiency programs is accomplished.

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<sup>2</sup> The states reporting that they have essentially no formally approved utility ratepayer-funded energy efficiency programs, chose not to participate in this survey, or did not have enough of an established evaluation function to respond to the survey are: Alabama, Alaska, Louisiana, Mississippi, North Dakota, and West Virginia. In addition, data for Georgia were not provided for many of the items, resulting in a maximum n=44 for most items.

<sup>3</sup> For convenience, we will refer to the 45 jurisdictions as “states” when presenting and discussing results, and not try to separately identify the District of Columbia.

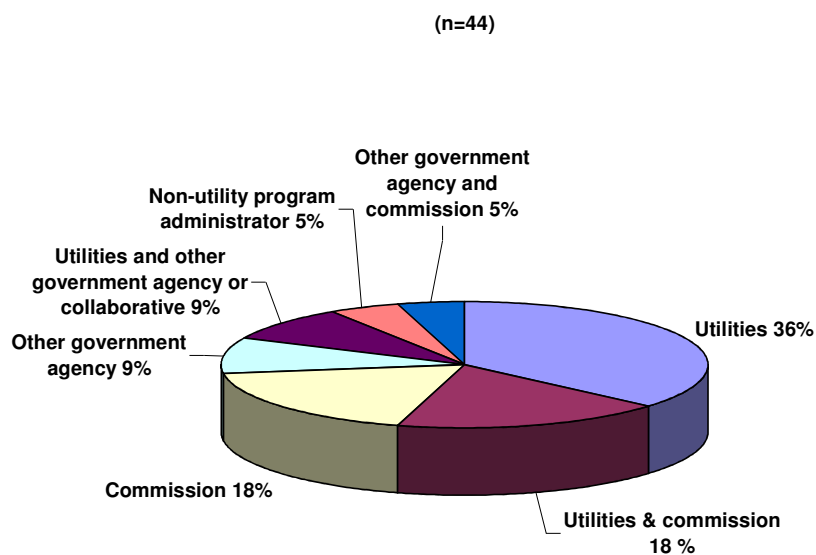
*Who administers/oversees the evaluation work?*

This variable focused on the question of which organization has the responsibility for administering the evaluation efforts (e.g., who does the entity conducting the evaluation work report to?). The results show:

- 16 (36%) Utilities
- 8 (18%) Commission
- 8 (18%) Utilities and commission
- 4 (9%) Other government agency
- 4 (9%) Utilities and other government agency or designated collaborative
- 2 (5%) Non-utility program administrator
- 2 (5%) Other government agency and commission

n=44

**Figure 1: Who Administers/Oversees Evaluation?**

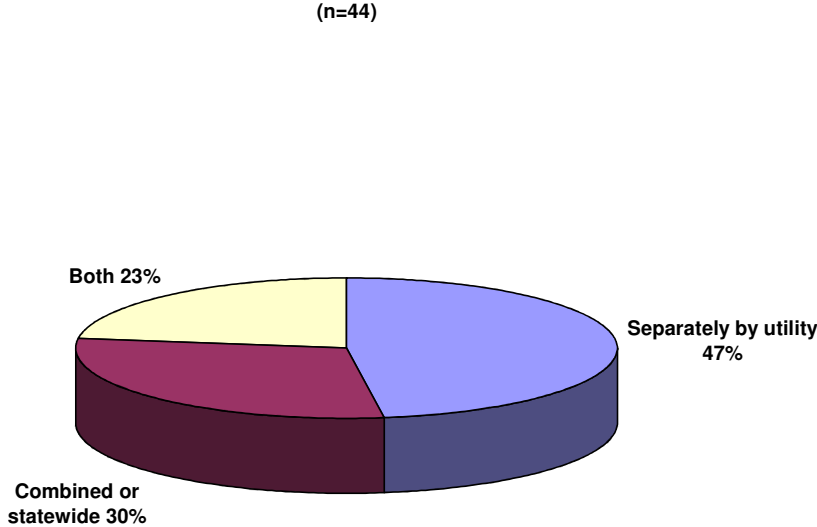


*Are evaluations administered/conducted separately for each utility or on a combined/statewide basis?*

- 21 (47%) Separately by utility
- 13 (30%) Combined/statewide
- 10 (23%) Both

n=44

**Figure 2: Combined/Statewide vs. Separate Evaluation**

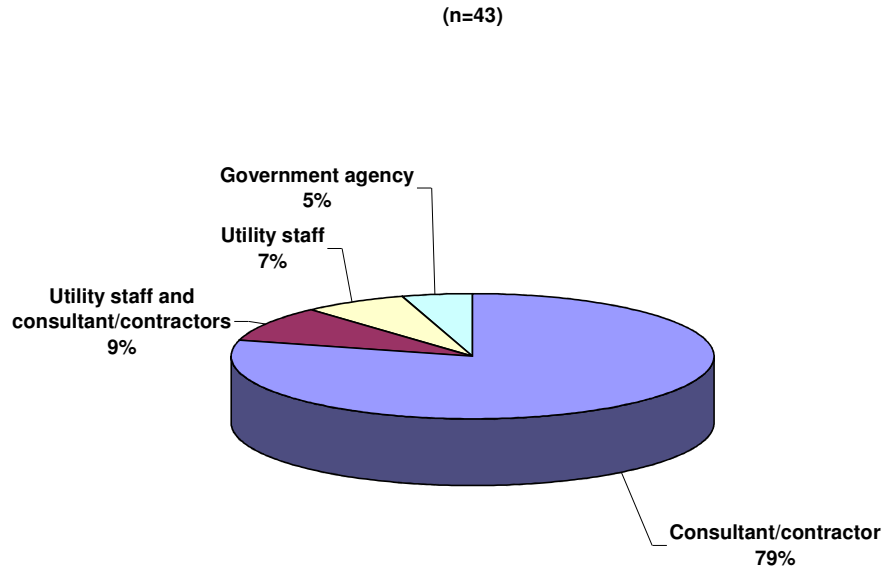


*Who conducts the actual evaluation studies?*

- 34 (79%) Consultants/contractors
- 4 (9%) Combination of utility staff and consultants/contractors
- 3 (7%) Utility staff
- 2 (5%) Government agency

n=43

**Figure 3: Entities Conducting Actual Evaluation Studies**



<i>Is there a mechanism for other interested parties to be involved in the evaluations?</i> (n=44)	
Yes	40 (91%)
No	4 (9%)

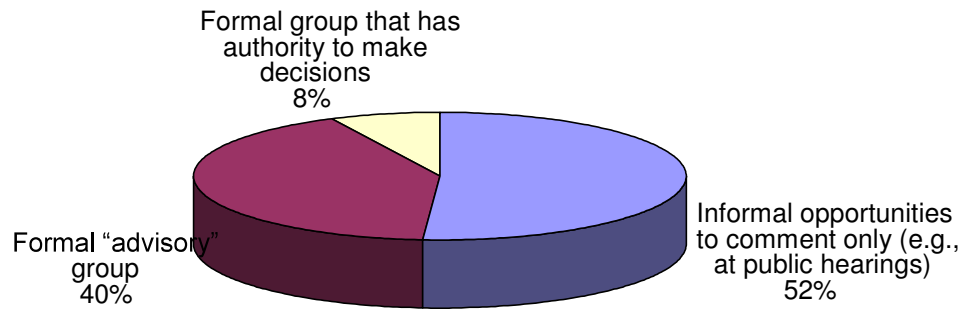
*If yes, what mechanism exists for other parties to be involved in the evaluation function?*

- 21 (52%) Informal opportunities to comment only (e.g., at public hearings)
- 16 (40%) Formal "advisory" group
- 3 (8%) Formal group that has authority to make decisions

n=40

**Figure 4: Involvement of Other Parties in Evaluation**

(n=40)

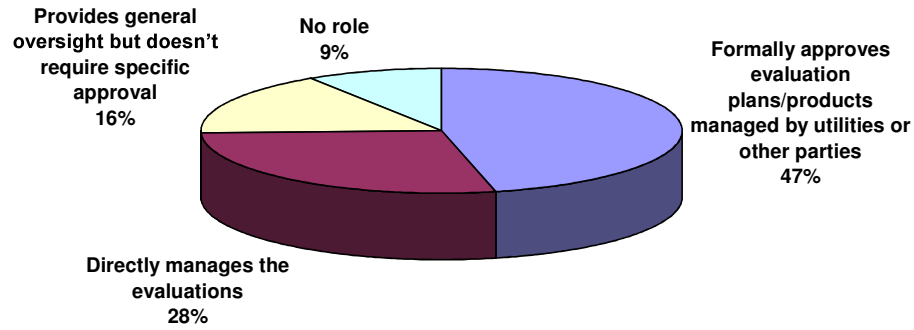


*What is the role for the state utility regulatory commission in the evaluation function?*

- 20 (47%) Formally approves evaluation plans/products managed by utilities or other parties
- 12 (28%) Directly manages the evaluations
- 7 (16%) Provides general oversight but doesn't require specific approval
- 4 (9%) No role

**Figure 5: Commission Role in Evaluation**

(n=43)



## Legal Framework for Evaluation

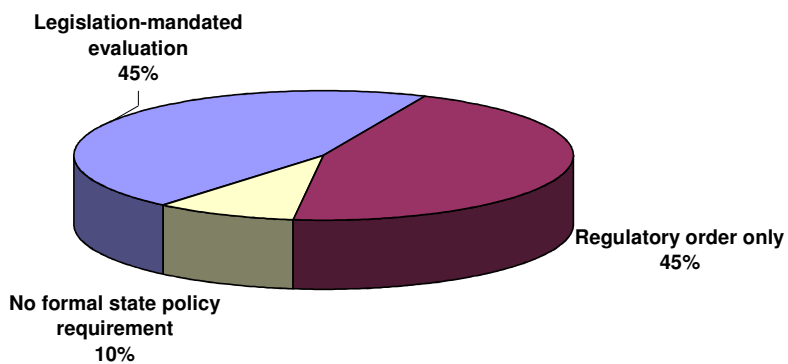
The next group of questions focused on the legal/policy framework for evaluation in each state.

*What legal requirements exist for evaluations of utility ratepayer-funded energy efficiency programs?*

- 20 (45%) Legislation-mandated evaluation
- 20 (45%) Regulatory order only
- 4 (10%) No formal state policy requirement

**Figure 6: Legal Requirements for Evaluation**

(n=44)



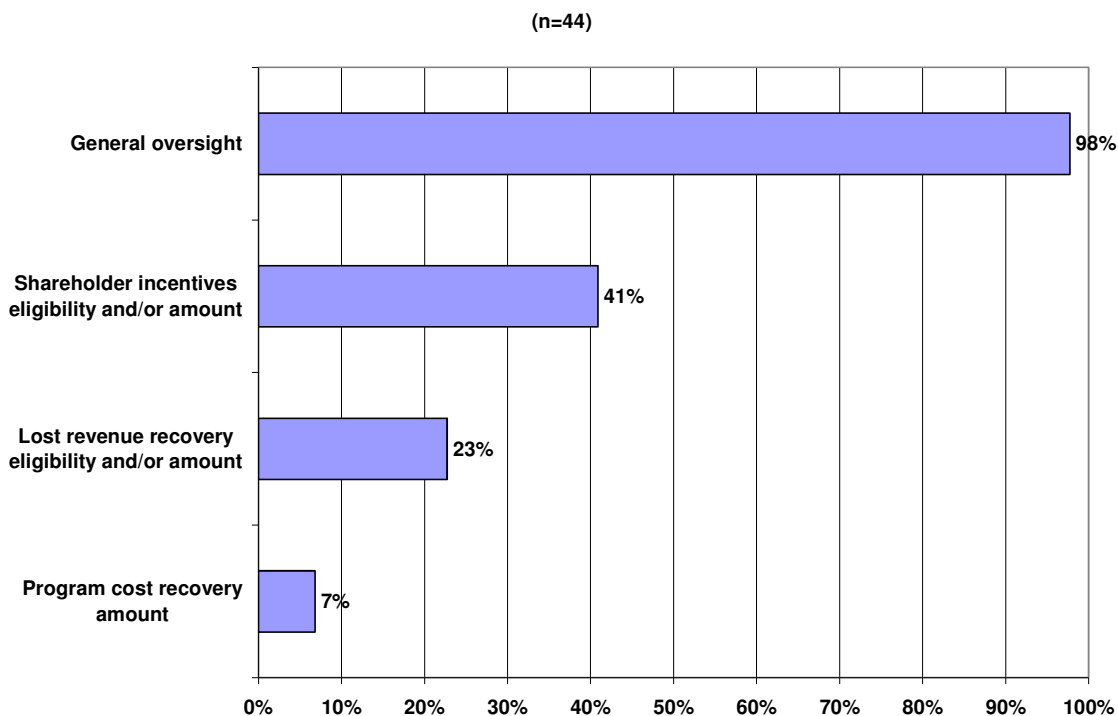
<i>Are evaluation requirements for natural gas energy efficiency programs the same as for electricity programs?</i>	
Yes	26 (65%)
No	11 (28%)
NA (no natural gas efficiency programs)	3 (8%)

*How are evaluation results used?* (Number of states responding “Yes” to each below. Total is greater than 44 because many states have more than one use for evaluation results.)

- 43 (98%) General oversight
- 17 (41%) Determine eligibility and/or amount of shareholder incentives
- 10 (23%) Determine eligibility and/or amount of lost revenue recovery
- 3 (7%) Determine amount of energy efficiency program cost recovery

n=44

**Figure 7: Uses of Evaluation Results (Percentage of States Responding “Yes” for Each)**





## Evaluation Rules

As a part of the examination of the legal framework, we inquired whether the state had established formal procedures/rules for evaluation. (Note: where provided by respondents, links to any such documents are listed in Appendix C.)

<i>Are the process/rules for conducting evaluations spelled out in writing somewhere?</i> (n=43)	
Yes	24 (56%)
No	19 (44%)

<i>Is there any rule or guidance on how much can be spent on program evaluation?</i> (n=44)	
Yes	15 (34%)
No	29 (66%)

<i>What % of total energy efficiency program costs is typically spent on evaluation?</i> (n=12)	
Low	1%
Median	5%
High	8%

## Cost-Effectiveness Tests

After covering the administrative structure and policy framework for evaluation, the survey examined in some detail the issue of how each jurisdiction handled the issue of “cost-effectiveness” of ratepayer-funded energy efficiency programs.

<i>Does the state use benefit-cost tests in connection with its utility ratepayer-funded energy efficiency programs?</i> (n=44)	
Yes	44 (100%)
No	0 (0%)

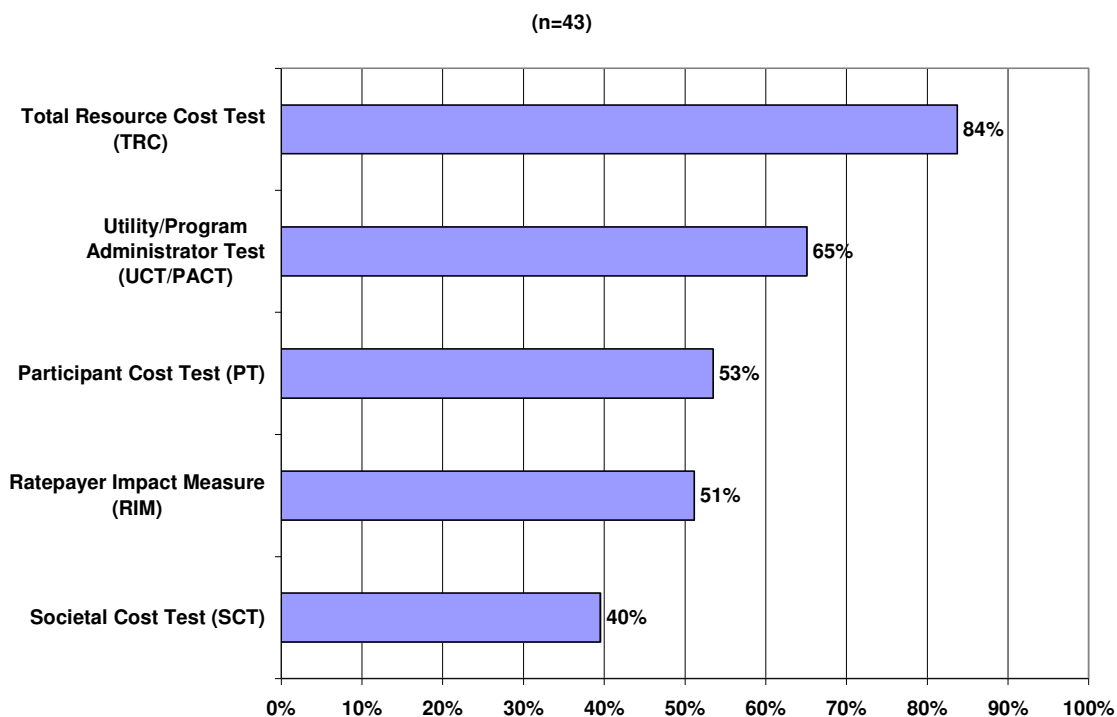
<i>Is there a legal requirement for the use of benefit-cost tests for ratepayer-funded energy efficiency programs?</i> (n=41)	
Yes, by legislation	17 (41%)
Yes, by regulatory order only	18 (44%)
No to both	6 (15%)

Which benefit-cost tests<sup>4</sup> are examined? (Number of states responding “yes” to each below. Total is greater than 43 because many states consider more than one test.)

- 36 (84%) Total Resource Cost Test (TRC)
- 28 (65%) Utility/Program Administrator Test (UCT/PACT)
- 23 (53%) Participant Cost Test (PT)
- 22 (51%) Ratepayer Impact Measure (RIM)
- 17 (40%) Societal Cost Test (SCT)

n=43

**Figure 8: Percentage of States Examining each Benefit-Cost Test**



<sup>4</sup> The common reference for definitions of the 5 basic “benefit-cost tests” is the California Standard Practice Manual <http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/EM+and+V/>

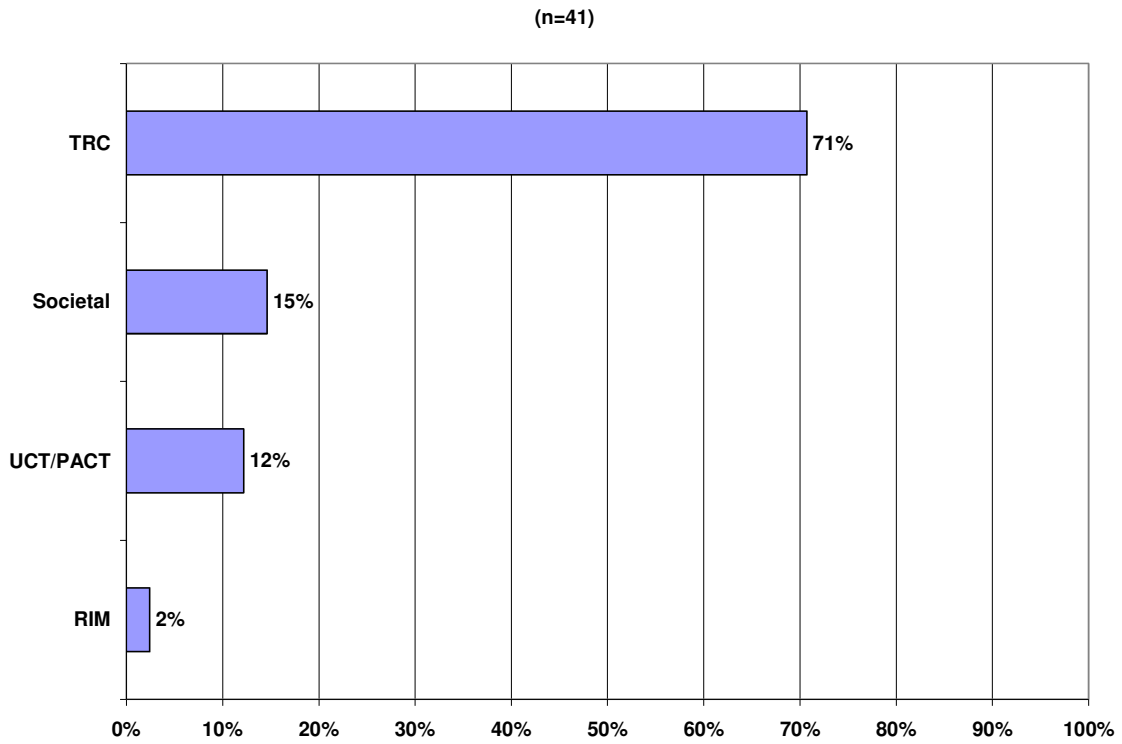
<i>Does the state have a “primary” cost-effectiveness test that it relies upon?</i> (n=43)	
Yes	41 (95%)
No	2 (5%)

If yes, what is the **primary** test?

- 29 (71%) TRC
- 6 (15%) Societal Cost
- 5 (12%) UCT/PACT
- 1 (2%) RIM

n=41

**Figure 9: Primary Benefit-Cost Test (Percent of States)**



<i>Does the state apply benefit-cost tests to load management/demand response programs?</i> (n=43)	
Yes	29 (67%)
No	8 (19%)
Don't know	6 (14%)

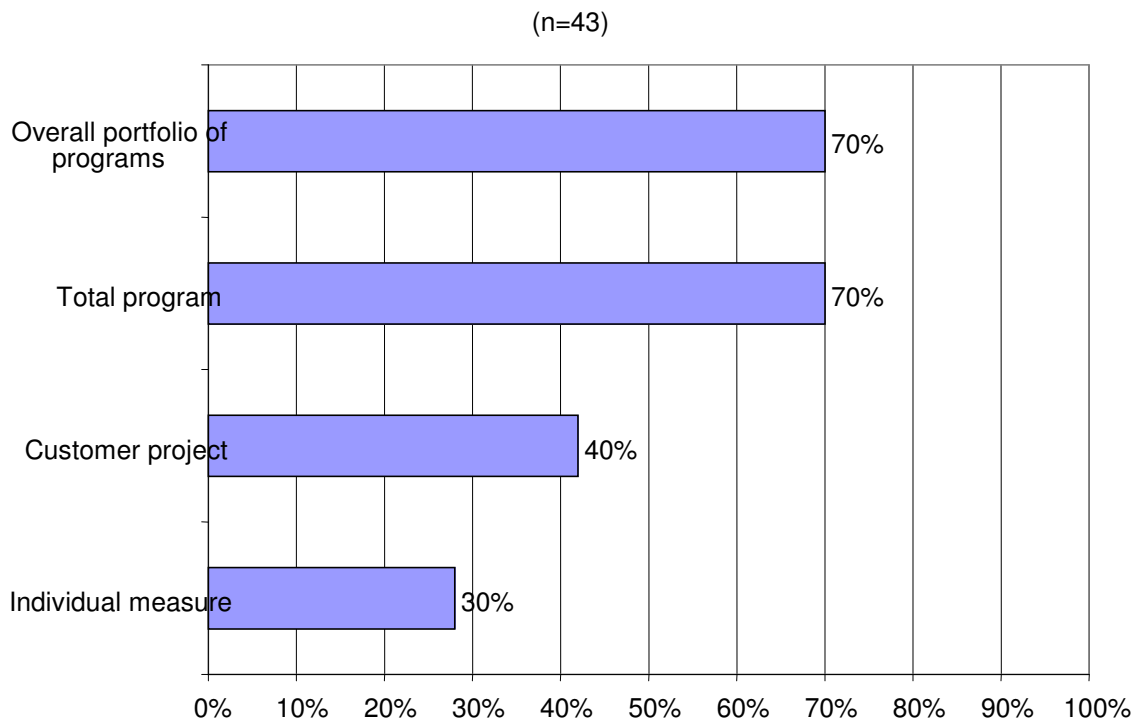
<i>Does the state apply benefit-cost tests to renewable energy programs?</i> (n=40)	
Yes	11 (28%)
No	22 (55%)
Don't know	7 (18%)

For energy efficiency programs, at **what level** are benefit-cost tests required?

- 30 (70%) Overall portfolio of programs
- 30 (70%) Total program<sup>5</sup>
- 17 (40%) Customer project
- 13 (30%) Individual measure<sup>6</sup>

n=43

**Figure 10: Level of Application of Benefit-Cost Tests**



<sup>5</sup> Of these, nearly half have some exceptions like low-income, pilots, and/or new technologies.

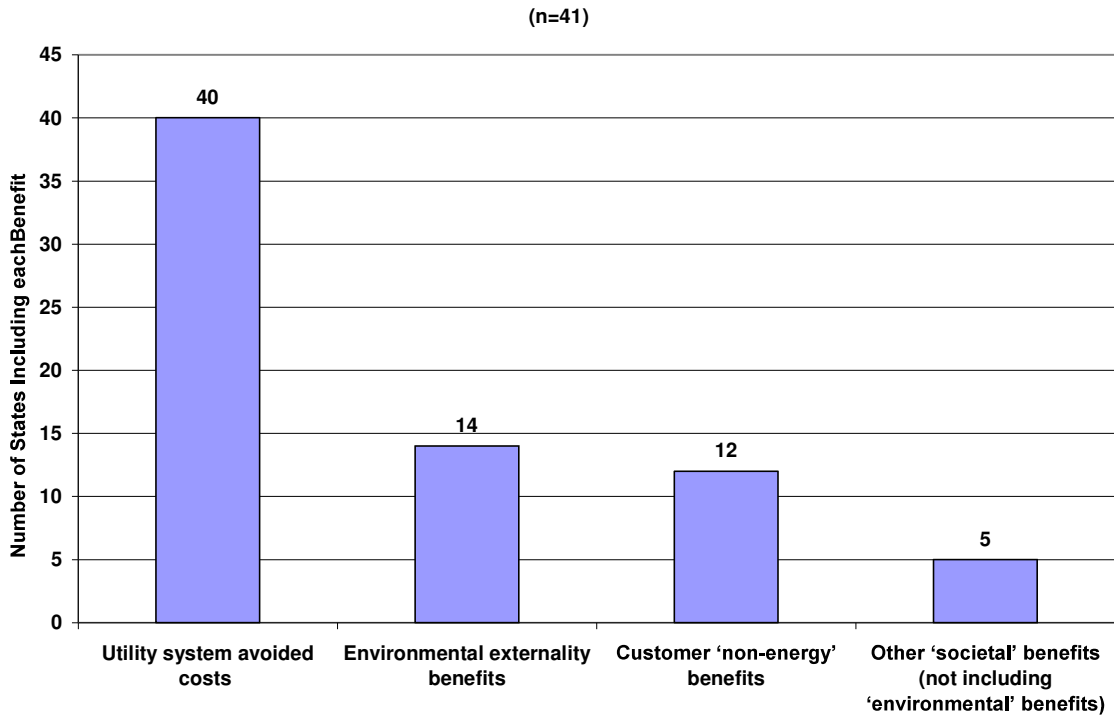
<sup>6</sup> A majority of those 13 states have some exceptions or flexibility in the application of the benefit-cost test at the measure level, including allowing bundling of measures or exceptions for certain types of programs (e.g., 'whole house' programs, low-income programs, etc.).

What types of **benefits** are quantified in the primary benefit-cost test (or the TRC test, if no test is designated as “primary”)?

- 40 (100%) Utility system avoided costs
- 14 (35%) Environmental externality benefits
- 12 (30%) Customer “non-energy” benefits
- 5 (12%) Other “societal” benefits (not including “environmental” benefits)

n=41

**Figure 11: Types of Benefits Quantified in Primary Benefit-Cost Test (or TRC Test, if no Primary Test)**

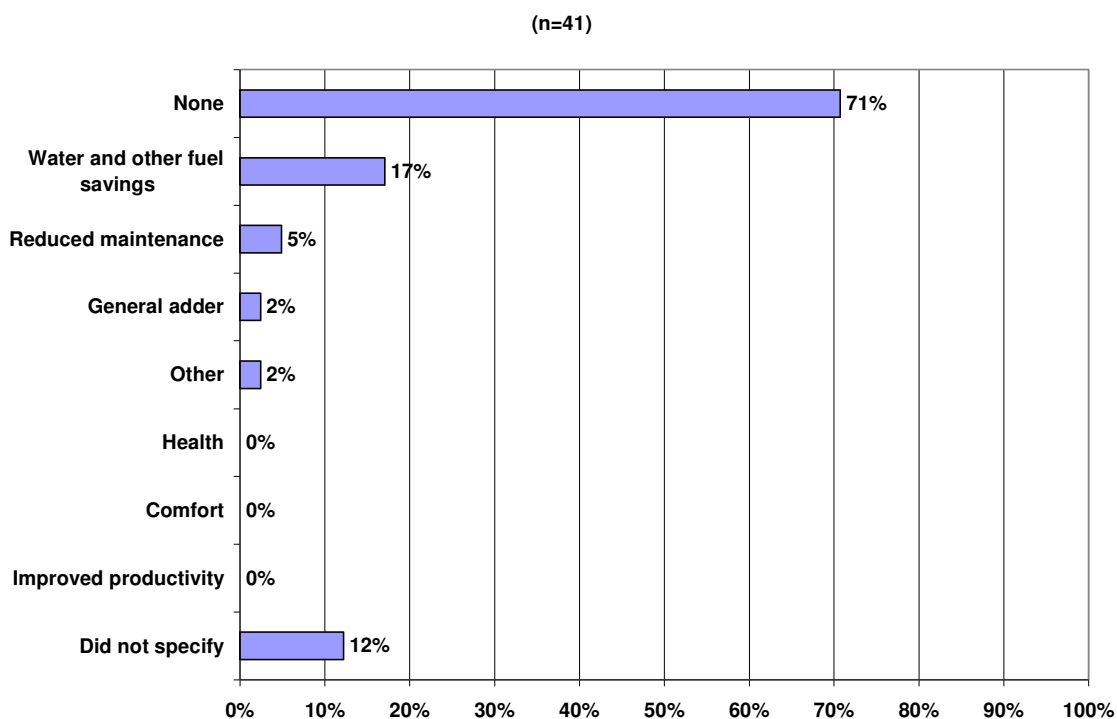


*What specific customer non-energy benefits are included? (Count is number of instances of each non-energy benefit being included by a state, so the total adds to more than the 12 states indicated in Figure 11.)*

29	(71%)	None
7	(17%)	Water and other fuel savings
2	(5%)	Reduced maintenance
1	(2%)	General adder
1	(2%)	Other
0	(0%)	Health
0	(0%)	Comfort
0	(0%)	Improved productivity
5	(12%)	Did not specify

n=41

**Figure 12: Percent of States Including Specific Customer Non-Energy Benefits**



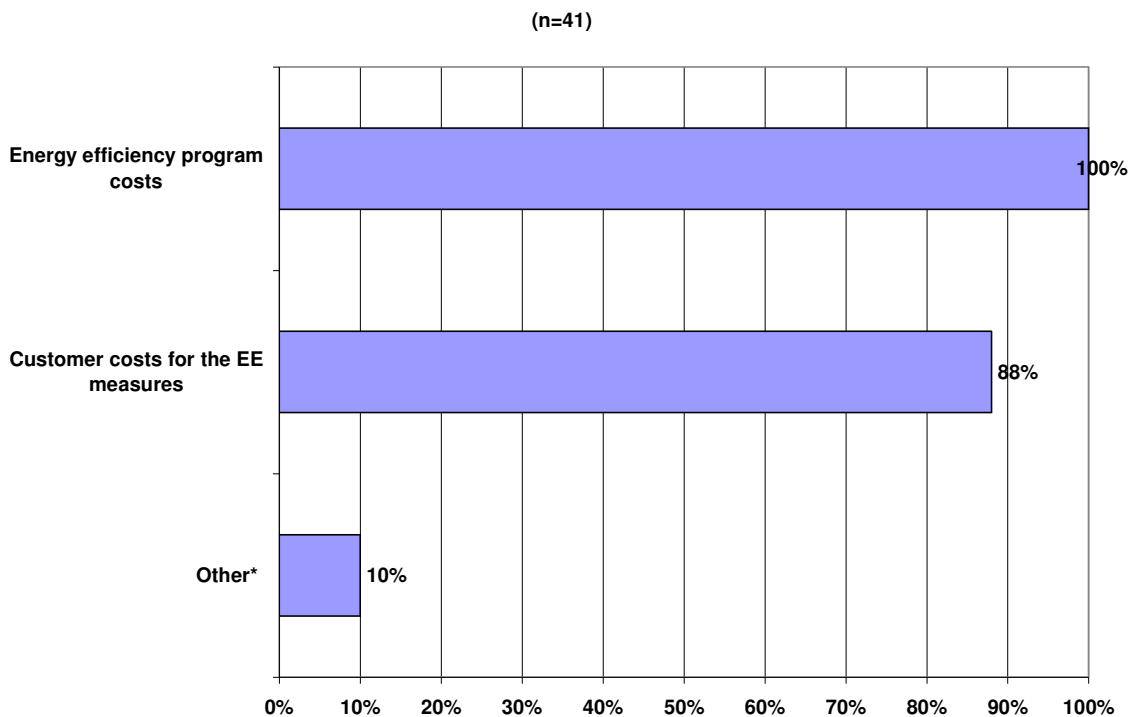
<i>If an environmental externality benefit is included, how is that quantified? (n=13)</i>	
Using some specific calculation of estimated benefits (e.g., \$X per ton of pollutant)	8 (62%)
Using a general “environmental adder” factor or not specified	5 (38%)

<i>If they have an environmental externality benefit included, is CO<sub>2</sub>/greenhouse gas/carbon emissions reduction/ etc. explicitly identified as part of the calculation of and/or rationale for the environmental externality benefit?(n=13)</i>	
Yes	10 (77%)
No	3 (23%)

What types of **costs** are quantified in the primary benefit-cost test (or the TRC test, if no test is designated as “primary”)?

- 41 (100%) Energy efficiency program costs
- 36 (88%) Customer costs for the energy efficiency measures
- 4 (10%) Other\*

**Figure 13: Percent of States Quantifying Specific Costs in Primary Benefit-Cost Test (or TRC if no Primary)**



<i>If a state has a policy allowing utility shareholder incentives for energy efficiency program performance, are those costs of utility shareholder incentives included in the benefit-cost screening of measures/programs/portfolios? (n=27)</i>	
Yes	12 (44%)
No	15 (56%)

\* (unspecified; utilities lost revenues; operations and maintenance)

**Avoided Costs**

Defining and calculating “avoided costs” are important steps in the evaluation of the cost-effectiveness of energy efficiency programs. We examined several aspects relating to the issue of “avoided costs” in our state interviews.

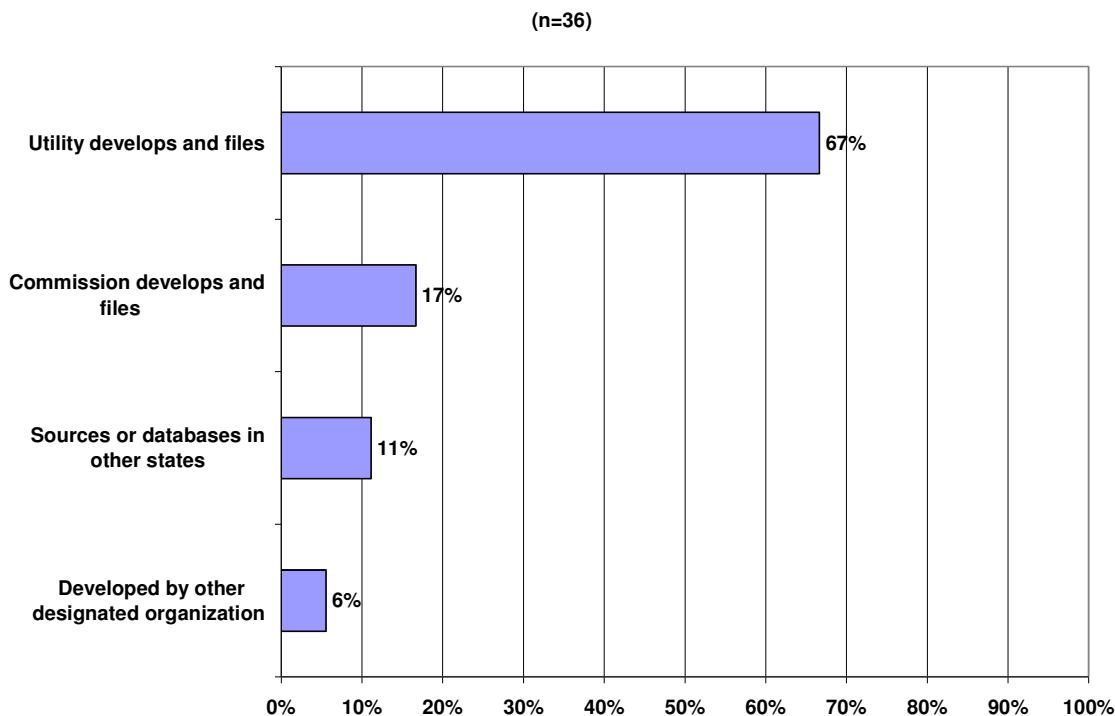
<i>Are avoided costs calculated for individual utilities or statewide?</i>	
(n=41)	
Individually	26 (63%)
Statewide	14 (34%)
Both	1 (2%)

*Where do the utility system avoided cost estimates used in the benefit-cost analyses originate?*

- 24 (67%) Utility develops and files
- 6 (17%) The Commission develops and files
- 4 (11%) Taken from sources or databases in other states
- 2 (6%) Developed by other designated organization

N=36

**Figure 14: Origins of Utility System Avoided Cost Estimates Used in Benefit-Cost Analyses**



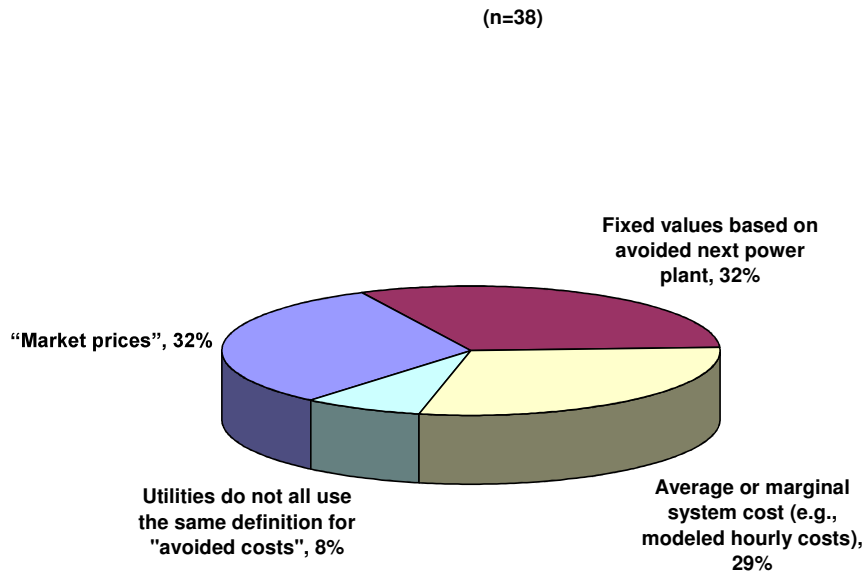


How are utility system "avoided costs" defined in the benefit-cost analyses?

- 12 (32%) Fixed values based on avoided next power plant
- 12 (32%) "Market prices"
- 11 (29%) Average or marginal system cost (e.g., modeled hourly costs)
- 3 (8%) Utilities do not all use the same definition for "avoided costs"

n=38

**Figure 15: Basis for Definition of Avoided Costs in Benefit-Cost Analyses**



<i>Do avoided costs include a value for avoided transmission and distribution costs?</i> (n=40)	
Yes	33 (82%)
No	7 (18%)

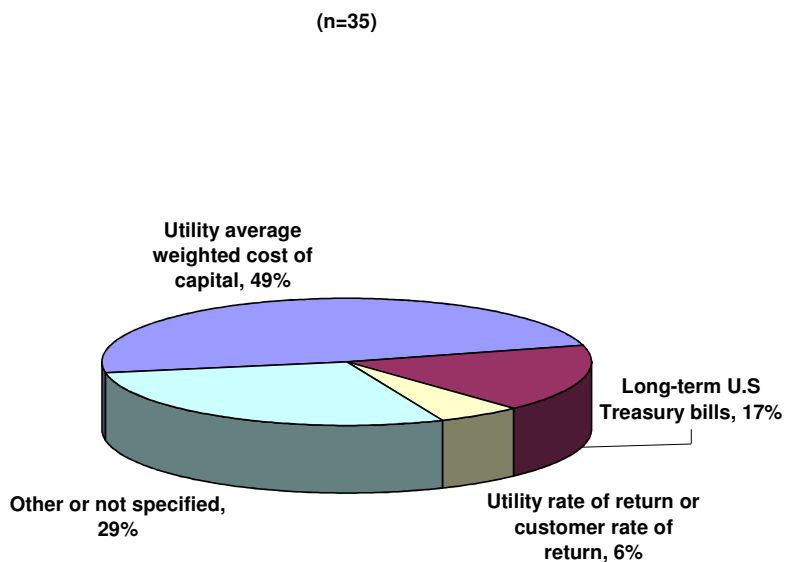
<i>What discount rate values are used in the benefit-cost calculation (for their primary test)?</i> (n=12)	
Low	2.0%
Median	5.5%
High	8.89%

*What is the basis for setting discount rates used in primary test benefit-cost calculations?*

- 17 (49%) Utility average weighted cost of capital
- 6 (17%) Long-term U.S Treasury bills
- 2 (6%) Utility rate of return or customer rate of return
- 10 (29%) Other or not specified

n=35

**Figure 16: Basis for Setting Discount Rates Used in Primary Benefit-Cost Test Calculations**



What “life of measure” (LOM) is used to calculate the lifetime savings of the energy efficiency programs?

Actual values:

Not enough states reported actual numerical data to compute a useful estimate. Reported values varied by measure/program, with a range from 3 years for O&M type programs to 35 years for building shell measures.

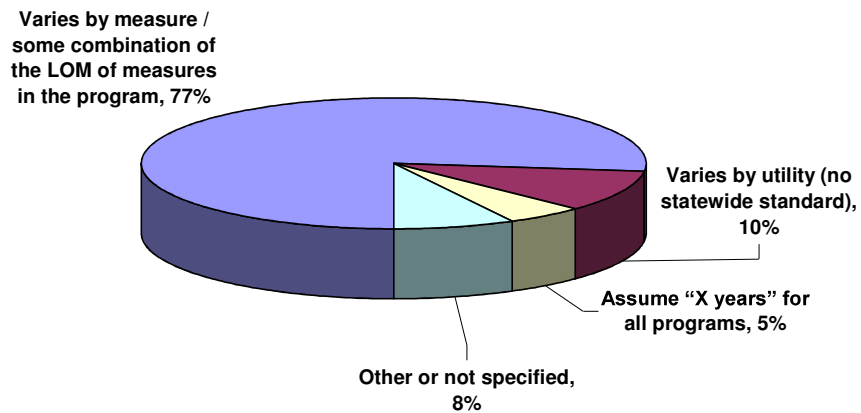
Basis for their life of measure values:

- 30 (77%) Weighted average or some combination of the LOM of all measures in the program / varies by measure
- 4 (10%) No standard—varies by utility
- 2 (5%) Assume “X years” for all programs
- 3 (8%) Other or not specified

n=39

**Figure 17: Basis for Setting Life of Measure Values**

(n=39)



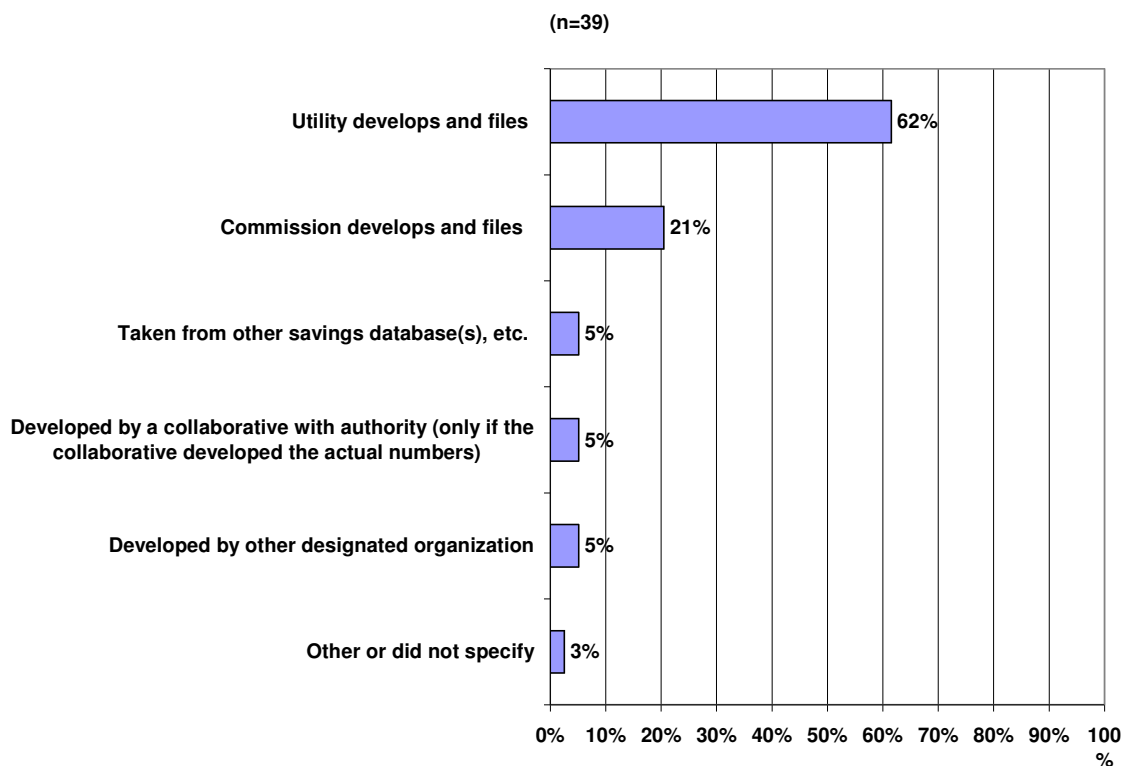
*How are key input assumptions such as discount rates determined?*

Process for the value

- 24 (62%) Utility develops and files
- 8 (21%) Commission develops and files
- 2 (5%) Taken from other savings database(s), etc.
- 2 (5%) Developed by a collaborative with authority (only if the collaborative developed the actual numbers)
- 2 (5%) Developed by other designated organization
- 1 (3%) Other or did not specify

n=39

**Figure 18: Process for Determining Key Inputs Such as Discount Rates (Percentage of States Responding)**



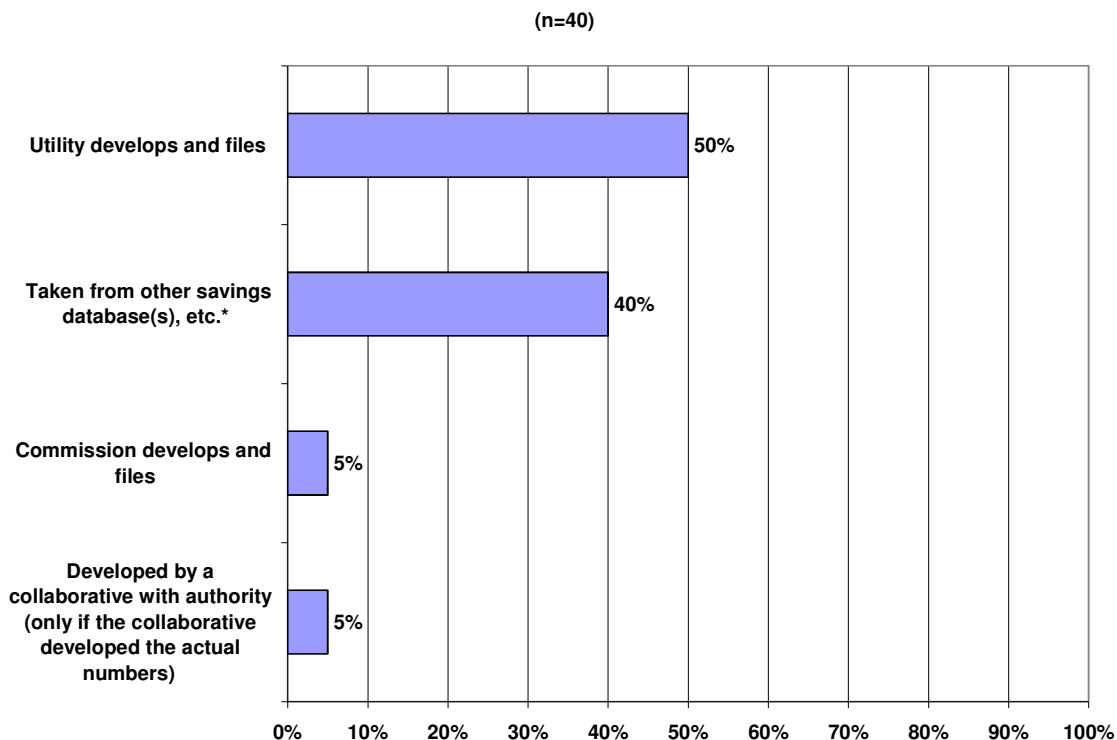
How are key input assumptions such as life of measures, etc. determined?

Process for the value

- 20 (50%) The utility develops and files
- 16 (40%) Taken from other savings database(s), etc.<sup>7</sup>
- 2 (5%) The Commission develops and files
- 2 (5%) Developed by a collaborative with authority (only if the collaborative developed the actual numbers)

n=40

**Figure 19: Process for Determining Key Input Assumptions Such As Life of Measure (Percentage of States Responding)**



<sup>7</sup> Many of these states indicated that they modify accepted values over time as their own evaluation results accumulate over time.

### Calculating Energy Savings

Finally, an area of critical importance in the evaluation of ratepayer-funded energy efficiency programs is the issue of how energy savings are calculated. We examined a number of important subjects relating to that issue.

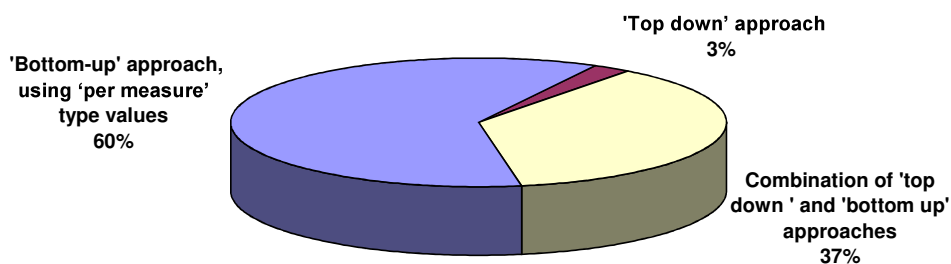
*How are energy savings estimates for energy efficiency programs developed?*

- 23 (60%) A “bottom up” approach, using “per measure” type values applied to the number of measures installed (and could also include “per project” engineering estimates for larger or custom projects)
- 14 (37%) A combination of “bottom up” and “top down” approaches
- 1 (3%) A “top down” approach where there are specific “program evaluations” conducted to establish savings from a program

n=38

**Figure 20: Process for Estimating Energy Savings**

(n=38)



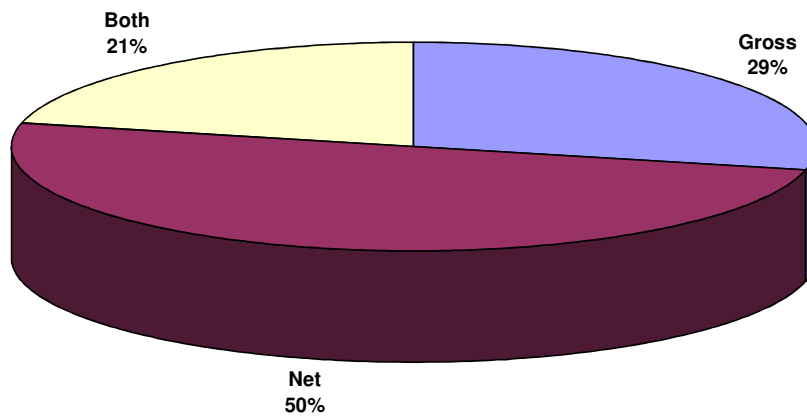
*Does the state use “gross” or “net” savings when it reports the energy savings from their ratepayer-funded energy efficiency programs?*

12 (29%) Gross  
21 (50%) Net  
9 (21%) Both

n=42

**Figure 21: States Reporting “Gross” or “Net” Energy Savings**

(n=42)



<i>Is there an adjustment for “free riders”?</i> (n=39)	
Yes	26 (67%)
No	10 (26%)
Partial/sometimes	3 (8%)

<i>Is there an adjustment for “free drivers/spillover”?</i> (n=39)	
Yes	17 (44%)
No	20 (51%)
Partial/sometimes	2 (5%)

<i>Does the state use deemed values to calculate savings?</i> (n=42)	
Yes	36 (86%)
No	6 (14%)

*Does the state use “deemed values” for any of these key variables?*

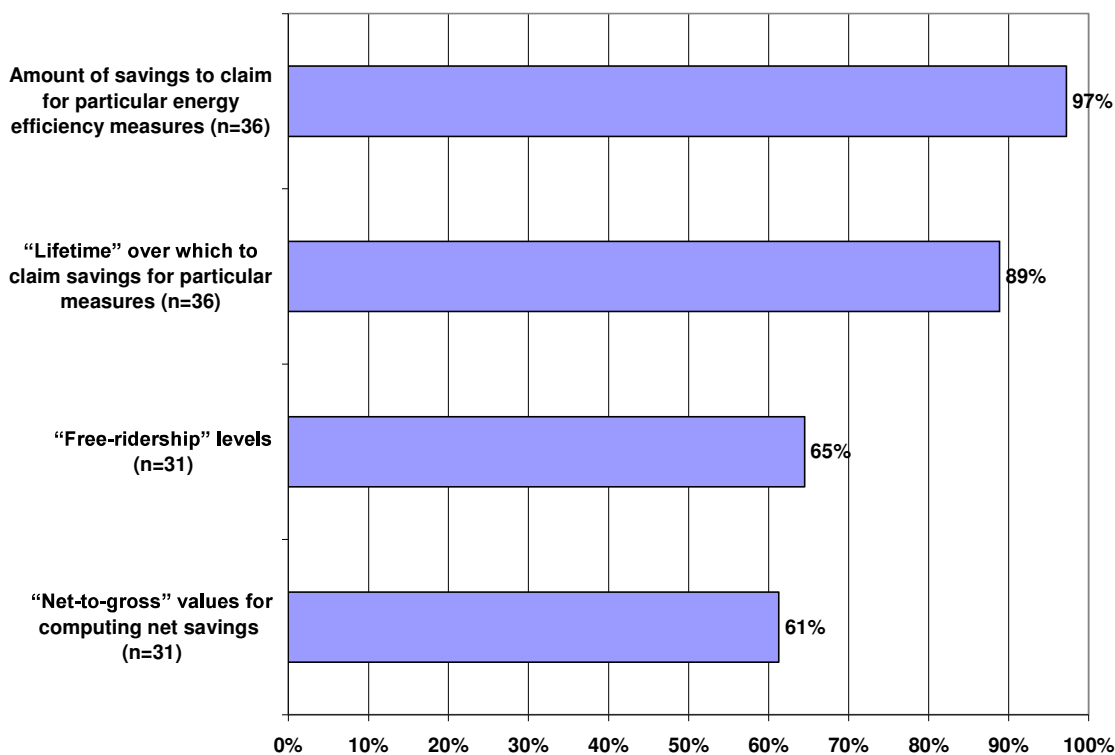
35 (97%) Amount of savings to claim for particular energy efficiency measures (n=36)

32 (89%) “Lifetime” over which to claim savings for particular measures (n=36)

20 (65%) “Free-ridership” levels (n=31)

19 (61%) “Net-to-gross” values for computing net savings (n=31)

**Figure 22: States Using “Deemed Values” for Key Variables (Percent of States Responding)**



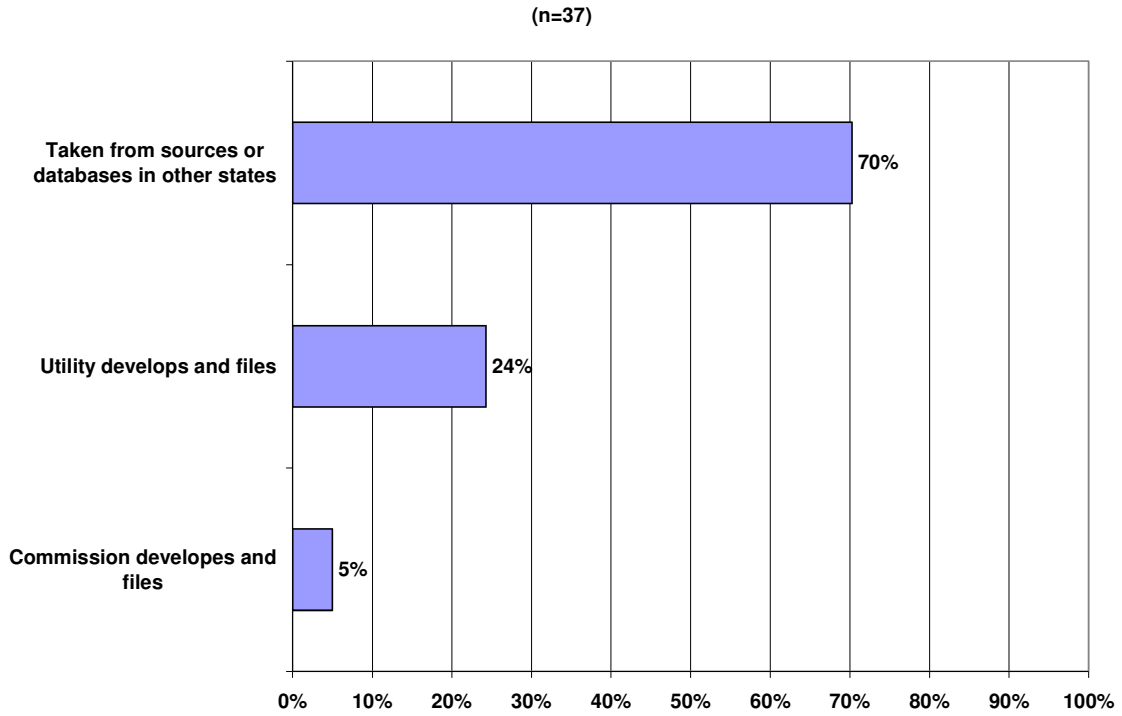


*How are these deemed values established?*

- 26 (70%) Taken from sources or databases in other states
- 9 (24%) Utility develops and files
- 2 (5%) Commission develops and files

n=37

**Figure 23: Process for Determining Deemed Values**



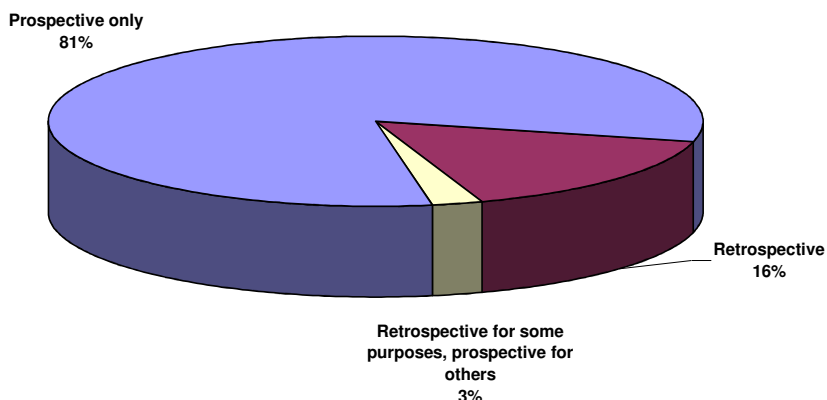
<i>Are deemed values updated based on the results of evaluations in their state?</i> (n=35)	
Yes	28 (80%)
No	7 (20%)

If an evaluation identifies a new value for a key input into the calculation of program savings (e.g., a new free-ridership percentage, a new “savings per unit” value, etc.), are those results applied **retrospectively** to the program that was just evaluated? Or just **prospectively** to the next year’s program?

- 31 (81%) Prospective only
- 6 (16%) Retrospective
- 1 (3%) Retrospective for some purposes, prospective for others

n=38

**Figure 24: Application of Evaluation Results to Program-Savings-Related Input Variables**  
(n=38)



This concludes the presentation of the basic numerical results of the survey. The next section discusses some of the key issues in more detail.

## DISCUSSION

The results of our national survey clearly confirm that individual state approaches to the evaluation of ratepayer-funded energy efficiency programs vary considerably across the country. From something as basic as who handles the administration of the evaluation function to the details of what is included in the assessment of cost-effectiveness, there is incredible diversity among the states. This section of the report will examine the results on some of the key variables of interest, and discuss some of the practical implications of what we have observed.

[Note: all percentages indicated in the text reflect the percentage of states that answered that particular item.]

### Administration and Legal Framework for Evaluation

We were somewhat surprised to see such a wide range of approaches amongst the states in terms of who administers the evaluation function. Clearly the two major categories are “the utilities” (16 states, 37%) and “the utility regulatory commission” (8 states, 18%), plus another eight states (18%) that involve both the utilities and the commission in administering the evaluation function. However, a fair number of states (12 states, 27%) utilize other entities such as other government agencies or designated non-utility organizations.

Similarly, there is a very wide diversity in the nature and extent of the legal framework for evaluation of ratepayer-funded energy efficiency programs. Only 20 states (45%) have requirements for evaluation articulated in statute, and most of those statutes include little or no details. Most of the remaining states have the evaluation requirements only expressed in regulatory orders, and a few states reported no formal state policy requirement for evaluation of these programs. Overall, only 24 states (56%) report that they have any form of written rules/procedures for their evaluation of ratepayer-funded energy efficiency programs. (Where available, we have included citations/links for those documents in Appendix C.)

Among other things, this extremely fragmented nature of the legal authority and administrative responsibility for evaluation amongst the states suggests that it would be an enormous task to achieve any type of national “standard” for evaluation through a state-by-state “voluntary” approach of seeking consensus from the states. Beyond the challenge of confronting the common policymaker instinct to protect state sovereignty, the sheer magnitude of the task of working through that many different decision-making entities—legislative and regulatory—would seem to make this state-by-state approach very difficult. (This issue of a national evaluation standard will be addressed further in the Conclusions section.)

### Role of Various Parties in the Evaluation Process

As with the administrative structure and legal framework, there is considerable variation across the states in the roles of key parties in the evaluation process. To begin, we inquired specifically about the role of the state utility regulatory commission, and found that at one end of the spectrum, the commission and/or commission staff in 12 states (28%) directly manage the evaluations. At the other end, in 11 states (25%) the commission either has no role at all or only provides limited oversight without requiring formal approval. In the middle, the most common situation (20 states, 47%) is for the commission to exercise formal approval over evaluation plans/products managed by utilities or other entities.

States also exhibit considerable diversity in the roles they allow for other interested parties (non-utility, non-regulatory) in the evaluation process. Of the 40 states that have some opportunity for public involvement, nearly half (19, 48%) responded that they have at least some specific structural mechanism for input from other parties, but the processes vary widely. A substantial number of those states (16) have some type of official “advisory” group established, and 3 states

have a specific multi-party group that has some formal decision-making authority regarding evaluation. The remaining 21 states (52%) have less-formal opportunities to comment (e.g., at public hearings).

The one area where there is much less diversity across the states is with regard to the question of who actually conducts the program evaluations. Most states (34, 79%) utilize consultants/contractors for that work. In 3 states (7%) the work is done by utility staff, and in 4 states (9%) the work is done by a combination of consultants and utility staff.

The results on that latter variable do suggest one practical implication. Amongst what is an incredibly diverse mosaic of administrative entities and legal frameworks, the role of the professional evaluation consultant industry is one common factor across nearly all states. This suggests the possibility that the professional evaluation community might be a useful vehicle to consider if one were attempting to accomplish a more standardized national approach to the evaluation of ratepayer-funded energy efficiency programs. If such an effort was undertaken, it may be a useful strategy to involve professional organizations such as the International Energy Program Evaluation Conference (IEPEC) and the Association of Energy Service Professionals (AESP).

### **How Are Evaluation Results Used?**

Not surprisingly, virtually every state indicated that evaluations were used for “general oversight” of ratepayer-funded energy efficiency programs. Where things get particularly interesting is when evaluation results are used in making decisions with specific economic consequences.

In that regard, 18 states use evaluation results for determining eligibility for and/or the amount of performance incentives (for utilities or program administrators), and 10 states use evaluation results for determining eligibility for and/or the amount of lost revenue recovery.<sup>8</sup>

The issue of recovery of program costs is a different matter. In general, utilities/program administrators are allowed full recovery of their authorized implementation costs for approved programs—at least absent some finding of imprudent action. We found only two states that formally determine cost recovery based on program evaluation results (due to the special nature of the program cost recovery and incentive structure in those states), plus a couple of other states that indicate they can use evaluation results to modify recovery of program costs, but have rarely or not yet done so. In general, industry practice follows the pattern that program evaluation results are used for shareholder/administrator performance incentives and lost revenue recovery, but not for determining the amount of recovery of the base costs of energy efficiency program delivery.

### **Cost-Effectiveness Tests**

The application of cost-effectiveness tests is an issue of great interest lately in the energy efficiency field. Consequently, we focused a fair amount of attention on this subject in our survey.

To begin, it is noteworthy that all 44 jurisdictions in our target population use some type of benefit-cost test in connection with their ratepayer-funded energy efficiency programs.<sup>9</sup> Most states have some type of legal requirement for the use of such tests, either by legislation (41%) or regulatory order only (44%).

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<sup>8</sup> We distinguish “lost revenue recovery mechanisms” from true “decoupling” mechanisms. Revenue adjustments under true decoupling are tied to actual sales volumes, and are not dependent upon “program evaluation” estimates of energy savings.

<sup>9</sup> Interestingly, that is not the case for load management/demand response programs or renewable energy programs, where only 67% and 28% of states, respectively, reported using benefit-cost tests for those ratepayer funded programs.

It is also the case that most states examine more than one benefit-cost test, with 36 states (85%) examining the Total Resource Cost (TRC) test; 28 states (63%) examining the Utility Cost Test (aka Program Administrator's Cost Test); 23 states (53%) examining the Participant's Test; 17 states (40%) examining the Societal Cost Test; and 22 states (51%) examining the Ratepayer Impact Measure (RIM).

When asked if they considered any particular test to be their "primary" benefit-cost test, nearly all states responded "yes" (41 states, 95%). For this variable, there was a greater degree of convergence among the states, with 29 states (71%) indicating that the TRC was their primary test. After that, 6 states (15%) indicated the Societal Cost test was primary; 5 states (12%) the Utility/Program Administrator test, and just 1 state considers the RIM Test to be its primary benefit-cost test.

We then pursued considerable additional information about how states applied these benefit-cost tests. But before delving into those details, one aspect of the above results merits highlighting.

In a field where diversity and inconsistency among states is the rule (as the results of our survey repeatedly show), it is striking to note that every single state relies upon one or more of the five "California Tests" first outlined in the California Standard Practices Manual.<sup>10</sup> This degree of acceptance of a single common source<sup>11</sup> for that purpose may provide some hope for the possibility of establishing certain national standard evaluation practices across the states.

#### *Level of application of cost-effectiveness tests*

In terms of how specifically these tests are applied, however, the results tend to return to the "diversity" pattern. When asked at "what level" the benefit-cost tests were applied, the most prevalent responses were: the "portfolio" level (30 states, 70%) and the "program" level (30 states, 70%), although nearly half of those states noted that they had some exceptions at the program level (e.g., low-income programs, pilot programs, etc.) where the benefit-cost test was not required or waivers were granted. Only 13 states (30%) applied their benefit-cost test requirements at the measure level, and a majority of those states provide exceptions for things like low-income programs and/or situations where measures can be bundled together into a cost-effective package of measures (e.g., certain "whole house" type programs).

#### *Types of benefits and costs considered*

One issue that has become of heightened concern in recent years is the perceived disparity between the types of benefits and costs that are included in the most prevalent benefit-cost test (i.e., the TRC test) as it is commonly applied (for example, see Neme & Kushler 2010). Therefore, this survey inquired specifically about what types of benefits and costs are considered in each state's primary benefit-cost test.

What we found on this variable revealed some fairly consistent patterns. Every state indicated that they used some measure of "utility system avoided costs"<sup>12</sup> as a benefit, and similarly, every state treated the "energy efficiency program costs" as a cost. In contrast, however, while 36 states (including all of the states with TRC as their primary test) treated "participant costs" for the energy efficiency measures as a cost, only 12 states treated any type of participant "non-energy benefits" as a benefit.

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<sup>10</sup> The California standard practice manual was first developed in February 1983. It was later revised and updated in 1987-88 and in 2001; a Correction Memo was issued in 2007. The 2001 California SPM and 2007 Correction Memo can be found at: <http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/EM+and+V/>.

<sup>11</sup> Admittedly, while it is true that the "California tests" tend to be nearly universally referenced, the exact manner of choosing among and implementing those tests does vary widely across the states.

<sup>12</sup> These are the life-cycle economic benefits to the utility system from the energy efficiency programs. These are the costs that would have been spent on alternative energy resources and infrastructure if energy efficiency had not been put in place.

Digging a little further, most of those “non-energy” participant benefits were confined to “water and other fuel savings.” Only 2 states quantified a benefit for “participant O&M savings,” and none quantified any benefit for things like “comfort,” “health,” “safety,” or “improved productivity” in their primary benefit-cost test. As others have observed, the magnitude of those types of non-energy benefits can be substantial (e.g., Skumatz & Dickerson 1998; Riggert et al. 2000; Skumatz, Khawaja & Krop 2010), even exceeding the value of the energy savings benefits for some types of programs. Omitting these non-energy benefits is also problematic given that energy efficiency programs increasingly are emphasizing those types of participant non-energy benefits when marketing energy efficiency programs to customers. Those factors arguably play an important role in persuading customers to make the significant investments necessary to achieve comprehensive energy savings in a home or business.<sup>13</sup>

### **Environmental Benefits**

Another area we examined in more detail was the issue of whether a state included any quantification of environmental externality benefits in their benefit-cost tests. A total of 13 states (32%) indicated that they do quantify some environmental benefits. Of those, at least 8 states attempt to calculate a specific value (e.g., using \$XX per ton of pollutants emitted, etc.), while the remaining states use a more general “environmental adder”<sup>14</sup> to reflect a recognition of environmental benefits from energy efficiency.

We also attempted to examine in particular whether states were including a recognition of “carbon costs” (i.e., somehow incorporating a benefit for reducing carbon dioxide emissions) in their use of a quantified value for “environmental benefits.” We found that at least 10 states included the issue of carbon (i.e., climate change) as part of their rationale for quantifying an environmental benefit.<sup>15</sup>

Overall, while there are some noteworthy state examples of quantifying environmental benefits, the most prevalent practice in the utility industry is to leave the environmental benefits of energy efficiency as an un-quantified externality.

### **Avoided Costs**

We also took the opportunity to examine several aspects of how states address the issue of avoided costs. One threshold issue was the level for which avoided costs were calculated. We found that 26 states (63%) calculated avoided costs individually for each utility, while 14 states (34%) make those calculations on a statewide basis (and one state had a combined approach).

When asked who develops the avoided cost estimates, 24 states (67%) indicated that the utility develops and files these estimates; 6 states (17%) said the Commission develops them; 2 states (6%) have those estimates developed by another designated organization; and 4 states (11%) essentially use estimates developed in other states.

We also inquired about the general methodological approach used as the basis for their avoided costs. Twelve states (32%) indicated that they were essentially fixed values based on an assumed “next power plant”; 11 states (29%) based them on a more sophisticated modeling of average or marginal system cost; 12 states (32%) used some “market price” based methodology; and 3 states (8%) used some other methodology that didn’t fit neatly into those categories. Most of the states (82%) also indicated that they included some value for avoided transmission and distribution (T&D) in their calculation of avoided costs.

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<sup>13</sup> One additional practical benefit of quantifying these non-energy benefits would be in using that information to help design program marketing messages to potential participants.

<sup>14</sup> For example, providing an extra 10% bonus to the calculated benefits.

<sup>15</sup> Note: this does not include the monetization of carbon emissions that is accomplished through the “auction” mechanism in the states participating in the Regional Greenhouse Gas Initiative (RGGI) in New England.

We were also able to gather some information on discount rates used in their primary benefit-cost test, although this is just based on a subset of 12 states. For those states, the median discount rate was 5.5%, with a range of 2% to 8.89%.

### **Calculating Energy Savings**

Arguably the most important purpose for the evaluation of ratepayer-funded energy efficiency programs is to determine an estimate of the energy savings resulting from those programs. In the survey, we inquired about several aspects of the process by which states arrive at their estimate of energy savings.

To begin, we asked for a general categorization of their approach as essentially a “bottom-up” approach using “per-measure” (or project) savings values applied to the number of measures/projects installed, or a more comprehensive (“top-down”) approach with specific “program evaluations” applied to whole programs to establish a unique energy savings estimate for that program.

Interestingly, it appears that the bottom-up, per measure approach has gained widespread acceptance in the industry. Twenty-three states (60%) indicated that was their methodology, while only one state indicated they relied upon only the “top-down” approach. Of course, many states (14, 37%) indicated that they used both types of approaches.

This trend toward a bottom-up, per measure approach seems to be driven by the evaluation cost and time savings it provides. Some additional observations on this trend are provided in the Conclusions section.

#### *Net vs. gross*

One issue of particular interest in the industry these days is the question of whether to use “gross” or “net” savings<sup>16</sup> for reporting overall program/portfolio savings achievements. We asked states<sup>17</sup> what they used when they report their energy savings results, and found that 21 states (50%) said they reported net savings, 12 states (29%) said gross savings, and 9 states (21%) said they report both (or use one or the other for different purposes).

We explored the net savings issue in a little more detail, and asked whether states made specific adjustments for “free riders” and “free-drivers/spillover.” Interestingly, while 28 states (67%) indicated they make an adjustment for free-riders, only 17 states (44%) make an adjustment for free-drivers/spillover.

Returning to the concern raised in the introduction to this report, these substantial discrepancies between states in the use of net vs. gross savings (and in the approaches used to calculate net savings) clearly underscore the difficulty of making “apples to apples” comparisons across the states.

#### *The use of “deemed” values*

For reasons of convenience and cost-reduction, as well as to reduce uncertainty in program planning, the use of “deemed savings databases” has gained widespread use in the industry in the last few years. We sought to gather data on the extent and nature of their use.

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<sup>16</sup> In general terms, “gross” savings are the total savings resulting from the implementation of energy efficiency measures or actions by program participants. “Net” savings are the amount of savings felt to be specifically attributable to the energy efficiency program.

<sup>17</sup> Note that we did not specify any particular definition of what qualifies as net or gross savings. Rather, we allowed states to categorize their own approach.

We found that nearly all states (36 states, 86%) use some type of deemed values in the evaluation framework. In terms of what types of values are “deemed,” we found 35 states (97% of those responding to this question) deem savings amounts for particular measures, 32 states (89%) deem the “lifetime” over which to claim savings for particular measures, and 20 states (65%) deem free-ridership or “net-to-gross” factors.

We also inquired about the source of the deemed values used by the states. It appears that there is a lot of “borrowing” going on within the industry. Twenty-six states (70%) cite the use of sources or databases from other states. In 9 states the utilities develop and file certain key deemed values, and in 2 states the Commission is responsible for developing the deemed values. In most states (28 states, 80%), the results of their own in-state evaluations are used to modify and update deemed values over time.

### *Retroactive vs. prospective*

One final issue of significant focus in the industry is the question of whether evaluation results that end up modifying deemed values that were assumed for planning and implementing a program should be applied retroactively to the program already delivered, or just prospectively to future program cycles. Utilities and program implementers argue that it is unfair and/or creates too much risk if the core assumptions under which a program was designed and approved are changed after-the-fact. Others argue that savings calculations should be made on the basis of the best available data, even if that differs from prior assumed values. Without attempting to resolve that argument here, we note that most states (31 states, 81%) report that they only apply changes to deemed values on a prospective basis, while 6 states (16%) do apply them retroactively (and 1 state reports using retroactive application for some purposes and prospective for others).

## **CONCLUSION**

There has long been a widely held perception, and frequently expressed lament, that there is much inconsistency among states in how they evaluate their ratepayer-funded energy efficiency programs. This study has certainly confirmed that perception, and has documented the extent of that inconsistency, which covers everything from the administrative structure and legal framework for evaluation to the details regarding key methodologies and assumptions. As an initial reaction from a national perspective, the situation might be regarded as “a mess.”

On the other hand, it would be a major mistake for one to conclude that ratepayer-funded energy efficiency programs are not being adequately evaluated.<sup>18</sup> Indeed, nearly all states take their responsibility for ratepayer protection very seriously—dollar-for-dollar<sup>19</sup> it’s hard to think of any other aspect of utility operations that receives as much detailed scrutiny as energy efficiency.<sup>20, 21</sup> Upon reflection, one might ask: what other utility expenditure (or for that matter, what other area of public policy) is required to demonstrate, through direct evaluations (often with extensive independent “contested case” scrutiny), that quantifiable monetary benefits exceed the costs of the program or policy?

It should also be noted that there has been a vast improvement over the years in the methodologies and practices employed in energy program evaluation. Indeed, an entire profession of highly trained and experienced energy program evaluators has developed (for example, see <http://www.iepec.org>), and that professional practice draws upon extensive

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<sup>18</sup> See, for example, Vine, Kushler & York 2007 for a thorough examination of the case for energy efficiency as a reliable utility system resource.

<sup>19</sup> For most states, energy efficiency spending only amounts to 1% or 2% of total utility revenues, or less.

<sup>20</sup> In part this is a legacy of the fact that utilities generally opposed requirements to deliver energy efficiency programs for many years, and demanded intense scrutiny in an attempt to minimize such requirements.

<sup>21</sup> For example, recall the previous data on what percentage of states report applying benefit-cost tests to load management/demand response (67%) or renewable energy (28%).



analytical tools—including statistics, economics, econometrics, engineering, and social science research.

So while it can be frustrating when trying to accomplish exact “apples to apples” comparisons across states, it would be a serious error for policymakers or others to conclude that we don’t have sufficient evaluation data to make a judgment about the cost-effectiveness of energy efficiency programs. Indeed, energy efficiency has been shown to be robustly cost-effective across states using many different specific approaches to evaluation. In ACEEE’s latest national examination of the cost-effectiveness of ratepayer-funded energy efficiency (Friedrich et al. 2009), across 14 different leading states, the results on reported utility cost-of-conserved-energy only ranged from 1.6 cents/kWh to 3.3 cents/kWh.<sup>22</sup>

Given that context, we take the perspective that what we have here regarding evaluation is not a “crisis” but rather an “opportunity for improvement.” In that spirit, we would like to offer some observations and recommendations regarding the evaluation of ratepayer-funded energy efficiency programs.

### **Observations/Recommendations**

Based on our observations and feedback obtained in this study, and building upon many years of experience in this field, we would like to offer some observations and recommendations regarding a number of the key issues identified in this report. For ease of reference, we will offer recommendations using the same basic topic headings contained in the Discussion section.

#### *Administration and legal framework*

Given the great diversity in the statutes and administrative structures amongst the states, and the fact that states appear to be successfully addressing the evaluation function under many different administrative approaches, we find no basis for recommending any single particular administrative or legal structure. As a general observation, we would note that it is usually helpful to have some statutory authority in place for regulators to require program evaluations and define the parameters of those activities. We would also observe that most states leave the details of evaluation rules and procedures to the regulatory setting rather than try to specify those in legislation, and we would tend to support that strategy. In most cases, the regulatory setting has the advantages of a more concentrated focus and much greater experience and expertise regarding utility matters, as well as greater procedural flexibility to make small adjustments and improvements over time.

#### *Role of outside parties*

While not a requirement for success, we do observe that it can be beneficial to involve outside interested parties in the evaluation/planning process. Many successful states have formal organized opportunities for other interested parties to observe and comment on the evaluation process. This can help secure “buy-in” on the front end, and help reduce the incidence of objections and legal challenges to evaluation results on the “back end” of the process. We would encourage states to develop and utilize such processes where feasible (taking care to ensure, of course, that such processes don’t result in undue delay or become mechanisms for obstruction).

#### *Use of evaluation results*

Every state indicated that they used the results of their evaluations for “general oversight” of their ratepayer-funded energy efficiency programs. We certainly endorse that use, and would take this

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<sup>22</sup> Moreover, it is important to keep in mind that utilities and regulators constantly make very large resource decisions in a context of significant uncertainty, including everything from customer demand forecasts to projections of future fuel prices and power plant construction costs. In that context, there is nothing about the variability in evaluation approaches across the states that should cause energy efficiency to be regarded as an unreliable or uncertain resource for the utility system.

opportunity to emphasize the importance of “process evaluation” in the overall evaluation strategy. While estimating “impacts” may be the most focused-upon aspect of evaluation, process evaluation can be very important in improving program performance and helping to ensure that energy efficiency programs are effective. It is both a waste of resources and ultimately misleading to expend a great effort on precise impact evaluation for a program that is not being properly implemented. It is far better to detect and fix the implementation problems early on, and then evaluate the impacts of a properly implemented program. For that reason, process evaluation early in a program cycle is particularly important.

“General oversight” also implies a certain degree of impact evaluation in order to confirm that energy efficiency programs are delivering the intended energy savings. This is important for demonstrating the value of energy efficiency as a “resource.” However, we support the nearly universal consensus that recovery of base “program costs” should not be dependent upon specific impact evaluation results. Absent some finding of imprudence, utilities/program administrators should recover their authorized costs for implementing approved energy efficiency programs.

Beyond general oversight, however, the issue of impact evaluation becomes especially important whenever there are explicit monetary decisions and allocations that hinge upon the results of an evaluation. This is clearly the case in states that have “performance incentives” for utilities/program administrators, and for states where specific “lost revenue recovery” is calculated based on the energy savings results of the energy efficiency programs. In such cases, the adequacy of the impact evaluation methodology becomes of paramount importance. We believe that enhanced and/or more stringent evaluation methodologies may be justified when substantial monetary awards are at stake, beyond what might be called for in general oversight and reporting. (More on this issue later.)

#### *Cost-effectiveness tests*

This is a significant and sensitive issue within the industry at this time. Some critics (e.g., Hall et al. 2009; Neme & Kushler 2010; LeBaron 2011) have claimed that the prevalent test in the industry (the TRC) has important shortcomings. One noteworthy concern is that the TRC suffers from a fundamental imbalance in that all participant costs for an energy efficiency upgrade are counted as costs, but most or all of the customer benefits outside of the utility fuel savings are not counted. This can have a very adverse effect on programs that require large customer investments in energy retrofits that are motivated in part by other “non-energy” benefits. Our survey results clearly document that this imbalance exists in terms of how states are implementing the TRC test. Possible remedies include expanding the TRC test to incorporate all or most of those “non-energy benefits,” or switching to other tests such as the Utility/Program Administrators test or the Societal Cost test. We recommend that states seriously consider this imbalance issue and pursue the best available remedies.<sup>23</sup>

On another related issue, we observed that only a minority of states (30%) apply a benefit-cost test requirement at the individual measure level (and more than half of those states allow some flexibility in that application, including certain exemptions, bundling of measures, etc.). We would recommend following the more prevalent approach in the industry, which is to apply the benefit-cost requirement at the program level (including allowing some exceptions, such as for low-income programs, experimental “pilot” programs, and certain longer-term “market transformation” type programs), or at the overall “portfolio” level.

One final observation in this area is in regard to the “Ratepayer Impact Measure” (RIM test). We find that this test has been largely abandoned by leading energy efficiency states and is only

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<sup>23</sup> We also note that some states (e.g., New York, in its Societal Benefits Charge programs) have employed a practice of examining multiple variations in calculating benefit-cost ratios (e.g., with and without quantification of non-energy benefits), which can help provide decision-makers with more depth of information.

used as the primary test in one of the 44 states in our study.<sup>24</sup> The flaws with the RIM test have been well documented elsewhere (e.g., Biewald et al. 2003). We recommend that the RIM test not be used to determine whether and/or which energy efficiency measures or programs will be delivered.

#### *Estimating utility system “avoided costs”*

This is obviously a critical component of any assessment of the cost-effectiveness of energy efficiency programs. Here again there was substantial variation across the states, with roughly one-third using each of three basic approaches: (1) fixed values based on an assumed “next power plant”; (2) values derived from a more sophisticated modeling of average or marginal system cost; and (3) values determined through some type of “market price” indicator (plus a few states using some approach that didn’t fit neatly into those basic categories).

We do not wish to recommend any single methodological approach to this task, but we would note that it is particularly important to include a full valuation of the long-run avoided energy and capacity costs. There is some risk, particularly in “restructured” and fully disaggregated markets, that the use of a short-run perspective (e.g., short-run energy cost plus a peaker capacity cost) will undervalue the true avoided capacity cost benefits of energy efficiency over the lifetime of the energy efficiency effects. Ideally, states could use a 10-year (or more) integrated resource planning perspective, considering the effects of a “with energy efficiency vs. without energy efficiency” case comparison, which would take into account differences in the need for incremental baseload and/or intermediate load generation sources over the full time period.

#### *Calculating energy savings/use of “deemed savings”*

In the context of thirty years of experience in the field of energy program evaluation, one of the striking observations of this study was the widespread application of what might be called “bottom-up” evaluation, based on the application of estimates of “savings per measure/project” applied to the number of measures/projects installed—rather than a more traditional “top-down” comprehensive evaluation of a specific overall program (e.g., conducting a “billing analysis” on a random sample of program participants).

Accompanying this trend has been a rapid growth in the use of co-called “deemed savings databases” to provide a clear and accessible source for the “per-unit” savings estimates (as well as other key input parameters).

Given the exploding demands on “evaluation” from the rapid growth in the number of energy efficiency programs; together with the improved accuracy of engineering-based savings projections over time; together with the common challenge of constrained evaluation budgets, we generally support this widespread application of what might be termed “verification-based evaluation.” We feel that the use of such tools as “deemed savings databases” are an appropriate and useful (perhaps even indispensable) strategy, as long as they are carefully developed, objective, and regularly updated as new evaluation information becomes available.

Of course this short-cut “deemed savings” approach needs to be accompanied by periodic rigorous, full-scale (which we have here termed “top-down” or “comprehensive”) program evaluations, which have an indispensable role in the overall evaluation portfolio.<sup>25</sup>

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<sup>24</sup> That state is ranked in the “bottom 10” in utility energy efficiency program policies and performance in ACEEE’s most recent *2011 State Energy Efficiency Scorecard* (Sciortino 2011).

<sup>25</sup> As one reviewer noted, a deemed savings approach is really more of an “accounting” approach to savings calculation, whereas actual program evaluation is necessary to verify and/or revise deemed savings values, as well as to develop robust estimates of overall program and portfolio impacts.

*Net vs. gross*

Perhaps the issue with the most vigorous debate in the industry today is the question of whether to estimate and report “net” or “gross” savings. This issue has received substantial discussion elsewhere (e.g., Vine et al. 2010; Skumatz & Vine 2010), so we will not attempt to address it in detail in this report. Our primary recommendation in the short term is that whichever approach a state uses, its methodologies and assumptions on this issue should be fully disclosed, so that others seeking to interpret reported results will have that understanding, and be able to take that into consideration when comparing results across states.

One corollary recommendation, for states that do attempt to report “net” savings, involves the issue of what is considered in the estimation of net savings. In particular, we found that 25 states (64%) reported that they made an adjustment for free riders, but only 17 states (44%) made an adjustment for free-drivers/spillover. We would argue that these are really two sides of the same “net” coin, and that it is fundamentally imbalanced to adjust for one of those factors and not the other. Therefore, we recommend that if a state wants to estimate and report “net savings,” their methodology should incorporate both free riders and free drivers/spillover.<sup>26</sup>

Beyond that, we would simply suggest that there may be merit in tailoring the approach on the net vs. gross issue to the intended use of the information. For example, a noted expert in the Pacific Northwest (Eckman 2011) has critiqued the focus on “net” savings, and explained the case that for resource planning purposes, what is important is the total gross contribution that energy efficiency improvements make to the region’s need for additional resources. Similarly, others (e.g., Peters & McRae 2008) have written persuasively about the difficulty of truly measuring things like free riders with commonly available evaluation tools and budgets. Still others (e.g., Vine et al. 2010) have written that with the plethora of government, utility, and private sector messages/programs promoting energy efficiency, attempting to parse out and attribute specific savings to specific parties is “a fool’s errand.” Lastly, when it comes to things like pursuing “climate” related goals, “Mother Nature” does not particularly care to whom carbon dioxide reductions are attributed. What matters is the gross reduction in overall emissions. All of those factors suggest that for certain purposes (e.g., tracking overall energy efficiency portfolio impact; monitoring public policy goals such as reductions in carbon emissions, etc.), the use of responsibly verified “gross” savings may be sufficient.

On the other hand, if free riders are ignored, some program administrators could propose programs known to have high levels of free riders, as recruiting free riders to participate in a program would be an easy way to increase gross savings. To address this problem, either net savings can be used, or another separate mechanism used to screen out programs with high free riders when decisions are made on which programs to offer. In addition, for situations where the transfer of substantial sums of money are dependent upon a careful measurement of the impact achieved by some entity (e.g., utility/program administrator performance incentives, “lost revenue” claims, etc.) there may be a justification for more of a “net savings” approach,<sup>27</sup> in order to more carefully calibrate the funds awarded to the savings attributable to the actions of that party. In such cases, however, we recommend that clear parameters and rules be established in advance (hopefully in a consensus-based process) in order to minimize the bitter arguments that can ensue when the net savings determination occurs after the fact.

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<sup>26</sup> Some states (e.g., California) have encountered controversy in attempting to go further in incorporating attribution of savings into their net savings calculations, meaning savings would only count if participants are not free riders *and* if savings can be attributed specifically to the utility operating the program and not some other party such as a state or local government program. In our opinion it is very difficult to precisely parse out attribution in an environment where many parties, private and governmental, are seeking to encourage energy efficiency. We caution against going too far in seeking to require narrow attribution.

<sup>27</sup> We would also note that care should be taken to avoid structuring such incentive mechanisms in a way that they discourage utilities/program administrators from pursuing “market transformation” types of activities, where effects are difficult to attribute back to a single program source. In that vein, we have recommended elsewhere (Vine et al. 2010) that at least part of an overall performance incentive be tied to overall gross savings.

Finally, it is worth noting that some effort to examine “net” effects for individual programs can also be useful in improving programs over time and helping them to achieve their optimal impact, even if the overall portfolio savings metric is expressed in gross savings.

#### *Retroactive vs. prospective*

Another noteworthy issue examined in this study is the question of whether to apply evaluation results on key parameters (e.g., deemed savings per unit, free-ridership levels, etc.) on a retroactive or a prospective basis (i.e., to re-calculate savings for the program just completed, or to just apply the changed factors to the next program cycle).

Our recommendations in this area depend upon the uses toward which the information is being applied. For purposes relating to judging program administrator performance (and perhaps for determining whether and how much “incentive” has been earned), we tend to be supportive of only applying changes prospectively. In general, in the context of a framework where program designs and budgets have been constructed based on agreed-upon values for certain key factors like deemed savings per unit, net-to-gross ratios, etc., we believe it is reasonable to not retroactively “change the playing field” and thus retroactively change the credited accomplishments of the utility/program administrator.<sup>28</sup> As recommended earlier, “deemed savings” type databases should be regularly updated based on the best available evaluation information and applied to the next program cycle.

However, there are certainly other purposes for which using the “best available” estimate of savings, including any updated assumptions or inputs, is most appropriate. A prime example of this would be for producing estimates of energy efficiency program impacts for use in utility system resource planning.

#### *National evaluation standard*

The final issue we would like to address in this report is the question of whether policymakers should establish a national standard for the evaluation of ratepayer-funded energy efficiency programs.

This is not a simple issue. (If it were, it would have been solved long ago.) On one hand, as this study has abundantly documented, there is a sometimes distressing amount of variability and inconsistency in how states handle the issue of evaluating ratepayer-funded energy efficiency programs. In an ideal world, a national standard would remove many of those discrepancies.

On the other hand, this report has noted the historical policy approach in the U.S. that leaves the regulation of retail utilities to the states. We have also noted the almost Byzantine mosaic of administrative and legal structures<sup>29</sup> across the 50 states, which would seem to make it extremely difficult to pursue an “individual state” focused voluntary effort to persuade states to adopt a single evaluation standard. This would seem to leave us with the paradoxical situation where it looks like the “heavy hand” of a federal mandate may be necessary in order to implement a national standard, yet that would conflict directly with the historical deference to state authority in the regulation of retail utilities.<sup>30</sup>

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<sup>28</sup> In contrast, other key factors more under the control of the utility/program administrator (such as the actual number of units installed, the size of the measures replaced, etc.) should indeed be based on “actual” data observed in the evaluation. This is the essence of the concept of “verified gross” savings.

<sup>29</sup> Moreover, our experience in the interview process reaffirmed the awareness that such factors as political climate, history with energy efficiency, and even personalities of the people at the regulatory commission all influence a state’s approach to the administration and evaluation of ratepayer-funded energy efficiency programs.

<sup>30</sup> One noteworthy and interesting exception in this area was the 1978 National Energy Conservation Policy Act, which created a federal mandate on retail utilities to provide “energy audits” to customers (i.e., the Residential Conservation Service and the subsequent Commercial and Apartment Conservation Service).

One middle-ground approach that we briefly mentioned earlier would be to take advantage of the nearly ubiquitous presence of the professional energy program evaluation community in implementing energy program evaluation in the states. Perhaps that professional network could be helpful in achieving more standardization in key aspects of evaluation practice—which they could then carry forward in their work for the states. (We acknowledge that this would be no simple task, as there is certainly diversity of opinion within the evaluation community on some of these issues.)

Another potential middle-ground approach would be to develop several different evaluation protocols and encourage states to adopt one of them. Such an approach would improve consistency while leaving states to make strategic decisions on which approach to use. Such an approach is analogous to the standard practice cost benefit tests, where states choose which test to use, but many states calculate a specific test in the same way. Another example is the International Performance Measurement and Verification Protocol (<http://www.evo-world.org/>), which provides a small set of core approaches that can be used to evaluate energy savings from a specific project at a specific facility. Perhaps this type of strategy could be modified to provide an accepted set of “recommended” methods for evaluating overall energy efficiency programs.

Meanwhile, there are important efforts going on to pursue increased adoption of important evaluation practices and standards, both at the regional level (e.g., the NEEP Regional Evaluation, Measurement & Verification Forum and its Common EM&V Methods and Savings Assumptions Project) and at the federal level (e.g., NAPEE 2007; Schiller, Goldman & Galawish 2011 for the SEE-Action EM&V Working Group; and the current DOE Uniform EM&V Methods Project).

We support and encourage the efforts to explore the issue of a national standard, but we are not yet persuaded that it is time to call for a single national evaluation standard. We have concerns both about what exactly such a standard might require, as well as what practical mechanism(s) might be used to achieve implementation.

For now, we would support and recommend the development and adoption of guidelines for evaluation reporting and disclosure. In addition to evaluation details, more transparency in reporting evaluation results and state summary data would be very helpful, including key assumptions and inputs such as measure lives, discount rates, methodologies for calculating avoided costs, etc. In this manner, at least key information would be provided so that results reported by any state could be properly interpreted and placed into context with reported results for other states.<sup>31</sup>

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<sup>31</sup> We note that some good work is going on in this area, at least on a regional basis (e.g., see NEEP 2010).

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## **APPENDIX A: INTERVIEW INSTRUMENT FOR THE ACEEE NATIONAL EVALUATION SURVEY**

## ENERGY EFFICIENCY EVALUATION REVIEW PROJECT

NAME \_\_\_\_\_ POSITION: \_\_\_\_\_ DATE: \_\_\_\_\_

We are doing a national survey of all 50 states, to see how each state handles the task of evaluating their utility-funded energy efficiency programs. The following questions are about ratepayer-funded energy efficiency program evaluation in your state (not taxpayer funded programs such as the federally-funded Weatherization program).

When we complete the study, we would be happy to provide a copy of the national results to our survey respondents. Would you like to receive a copy? Yes \_\_\_\_ No \_\_\_\_

If you find that there are some questions that you are unable to answer, please let us know who to contact to obtain the additional information here:

NAME \_\_\_\_\_

POSITION \_\_\_\_\_

EMAIL \_\_\_\_\_

PHONE \_\_\_\_\_

1. In general, how is the task of evaluating utility-funded energy efficiency programs handled in your state? (i.e., in particular, the task of determining how much energy savings has been achieved by the programs)

Specifically:

- Which organization administers/oversees the evaluation work? (e.g., who contracts with the evaluator? Who does the evaluator submit reports to?)
- Are evaluations administered separately for each utility? Or on a combined/statewide basis? If not all combined, when are they separate and when joint?
- Who conducts the actual evaluation studies? (e.g., independent contractors, utility staff, state agency staff, etc.)
- Is there any role for other interested parties to be involved with the evaluation process? (e.g., customer groups, environmental groups, state agencies, stakeholder collaboratives). If yes, what role?
- What is the overall role of the Public Utilities Commission or Public Service Commission with respect to evaluation?

2. Are "evaluations" of the utility-funded energy efficiency programs required by legislation?

Yes \_\_\_\_ No \_\_\_\_

If so, please cite: \_\_\_\_\_

\_\_\_\_\_  
(Please provide specific description and number or link)

Or by regulatory order? Yes \_\_\_\_ No \_\_\_\_

If so, please cite: \_\_\_\_\_

\_\_\_\_\_  
(Please provide specific description and number or link)

If you don't know, who would know this or where can we find out?

3. Are evaluation requirements for natural gas energy efficiency programs the same as for electric energy efficiency programs?

Yes \_\_\_\_ No \_\_\_\_ (If no natural gas efficiency programs, skip to question #4)

If different, how?

3a. Are benefit-cost or cost-effectiveness tests different? Yes \_\_\_\_ No \_\_\_\_

If different, how?

NOTE:

If evaluation requirements for natural gas energy efficiency programs are different than for electric energy efficiency programs, then for the remainder of these questions, please assume that the question applies to evaluations of electric energy efficiency programs, but if there are major differences for natural gas that you would like to mention, that would be helpful.

4. How are energy efficiency evaluation results used in your state and who uses them for each of those purposes ?

• For general oversight of the programs? Yes \_\_\_\_ No \_\_\_\_

If yes, how?

• For determining the amount of program cost recovery? Yes \_\_\_\_ No \_\_\_\_

If yes, how?

• For eligibility and/or amount of shareholder incentive/penalty for utilities Yes \_\_\_\_ No \_\_\_\_

If yes, how?

• For eligibility/calculation of lost revenue recovery? Yes \_\_\_\_ No \_\_\_\_

If yes, how? If not, does your state have a lost revenue recovery mechanism in place? If so, how is lost revenue recovery calculated if not from evaluation results?

5. Is the process, and/or rules, for conducting the evaluations in your state spelled out in writing anywhere? (e.g., in regulatory orders or legislation?) Yes \_\_\_\_ No \_\_\_\_

If so, where? \_\_\_\_\_

\_\_\_\_\_  
(Please provide specific description and number or link)

6. Is there any rule or guidance on how much can be spent on program evaluation? (e.g., as a percent of total energy efficiency program budget)? Yes \_\_\_\_ No \_\_\_\_

If yes, how much? \_\_\_\_\_ If there is a rule, please write source or link here:  
\_\_\_\_\_

If no, what is your best estimate of what percent is usually spent on evaluation? \_\_\_\_\_  
And/or what percent was spent in recent year or years?

### COST-EFFECTIVENESS TESTS

1. Does your state use benefit-cost tests in connection with its utility-funded energy efficiency programs? Yes \_\_\_\_\_ No \_\_\_\_\_

2. If you do, which benefit-cost tests do you use? \_\_\_\_\_  
\_\_\_\_\_

If there is more than one, is any one of those tests used as the “primary” test? (For example, is one test designated as the primary test, or is one test used as the typical practice?)

3. If there is a primary test, which one? How is that used as the primary test?  
\_\_\_\_\_  
\_\_\_\_\_

4. Is this use of B/C tests required by legislation?

Yes \_\_\_\_\_ No \_\_\_\_\_

\_\_\_\_\_  
(Please provide specific description and number or link)

Or is the use of B/C test required by regulatory order?

Yes \_\_\_\_\_ No \_\_\_\_\_

\_\_\_\_\_  
(Please provide specific description and number or link)

5. Are B/C tests required for load management/demand response programs? (including, for example, smart meters-would they be required to pass a cost benefit test)

Yes \_\_\_\_\_ No \_\_\_\_\_ Don't know \_\_\_\_\_

If yes, please describe how the B/C tests are applied to load management/demand response:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

6. Are B/C tests required for renewable energy programs? (including for example, renewables for compliance with an RPS)

Yes \_\_\_\_\_ No \_\_\_\_\_ Don't know \_\_\_\_\_

If yes, please describe how the B/C tests are applied to renewable energy programs:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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RETURNING TO ENERGY EFFICIENCY PROGRAMS:

7. Does your state apply the B/C tests to program screening for energy efficiency programs?

Yes \_\_\_\_ No \_\_\_\_

8. At what level(s) is the B/C screening applied?

Level	Check here if B/C test is applied	If B/C test applies, does that mean that the measure, project, program or portfolio cannot be approved if it does not pass the B/C test? Please explain if necessary.
Individual measure		
Customer project		
Total program		
Overall portfolio		

BENEFIT-COST TEST CALCULATIONS

9. What benefits are included when calculating the primary benefit-cost test? If no test is the primary test, check the benefits included in calculating the Total Resource Cost (TRC) test:

Benefit	Check if included in primary B/C test
Utility system "avoided costs?"	
Non-energy benefits to participants? (e.g., health, comfort, reduced maintenance improved productivity, savings on water or other fuels, etc.) If yes, please list here	
Environmental benefits?	
Other "societal" type benefits?	
Other _____ benefits? (describe)_____	

List benefits here and describe how each is quantified in the benefit-cost test:

9b. What costs are included when calculating the primary benefit-cost test? If no test is the primary test, check the costs included in calculating the Total Resource Cost (TRC) test:

Cost	Check if included in primary B/C test
Utility program costs?	
Customer costs for the measures	
Utility shareholder incentives (if applicable)	
Other costs? _____	

How is each of these component costs quantified?

10. How are the utility system “avoided costs,” that are used to help quantify energy efficiency program benefits, defined? (e.g., cost of the next power plant, average system cost, etc.)

10a. Is a value for avoided transmission & distribution costs included in the calculation?

Yes \_\_\_ No \_\_\_

10b. Are “avoided costs” determined individually for each utility? Or on a statewide basis?

\_\_\_ by utility \_\_\_ statewide

11. What discount rate(s) is used in the benefit-cost test calculations? If more than one, please describe.

12. What “life of measure” is used to calculate the lifetime savings from the energy efficiency program?

13. How are discount rates and measure lives determined in your state? (Examples: each utility submits proposed figures to regulators; a state agency establishes the values; a technical review committee develops them)

**EVALUATION ISSUES**

14. Please briefly describe how the energy savings results from utility-funded energy efficiency programs are determined in your state. How are the savings numbers developed?

15. Does your state use “gross savings” or “net savings” when it quantifies the energy savings from an energy efficiency program? Gross \_\_\_ Net \_\_\_ Both \_\_\_

If both, please describe how each is used here, then skip to “Net” questions

Gross

Net

If you use gross savings, or you do not know:

15a. Does your state make any adjustments for things like “free riders” or “free drivers/spillover” ?

- Free riders: Yes \_\_\_\_ No \_\_\_\_
- Free drivers/Spillover Yes \_\_\_\_ No \_\_\_\_

If you answered “yes” to either of these in 15a, please answer items 16a and 16b

If you use “net savings” or answered Yes to 15a.

16. How does your state calculate net savings? (For example, may be determined in advance for a given program year with a deemed net-to-gross ratio, or calculated by evaluator based on customer surveys or data analysis after the end of the program year)

**Note:** Questions 16 and 19 both touch upon whether evaluation results are used retrospectively or prospectively—e.g., if an evaluation is used to determine things like net savings or a “net-to-gross ratio,” are those results applied to the program year that was just evaluated? Or is that information just applied to the next program year or years? If some factors are applied retroactively and some prospectively, please distinguish which is which.

If not covered above:

16a. What is done regarding “free-riders”? (What methods do you use and what is done with the information?)

16b. What is done regarding “free-drivers/spillover”? (What methods do you use and what is done with the information?)

17. Where and how are the values for variables like “free riders” determined?

- \_\_\_\_ case by case (e.g., in individual utility regulatory cases)
- \_\_\_\_ set by state agency
- \_\_\_\_ determined by a technical review committee (multi-party)
- \_\_\_\_ other \_\_\_\_\_

18. Does your state use any kind of a “deemed savings” approach for some or all efficiency measures?

Yes \_\_\_\_ No \_\_\_\_

IF YES, For what measures or sets or measures are deemed savings used?

IF YES, What types of values are “deemed”? (check all that apply)

- \_\_\_\_ amount of savings to claim for particular energy efficiency measures
- \_\_\_\_ lifetime over which to claim savings for particular measures
- \_\_\_\_ free-ridership levels
- \_\_\_\_ net-to-gross values for computing net savings
- \_\_\_\_ other \_\_\_\_\_

19. How are deemed values determined, and how does that relate to evaluation studies? (i.e., are evaluation results used to update deemed savings values, and how does that process work?)

If there is a deemed savings database, please provide citation or link here

Are there any other important aspects or features about energy program evaluation in your state that you think should be included in this survey and compilation of state evaluation approaches?

Thank you very much for your assistance in this survey.



## **APPENDIX B: STATE-BY-STATE RESULTS FOR KEY VARIABLES**

**Table B-1. State Ranking on ACEEE Energy Efficiency Scorecard and Relative Size of Ratepayer-Funded Energy Efficiency Budget**

State	ACEEE 2011 Scorecard Ranking*	2009 Total EE Budget (million \$)**	2009 Total EE Budget per Capita (\$)**	2010 Total EE Budget (million \$)***	2010 Total EE Budget per Capita (\$)
Alabama	36	\$9.10	\$2	\$17.70	\$4
Alaska	49	\$0.00	\$0	\$0.40	\$1
Arizona	13	\$53.20	\$8	\$94.90	\$14
Arkansas	27	\$8.90	\$3	\$17.30	\$6
California	5	\$1,376.70	\$37	\$1,496.90	\$40
Colorado	16	\$60.00	\$12	\$83.10	\$16
Connecticut	10	\$82.80	\$24	\$138.40	\$39
Delaware	36	\$0.00	\$0	\$4.80	\$5
District of Columbia	26	\$15.60	\$26	\$10.90	\$18
Florida	33	\$139.80	\$8	\$129.70	\$7
Georgia	44	\$21.30	\$2	\$22.60	\$2
Hawaii	10	\$35.50	\$27	\$19.30	\$15
Idaho	21	\$33.10	\$21	\$38.20	\$24
Illinois	21	\$94.00	\$7	\$182.80	\$14
Indiana	25	\$28.00	\$4	\$31.00	\$5
Iowa	7	\$90.40	\$30	\$108.30	\$36
Kansas	47	\$3.70	\$1	\$5.40	\$2
Kentucky	33	\$19.60	\$5	\$30.90	\$7
Louisiana	36	\$2.30	\$1	\$0.00	\$0
Maine	17	\$21.20	\$16	\$14.40	\$11
Maryland	20	\$38.10	\$7	\$92.20	\$16
Massachusetts	2	\$221.80	\$34	\$385.70	\$58
Michigan	19	\$80.90	\$8	\$116.50	\$12
Minnesota	4	\$133.50	\$25	\$200.30	\$38
Mississippi	48	\$9.20	\$3	\$12.50	\$4
Missouri	36	\$24.30	\$4	\$47.60	\$8
Montana	29	\$13.30	\$14	\$9.00	\$9
Nebraska	44	\$7.10	\$4	\$13.00	\$7
Nevada	13	\$42.60	\$16	\$48.40	\$18
New Hampshire	17	\$18.20	\$14	\$32.50	\$25
New Jersey	23	\$190.00	\$22	\$281.10	\$32
New Mexico	28	\$16.10	\$8	\$20.10	\$10
New York	6	\$421.20	\$22	\$631.60	\$32
North Carolina	29	\$65.60	\$7	\$46.60	\$5
North Dakota	49	\$0.20	\$0	\$1.40	\$2
Ohio	23	\$44.10	\$4	\$163.80	\$14

State	ACEEE 2011 Scorecard Ranking*	2009 Total EE Budget (million \$)**	2009 Total EE Budget per Capita (\$)***	2010 Total EE Budget (million \$)****	2010 Total EE Budget per Capita (\$)
Oklahoma	36	\$3.80	\$1	\$27.90	\$7
Oregon	8	\$105.50	\$28	\$113.90	\$30
Pennsylvania	32	\$105.60	\$8	\$122.90	\$10
Rhode Island	2	\$37.10	\$35	\$36.90	\$35
South Carolina	44	\$14.60	\$3	\$12.30	\$3
South Dakota	29	\$3.50	\$4	\$4.90	\$6
Tennessee	41	\$24.20	\$4	\$48.90	\$8
Texas	35	\$101.90	\$4	\$130.00	\$5
Utah	10	\$92.80	\$33	\$91.60	\$32
Vermont	1	\$32.50	\$52	\$36.10	\$58
Virginia	41	\$0.40	\$0	\$6.40	\$1
Washington	8	\$165.40	\$25	\$194.00	\$29
West Virginia	49	\$0.00	\$0	\$0.00	\$0
Wisconsin	13	\$162.40	\$29	\$157.10	\$28
Wyoming	41	\$3.10	\$6	\$4.70	\$9

\* This represents ACEEE's overall ranking on each state's "Utility and Public Benefits Programs and Policies," taken from Table 2 in the ACEEE report: "*The 2011 State Energy Efficiency Scorecard*" (Sciortino et al. 2011)

\*\* 2009 budget data from Molina et al. (2010)

\*\*\* Per-capita numbers derived by dividing budget by state population from Census)

\*\*\*\* 2010 budget data from Sciortino et al. (2011)

**Table B-2. Administrative Structure for the Evaluation of Ratepayer-Funded Energy Efficiency Programs**

State	Who Administers the Evaluation					Are Evaluations Conducted Individually for Each Utility or Statewide			Legal Framework/ Requirement for Evaluation	
	Utilities	Public Utilities Commission	Non-Utility Program Administrator	Other Government Agency	Other	Utility	Statewide	Both	Legislative	Regulatory
Arizona	X					X				X
Arkansas		X				X				X
California	X	X						X		X
Colorado	X						X			X
Connecticut					X <sup>32</sup>		X		X	
Delaware				X <sup>33</sup>			X		X	
District of Columbia		X		X <sup>34</sup>				X	X	
Florida	X					X			X	X
Georgia										
Hawaii		X					X		X	
Idaho	X	X				X				X
Illinois	X			X <sup>35</sup>		X			X	X <sup>36</sup>
Indiana	X	X						X		X
Iowa	X							X	X	X
Kansas		X				X				X
Kentucky	X					X				X
Maine			X <sup>37</sup>				X		X	
Maryland	X	X						X	X	X <sup>38</sup>
Massachusetts	X			X <sup>39</sup>	X <sup>40</sup>		X		X	X <sup>41</sup>
Michigan	X					X			X	
Minnesota	X			X <sup>42</sup>		X			X	
Missouri	X	X				X				X
Montana	X					X				X
Nebraska	X							X		
Nevada	X							X		X
New Hampshire		X					X		X	
New Jersey	X	X					X			
New Mexico		X				X			X	

<sup>32</sup> The Connecticut Energy Efficiency Board administers Connecticut's evaluations.

<sup>33</sup> The Delaware Department of Natural Resources and Environmental Control administers Delaware's evaluations.

<sup>34</sup> The District of Columbia Department of the Environment assists in the administration of the evaluations in D.C.

<sup>35</sup> The Department of Commerce and Economic Opportunity administers the evaluations for a portion of the programs in Illinois.

<sup>36</sup> The order follows the legislation.

<sup>37</sup> Efficiency Maine administers Maine's evaluations.

<sup>38</sup> The order follows the legislation.

<sup>39</sup> The Massachusetts's Energy Advisory Council assists in the administration of the evaluations in Massachusetts.

<sup>40</sup> The Energy Efficiency Program Administrators assist in the administration of the evaluations in Massachusetts.

<sup>41</sup> The order follows the legislation.

<sup>42</sup> The Division of Energy Resources, Department of Commerce Staff assists in the administration of the evaluations in Minnesota.

State	Who Administers the Evaluation					Are Evaluations Conducted Individually for Each Utility or Statewide			Legal Framework/ Requirement for Evaluation	
	Utilities	Public Utilities Commission	Non-Utility Program Administrator	Other Government Agency	Other	Utility	Statewide	Both	Legislative	Regulatory
New York	X			X <sup>43</sup>				X		X
North Carolina	X					X				X
Ohio	X	X						X		X
Oklahoma	X					X				X
Oregon			X <sup>44</sup>				X			X
Pennsylvania		X				X			X	X <sup>45</sup>
Rhode Island	X						X			X
South Carolina		X		X <sup>46</sup>			X		X	X
South Dakota	X					X				
Tennessee				X <sup>47</sup>			X			
Texas	X					X			X	X
Utah	X					X				X
Vermont				X <sup>48</sup>			X		X	X
Virginia		X				X			X	
Washington	X					X				X
Wisconsin	X	X						X	X	X
Wyoming		X				X				X

<sup>43</sup> New York State Energy Research and Development Authority (NYSERDA) administers the evaluations for a portion of the programs in New York.

<sup>44</sup> The Energy Trust of Oregon administers Oregon's evaluations.

<sup>45</sup> The order follows the legislation.

<sup>46</sup> The South Carolina Office of Regulatory Staff assists in the evaluation administration in South Carolina.

<sup>47</sup> The Tennessee Valley Authority administers Tennessee's evaluations.

<sup>48</sup> The Vermont Department of Public Service administers Vermont's evaluations.

**Table B-3. EM&V Rules Published and Use of a Technical Reference Manual**

State	Rules for Evaluation Are Established and Published* <sup>49</sup>	Is There a Technical Resource Manual or Deemed Savings Database?	Are Changes to Deemed Values Applied Prospectively or Retrospectively?		
			Prospectively	Retrospectively	Both
Arizona	X		X		
Arkansas			X		
California	X	X	X		
Colorado	X		X		
Connecticut	X	X	X		
Delaware					
District of Columbia					
Florida	X		X		
Georgia	X				
Hawaii	X		X		
Idaho	X <sup>50</sup>			X	
Illinois	X	proposed	X		
Indiana		X			
Iowa			X		
Kansas	X			X	
Kentucky			X		
Maine		X	X		
Maryland	X		X		
Massachusetts		X		X	
Michigan	X	X	X		
Minnesota	X	X	X		
Missouri	X				
Montana				X	
Nebraska					
Nevada			X		
New Hampshire	X		X		
New Jersey	X	X	X		
New Mexico				X	
New York	X	X	X		
North Carolina					X

<sup>49</sup> Where available, links to state rules/requirements for evaluation are provided in Appendix C.

<sup>50</sup> No rules or requirements but there is a January 2009 Memorandum of Understanding (MOU) among Commission Staff and the three electric Idaho investor-owned utilities.

State	Rules for Evaluation are Established and Published*	Is There a Technical Resource Manual or Deemed Savings Database?	Are Changes to Deemed Values Applied Prospectively or Retrospectively?		
			Prospectively	Retrospectively	Both
Ohio		drafted	X		
Oklahoma			X		
Oregon	X			X	
Pennsylvania		X	X		
Rhode Island	X		X		
South Carolina					
South Dakota			X		
Tennessee			X		
Texas	X	X	X		
Utah	X		X		
Vermont		X	X		
Virginia	X		X		
Washington	X		X		
Wisconsin		X	X		
Wyoming	X		X		