Hong Wang

**Attachments:** TRC v. UCT-Paper_12DEC11.pdf

**From:** Jim Varian <jvarian@PSC.STATE.FL.US>
**Sent:** Wednesday, March 1, 2023 1:03 PM
**To:** Adam Teitzman <ATEITZMA@psc.state.fl.us>
**Cc:** Betty Leland <BLELAND@psc.state.fl.us>
**Subject:** Fwd: FEECA rulemaking agenda item

Adam -

Would you please have this placed in the 20200181 docket file? correspondence AT 3/1/23

Thank you.

Jim Varian
Chief Advisor to Commissioner Art Graham
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Begin forwarded message:

**From:** George Cavros <george@cleanenergy.org>
**Date:** March 1, 2023 at 7:56:43 AM EST
**To:** Jim Varian <jvarian@psc.state.fl.us>
**Subject: FEECA rulemaking agenda item**

Hi Jim,

I'm reaching out to you about the energy efficiency rulemaking agenda item to be discussed at the March 7th Agenda Conference. I thought it would be helpful to give you and the commissioner a heads-up on the non-utility stakeholders' suggested modifications to the proposed rule that will be considered by commissioners. The suggestions aim to increase transparency and provide critical information to the Commission when it sets demand side management goals as well providing the state's utilities more flexibility in proposing goals and programs. The suggestions are below with a very brief explanation for their inclusion.

- Add the Utility Cost Test (UCT) to the list of cost-effectiveness tests for goal scenarios provided to the Commission. This will provide greater transparency and more information to the Commission because it's the only test that places energy efficiency and supply side investments on a level playing field. The proposed rule requires that the RIM and TRC test results and goal scenarios must be provided; although this is already current practice. Adding the UCT will provide the economic benefit of energy efficiency to the general body of ratepayers – therefore is

consistent with Section 336.82(3) and an informative tool for the commissioners to understand utility system benefits from efficiency measures and goals. I've attached a helpful, if not dated, factsheet on the UCT test relative to the others.

- End the use of the 2-year payback screen by no longer using "time-based" screens. The 2-year payback screen doesn't address freeridership, but rather is an arbitrary screen that eliminates low cost, high impact measures by assuming customers will invest in efficiency measures that have a payback of 2 years or less to the customer. There is no empirical evidence to support this assumption – and is simply not true of families having to make the decision to put food on the table or pay a power bill. It reduces energy efficiency potential by 50% and more according to testimony in the 2019 FEECA goal setting docket.

- Establish low-income customer goals commensurate with the percentage of low income population in a utility's service territory, and exempt programs from standard cost-effectiveness test, or at a minimum, the RIM test and time-based screens – like the 2-year payback screen. This would provide consistency, clarity and flexibility to utilities in designing programs. Currently, some utilities do low-income programs well, some hardly at all. This is an extension of the Commission's currently existing desire for utilities to provide meaningful low-income programs.

Even the adoption of one of these suggestions would be a positive step towards providing more transparency, information and flexibility to the energy efficiency goal setting process.

Please feel free to reach out to me with any technical questions. Thanks again,

George

--
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*Please think about the environment before printing this email*

# Whose Perspective? The Impact of the Utility Cost Test

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## ABSTRACT

As more states have adopted portfolio standards for energy efficiency, a majority have selected the Total Resource Cost Test (TRC) as the cost-effectiveness threshold utilities must meet. This trend, however, may be changing. In 2009, Utah altered course, and required all programs pass the Utility Cost Test (UCT), rather than the TRC. Similarly, in 2008 Michigan passed Public Act 295, adopting the UCT as the cost-effectiveness screening test. Each test reflects a different perspective, and, depending on that perspective, desired outcomes can differ dramatically. This study examines: the theory behind each test perspective; the rationale for adopting each test; and key outcomes, including achieved savings, overall cost-effectiveness, cost-per-kWh, and the diversity of program offerings. The paper also examines advantages lost when only one test is used in evaluating a program's worthiness, and a glimpse of energy-efficiency's future if more jurisdictions adopt the UCT over the TRC.

## Overview

The California Standard Practice Manual (California Manual) serves as the general standard of cost-effectiveness analysis in the United States (CPUC 2001), offering guidelines for measuring the cost-effectiveness of utility-sponsored programs using the following five, defined tests:

- ***Total Resource Cost Test (TRC).*** Originally known as the All-Ratepayer Test, this test examines efficiency from the viewpoint of an entire service territory. This test compares the program benefits of avoided supply costs to costs for administering a program and the cost of upgrading equipment[1]. When a program passes the TRC, this indicates total resource costs will drop, and the total cost of energy services for an average customer will fall.
- ***Ratepayer Impact Test (RIM).*** Originally known as the Non-Participant Test, RIM is also known as the "no losers test." The RIM tests from the viewpoint of a utility's customers as a whole, measuring distributional impacts of conservation programs. The test measures what happens to average price levels due to changes in utility revenues and operating costs caused by a program. A benefit/cost ratio less than 1.0 indicates the program will influence prices upward for all customers. For a program passing the TRC but failing the RIM, average prices will increase, resulting in higher energy service costs for customers not participating in the program.
- ***Utility Cost Test (UCT).*** Also known as the Program Administrator Test (PACT), this test measures cost-effectiveness from the viewpoint of the sponsoring utility or program administrator. If avoided supply costs exceed costs incurred by the program administrator, average costs decrease.
- ***Participant Test (PCT).*** This test measures benefits and costs to customers participating in

[1] Some states use a modified TRC which can include non-energy benefits or a lower discount rate more in line with the societal perspective; however the California Manual strictly defines the TRC as including benefits only from avoided energy costs.

demand-side management (DSM) programs. The test compares bill savings against incremental costs of the efficient equipment. It measures a program's economic attractiveness to customers, and can be used to set rebate levels and forecast participation.

- ***Societal Cost Test (SCT).*** A variation of the TRC, this test expands the point-of-view from the service territory to society's perspective. The TRC and the SCT differ in two important ways: 1) while the TRC uses an average cost of capital discount rate, the SCT uses a societal discount rate; and 2) the SCT also includes *all* quantifiable benefits attributable to a program, such as avoided pollutants, water savings, detergent savings, and other non-energy benefits.

A recent survey of U.S. cost-effectiveness requirements conducted by Cadmus indicates the TRC is the dominant cost-effectiveness test. Of 27 states reviewed for this study, 18 rely solely on the TRC or SCT. Three states review cost-effectiveness from multiple perspectives (including the UCT and TRC/SCT). Table 1 shows requirements by state. Jurisdictions clearly trend toward requiring the TRC when evaluating the economic worthiness of a measure, program, or portfolio of programs. Changes in multiple states confirm this trend: in Florida, which recently changed from using the RIM to the TRC; in New York, where the 2008 Energy Efficiency Portfolio Standards (EEPS) require all measures to pass the TRC (New York PSC 2008); and in Pennsylvania, where 2008 ACT 129 requires portfolios to pass the TRC (PA PUC 2009).

**Table 1. Primary Cost-Effectiveness Test by State**

| All tests | TRC/SCT Primary Threshold | UCT Primary Threshold |
|---|---|---|
| IN, IA, NC | CA[2], CO, DE, FL, IL, ME, MA, MN, MO, NH, HJ, NM, NV, OH, OR[3], PA, RI, VT, WA, WI | CA, CT, MI, OR, TX, UT |

While the majority of jurisdictions use the TRC, a few notable exceptions point toward a newer trend of using the UCT. Utah relied on the TRC for a number of years, but replaced it with the UCT in 2009. Michigan, a state that adopted energy-efficiency standards in 2008 along with Pennsylvania and New York (TRC jurisdictions), prescribed the UCT as the cost-effectiveness threshold utilities must meet. California has also shifted to a weighted TRC and UCT test, rather than the TRC alone (CPUC 2005).

Before examining the rationale for selecting one test over the other, one must examine the differences between the two tests more closely. While similar, the UCT and the TRC differ significantly in calculating net benefits. The table below outlines costs and benefits associated with each test.

**Table 2. Benefits and Costs for TRC and UCT[4]**

| | Total Resource | Utility |
|---|---|---|
| **Benefits** | • Utility avoided supply costs<br>• Tax credits | • Utility avoided supply costs |
| **Costs** | • Program administrator costs<br>• Net participant costs | • Program administrator costs<br>• Incentives paid by sponsoring utility |

[2] California uses a weighted UCT/TRC test.
[3] Oregon relies on the TRC and UCT.
[4] This summary, focusing on energy efficiency, does not include costs and benefits associated with fuel switching or demand response programs.

The two tests generally use the same benefits with the exception of measures where the rebate exceeds the incremental cost or where tax credits are available resulting in significant differences in cost-effectiveness. Differences between the two tests' results generally can be found in the costs. The TRC uses a measure's incremental cost, which can be thought of as the cost of upgrading installed equipment to a higher efficiency. In contrast, the UCT only uses the cost paid by the utility (generally as rebates to participating customers[5]).

While the California Manual cites the TRC's scope as a strength, given it captures all demand-side option costs, this can also be considered its weakness. A price impact perspective considers only costs incurred by the utility as relevant. While utilities typically incur total costs of supply-side options, demand-side options incur only program administration and incentive costs. Using the UCT accounts for this difference in accounting for supply- and demand-side costs.

As utilities generally pay the full cost for low-income weatherization or energy education programs, the TRC costs for such programs generally equal utility costs. For the majority of program offerings, however, the difference between TRC and UCT costs will differ substantially. Table 3 below illustrates differences between estimated incremental costs and standard rebates for select measures.

**Table 3. Incremental and Rebate Cost Comparison[6]**

| Measure | Incremental Cost | Utility Incentive |
|---|---|---|
| High Efficiency Clothes Washer | $258 | $50 |
| Heat Pump Hot Water Heater | $2,433 | $300 |
| Tankless Water Heater | $685 | $300 |
| Energy Star® Refrigerator[7] | $30 | $50 |
| CFL[8] | $4 | $2 |
| Energy Star® Room Air Conditioner[7] | $50 | $25 |

Clearly, these costs substantially differ: clothes washers and heat pump water heaters exhibit incremental costs five times the utility cost; room air conditioners and refrigerators experience utility costs (incentives) exceeding the incremental cost.

While the rationale behind adopting the TRC or UCT may not always be clear, the use of the TRC appears to be driven by a concern for appropriate use of ratepayer funds. In Pennsylvania, for example, the portfolio of programs must pass the TRC because "[a] B/C ratio above one indicates that the program is beneficial to the utility and its ratepayers on a total resource cost basis." (Pennsylvania PUC 2009). In Pennsylvania, not only must the utility realize a benefit from energy-efficiency activities, but ratepayers must benefit as a whole. New York shares similar concerns regarding use of ratepayer funds, requiring all measures, projects, and programs to pass the TRC (New York PSC 2009).

In Utah, the UCT has been adopted as the primary cost-effectiveness measure "[t]o put candidate demand-side resources on the same footing as supply-side resources." (State of Utah 2009). While utilities must provide all five tests outlined in the California Manual for filed programs, the UCT serves as the primary test in screening programs[9]. As seen in the costs outlined above, impacts of adopting the

[5] Utility costs include administrative costs, which are also accounted for in the TRC costs.
[6] Sources for incremental costs are provided in Table 8 unless otherwise noted.
[7] Incremental cost from Energy Star®
[8] Incremental costs from engineering research.
[9] Note that, while the Commission requires utilities to provide the PCT and the Division of Public Utilities cites its usefulness in program design, the Division states the PCT "should be accorded little weight in the approval of DSM programs." (Utah

UCT over the TRC have the potential to dramatically increase potential savings. The Utah Office of Consumer Services notes: "the practical effect is that more DSM resources will likely be selected as cost-effective in future IRP case scenarios." (State of Utah 2009).

While California traditionally has used the TRC test, the California Public Utility Commission (CPUC) has recognized DSM costs differ from those associated with supply-side options. Noting TRC costs more accurately capture comparisons between supply-side and demand-side costs, the CPUC adopted a "two thirds TRC to one-third [UCT] weighting in calculating the performance basis of energy efficiency resource programs." Incorporating the UCT seeks to minimize utility administration costs, while balancing comparisons to supply-side resources.

## The Impact

To better examine differences in applying the TRC versus the UCT, we examine cost-effectiveness results reported by three utilities for selected residential energy-efficiency programs.

**Table 4. Appliance Rebates: Comparison of Cost-Effectiveness**

| Utility | TRC | UCT | PCT | RIM |
|---|---|---|---|---|
| MidAmerican (Iowa)[10] | 1.45 | 3.60 | 2.82 | 0.70 |
| Questar[11] | 1.90 | 2.80 | 2.20 | 1.90 |
| DTE[12] | 4.77 | 9.59 | 7.75 | 0.77 |

As shown in Table 4, the appliance rebate program passes the TRC for each utility. MidAmerican finds it marginally cost-effective from a TRC perspective. The program, however, evidences a very high benefit-cost ratio for the UCT. While benefitting ratepayers, this program is clearly cost-effective for utilities. It also passes the PCT for all three utilities, indicating that it will be economically attractive to customers. Based on experiences with other, similar programs, we know such offerings generally prove popular, and serve many customers. Balancing the TRC, UCT, and the program's value, this program can clearly be considered worthy of funding.

**Table 5. New Construction: Comparison of Cost-Effectiveness**

| Utility | TRC | UCT | PCT | RIM |
|---|---|---|---|---|
| MidAmerican (Iowa) | 1.06 | 2.27 | 1.67 | 0.78 |
| Questar | 1.60 | 2.60 | 2.30 | 1.70 |
| DTE | 0.30 | 1.64 | 0.42 | 0.63 |

As shown in Table 5, the new construction program does not pass the TRC for the electric-only utility (DTE), and is marginally cost-effective for MidAmerican, which includes costs and benefits for both gas and electric. The program indicates the greatest cost-effectiveness from a TRC perspective for Questar, a gas utility. The UCT, however, passes in all cases. For such programs, examining the PCT for as an indicator of non-energy benefits can be worthwhile. Customers commonly participate in programs or adopt measures that do not pass the PCT or TRC. Recently, it has been suggested this indicates customers may be motivated by factors other than energy savings, and costs used in the TRC or PCT are not necessarily directly tied to the energy benefits, thus biasing the tests (Neme 2010). This argument

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Division of Public Utilities, 2009)

[10] Gas and electric rebates.

[11] Gas rebates only

[12] Electric rebates only

proves particularly persuasive for a new construction program, where customers participate even though the economics suggest they are making an economically irrational decision. Program experience and economic analysis tell us these tests might not accurately reflect reality. As customers do participate in this program, costs have been overstated or not all benefits perceived by participants have been accurately captured. While it is important to calculate the TRC, in this instance, the PCT and industry experience indicate the UCT might more accurately reflect the economics and behavior.

Though commonly acknowledged as difficult to reach, the multifamily market offers significant savings, making it important to offer programs to this sector. Table 6 illustrates this program does not pass the TRC for MidAmerican, and only marginally passes for Questar. It is better in this instance to rely on the UCT in the case of Questar where the program is substantially more cost-effective from a utility perspective. For MidAmerican, it is important to balance cost-effectiveness requirements, equitably serving ratepayers and, possibly, the need for hard-to-reach markets in achieving savings targets.

**Table 6. Multifamily: Comparison of Cost-Effectiveness**

| Utility | TRC | UCT | PCT | RIM |
|---|---|---|---|---|
| MidAmerican (Iowa) | 0.96 | 0.99 | 34.78 | 0.48 |
| Questar | 1.20 | 2.40 | 1.60 | 0.40 |
| DTE | 2.70 | 4.05 | 9.85 | 0.68 |

To achieve a more granular view, we examine the cost-effectiveness of select energy-efficiency measures. Table 7 shows the inputs and results of cost-effectiveness analysis for six measures. Table 8 provides the sources for these inputs.

**Table 7. Measure Cost-Effectiveness Comparison**

| Measure | High Efficiency Clothes Washer (Gas / Electric) | Heat Pump Water Heater | Tankless Water Heater | High Efficiency Dishwasher | Air Source Heat Pump (14.5 SEER) | LED (6 W) |
|---|---|---|---|---|---|---|
| **Savings** | 224 (kWh) 6 (therms) | 1,622 (kWh) | 55 (therms) | 74 (kWh) | 2,691 (kWh) | 33 (kWh) |
| **Measure Life** | 11 years | 10 years | 20 years | 10 years | 12 years | 24 years |
| **Incremental Cost** | $258 | $2,433 | $685 | $12 | $1,000 | $25 |
| **Rebate** | $50 | $300 | $300 | $20 | $250 | $8 |
| **TRC** | 0.38 / 0.10 | 0.27 | 0.48 | 2.52 | 1.24 | 0.87 |
| **UCT** | 2.35 / 0.64 | 2.63 | 1.49 | 1.80 | 6.06 | 3.79 |
| **PCT** | 0.77 / 0.37 | 0.55 | 1.24 | 5.57 | 2.14 | 1.58 |

**Table 8. Cost-Effectiveness Assumptions[13]**

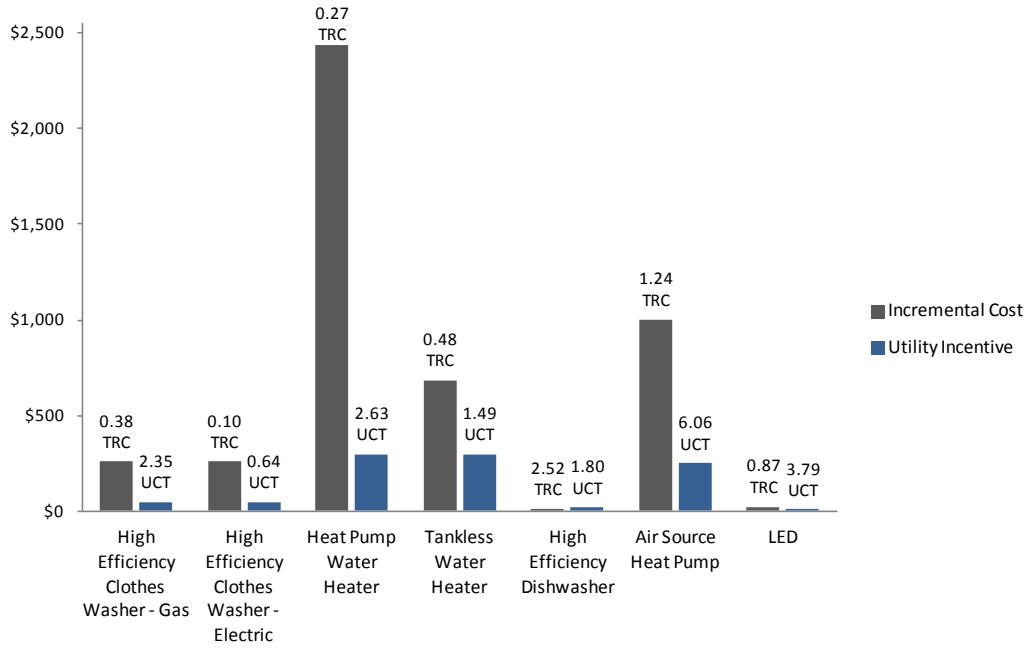
| Measure | High Efficiency Clothes Washer | Heat Pump Water Heater | Tankless Water Heater | High Efficiency Dishwasher | Air Source Heat Pump (14.5 SEER) | LED (6 W) |
|---|---|---|---|---|---|---|
| **Savings** | Energy Star® | PA TRM[14] | NY TRM | Energy Star® | Energy Star® | Engineering Calculation |
| **Measure Life** | Energy Star® | PA TRM | NY TRM | Energy Star® | Energy Star® | DEER[15] |
| **Incremental Cost** | Energy Star® | RTF[16] and research | Research | Energy Star® | Energy Star® | Online pricing |

[13] The analysis used a TRC and UCT discount rate of 7.7% and a PCT discount rate of 10%.
[14] Pennsylvania Public Utility Commission Technical Reference Manual.
[15] Database for Energy Efficient Resources.

| Measure | High Efficiency Clothes Washer | Heat Pump Water Heater | Tankless Water Heater | High Efficiency Dishwasher | Air Source Heat Pump (14.5 SEER) | LED (6 W) |
|---|---|---|---|---|---|---|
| **Avoided Cost** | Annual Energy Outlook | | | | | |
| **Retail Rates** | Energy Star® | | | | | |

The results of this analysis are also presented in Figure 1, which shows the dollar value of each measure's incremental cost in the first bar and the utility incentive in the second bar. The bar representing the incremental cost is labeled with the corresponding TRC ratio, while the bar representing the incentive shows the corresponding UCT ratio (as these are the two major cost components that vary between the tests). This illustration highlights the relationship between incremental costs and the TRC and utility incentives and the UCT.

**Figure 1. Incremental Cost vs. Utility Incentive by Measure**




Though water heating measures (save dishwashers) do not prove cost-effective from a TRC perspective, each measure passes the UCT, and only the tankless water heater and dishwasher pass the PCT. While the air source heat pump passes the TRC, it does so marginally, and has a high benefit-to-cost ratio for the UCT. This illustrates more specifically how relying on the UCT can expand program offerings and potential savings, but use of the TRC and PCT can assist in carefully assessing these measures for program inclusion, setting rebate levels, and forecasting participation.

Table 7 also indicates the LED measure fails the TRC, but passes the UCT and PCT. Due to high freeridership rates and changing baselines associated with CFLs, LEDs merit careful consideration for their ability to help meet long-term savings goals. Further, this illustrates a situation where funding a measure could increase market adoption rates and reduce costs over time. The TRC does not include benefits from such market impacts, again illustrating the advantages of carefully considering the other tests' results.

[16] Regional Technical Forum.

Beyond examining individual programs and measures, we examine whether or not overall program offerings vary between jurisdictions relying on the TRC or UCT. Table 9 compares offerings that target hard-to-reach customers and typically do not prove cost-effective from a TRC perspective.

**Table 9. Residential Program Offerings[17]**

| State | Test | Multifamily Directly Targeted | Direct-Install |
|---|---|---|---|
| Florida | TRC | No | No |
| New York | TRC | Yes | Yes |
| Pennsylvania | TRC | Yes[18] | Yes |
| California | TRC/UCT | Yes | No |
| Oregon | TRC & UCT | Yes | Yes |
| Connecticut | UCT | Yes | No |
| Michigan | UCT | Yes | Yes |
| Texas | UCT | Yes | No[19] |
| Utah | UCT | No | No |

Table 10 compares offerings in the commercial and industrial (C&I) market.

**Table 10. Commercial and Industrial Program Offerings[17]**

| State | Test | Direct-Install | Small Businesses Directly Targeted | Government/ Nonprofits Directly Targeted | On-Bill Financing or Energy Grants |
|---|---|---|---|---|---|
| Florida | TRC | No | No | Yes | No |
| New York | TRC | Yes[20] | | No | No |
| Pennsylvania | TRC | Yes | Yes | Yes | No |
| California | TRC/UCT | No | No | No | No |
| Oregon | TRC & UCT | No | No | Yes | No |
| Connecticut | UCT | No | Yes | No | Yes |
| Michigan | UCT | No | No | No | No |
| Texas | UCT | No[21] | Yes | Yes | Yes |
| Utah | UCT | No | No | No | No |

Comparing general offerings, Table 11 shows that jurisdictions relying on the UCT have the edge in offering financing, education, and innovative technology program. The differences, however, are slight.

**Table 11. General Offerings[17]**

| State | Test | Financing Options | Market Transformation, Innovative Technologies, or Pilot Programs | Education Programs |
|---|---|---|---|---|
| Florida | TRC | No | Yes[22] | No |
| New York | TRC | No | Yes | Yes[23] |

[17] This analysis examines utility offerings only.
[18] The FirstEnergy companies of Pennsylvania (Penelec, Met-Ed, and Penn Power) are the only Pennsylvania utilities offering multifamily programs. PECO, which includes Philadelphia in its service territory, does not offer a targeted multifamily program. The other Pennsylvania utilities indicate limited potential savings in this market.
[19] Texas' residential standard offer program allows contractors to submit applications for energy-efficiency projects, which could include direct installation by a contractor. Texas utilities, however, do not offer standalone, direct-install programs.
[20] The Small Business Direct-Install "Fast Track" programs directly target small business.
[21] Note previous reference to Texas' residential programs.
[22] Florida Power and Light offers an Energy Innovation program funding innovative projects in the C&I sector.
[23] This state claims savings associated with education programs.

| State | Test | Financing Options | Market Transformation, Innovative Technologies, or Pilot Programs | Education Programs |
|---|---|---|---|---|
| Pennsylvania | TRC | No | No | Yes |
| California | TRC/UCT | Yes | No | No |
| Oregon | TRC & UCT | No | Yes | Yes |
| Connecticut | UCT | Yes | Yes | No |
| Michigan | UCT | No | Yes | Yes |
| Texas | UCT | Yes | Yes | Yes |
| Utah | UCT | No | No | No |

Overall trends point to greater differences between individual programs or measures rather than in overall offerings. Programs targeting government or non-profits are more frequently intended to meet savings targets and regulatory requirements rather than designed based on cost-effectiveness screening. It is important to note that only Texas, Connecticut, and California, all states that rely on the UCT, offer financing options.

## Conclusion

While many states require utilities to report more than a single cost-effectiveness test for DSM, a single test can generally be relied on in determining an energy-efficiency program or measure's worthiness. Most jurisdictions use the TRC, but there are increasingly more jurisdictions that rely on the UCT (or, in the case of California, combine the two). After examining impacts from relying on a single test, we advocate using a more nuanced approach for screening DSM programs, specifically recommending the following guidelines:

1) ***Test the DSM program using the TRC to provide a cost comparison with supply-side resources.*** While there are ongoing discussions regarding the appropriate application of the TRC, the TRC is beneficial in that it accurately measures total costs of implementing a demand-side alternative, though consumer demand clearly indicates benefits captured in the TRC may not be comprehensive.
2) ***Rely on the UCT as the threshold test for program approval and cost recovery.*** The UCT accurately compares the utility (and, therefore, utility customer) costs with supply-side alternatives. Consequently, total costs to the utility are minimized for a UCT greater than 1.0. Customer participation will indicate whether, from the customer's perspective, participation benefits exceed the costs.

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