GETTING TO FAIR COST-EFFECTIVENESS TESTING
Using the PAC Test, Best Practices for the TRC Test, and Beyond

Robin LeBaron
National Home Performance Council

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Introduction

The suite of tests used to test the cost-effectiveness of energy efficiency and other programs funded by systems benefits charges needs fundamental change. These tests have a legitimate rationale: to ensure that ratepayer funds are spent on programs that will provide genuine benefits to ratepayers and other stakeholders. As currently structured and implemented in many jurisdictions, however, the tests often hinder the design and implementation of residential energy efficiency programs, particularly programs intended to support comprehensive energy efficiency upgrades. As a result, cost-effectiveness tests frequently undermine important public policy goals, such as carbon reduction, clean air, job creation, national security, and reduction in dependence on foreign energy sources.

Energy efficiency practitioners have been voicing serious concerns about the cost-effectiveness tests and proposing changes to the testing methodologies for decades (e.g. Fulmer and Biewald 1994). The tests have been criticized on a number of grounds. At the most basic level, the test designs tend to favor some types of programs over others: demand-response programs tend to score better than energy efficiency programs on the TRC and RIM tests, for example, and single-measure direct-install programs typically score better than more comprehensive ones. Critics have pointed out that the tests fail to capture the full benefits of energy efficiency while incorporating costs that should not be included, making it unnecessarily difficult for programs to pass the test. Further, the tests create a hurdle for demand-side resources that supply-side resources do not have to clear. Finally, some observers have argued that the tests do not adequately reflect stakeholders' real interests, specifically the interests of utilities, and as a result, cannot be properly aligned with market forces.

Many proposals have been advanced to address these issues. Drawing on the extensive work of many commentators and critics, this paper proposes three solutions that attempt to consolidate and synthesize these suggestions into a comprehensive approach for making cost-effectiveness testing fairer, more rational, and more consistent.

This paper first recommends that the Program Administrator Cost test (PAC) be used as the primary test for screening energy efficiency programs. This test measures whether energy efficiency makes sense for a program administrator when compared to other supply-side alternatives, an appropriate economic consideration. The PAC test is relatively simple to administer, in that it does not require the complicated assessments necessary to determine non-energy benefits, incremental costs, and other values that are inherently difficult to quantify.

The second solution proposes a set of "best practices" that can be incorporated into the methodologies used to administer the TRC test in jurisdictions across the U.S. These best practices are designed to make the TRC more accurate and more reflective of its stated goals. Reference to this set of best practices would standardize testing methodologies, allowing more meaningful comparisons between programs.

However, none of the current cost-effectiveness tests, including the Program Administrator Cost test, fully address the issue that, from a utility's perspective, demand-side resources are not financially equivalent to supply-side resources, even if they are less expensive to create. Accordingly, a third, long-term proposal advanced by this paper is to outline a research agenda designed to propose alternative incentive structures that would create genuine parity between demand- and supply-side energy sources.

Each of these proposals is described in greater detail, below.

The California Standard Practices Manual Cost-Effectiveness Tests

In simple terms, a cost-effectiveness test is designed to determine whether the benefits of a particular program (or, as discussed below, portfolio, project or measure) outweigh its costs. These tests are frequently expressed as a ratio of benefits to costs: a result of greater than one indicates that benefits outweigh costs, while a result of less than one indicates the reverse. In theory, the exercise sounds simple; in practice, the results depend on the details of how "costs" and "benefits" are defined, which involves a number of complex issues.

For investor-owned utilities, the basic decisions about which tests should be used for evaluative purposes and how they should be administered are made by state-level commissions (commonly known as public service or public utility commissions). Almost without exception, each state's commission uses one, or a combination, of five tests developed in the early 1980s by the California Public Utilities Commission and codified in the California Standard Practices Manual. Each of the tests is designed to present a ratio of the benefits and costs of a ratepayer-funded program from the perspective of one of several stakeholders, including a program participant (the Participant Cost test), non-participant ratepayers (the Ratepayer Impact Measure), the program administrator (the Program Administrator Cost test), and society at large (the Total Resource Cost and the Societal Cost test).[1]

Proponents of energy efficiency have advanced a wide range of thoughtful proposals designed to address and remedy the shortcomings of the current testing methods. Most can be grouped into three general approaches:

1. To revise the design and application of the Total Resource Cost (TRC) test, which is the most commonly used primary test for making decisions about whether to fund energy efficiency programs;

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[1] As excellent descriptions of these tests are available in a number of existing sources, this paper does not provide detailed descriptions; readers interested in learning more may want to consult NAPEE 2008 for an introduction to these issues.

2. To use the Program Administrator Cost Test, also known as Utility Cost Test, as the primary test in lieu of the TRC; and

3. To create and introduce a new test not included in the Standard Practice manual.

This paper advocates use of the PAC test in jurisdictions where this approach is feasible, and recommends a set of standardized best practices for applying the TRC when it is not. It does *not* propose development of a new test, but it does advocate development of proposals to modify utilities' incentive structures.

Recommendation 1: Use the Program Administrator Cost Test as the Primary Evaluative Tool

The Program Administrator Cost test attempts to compare what the program in question costs the program administrator, whether a utility or other administrative entity, to what it would cost the administrator to generate the same energy from the least expensive supply-side source. Stated another way, the test compares the cost of conserving energy to the cost of supplying the equivalent amount of energy. This approach has three significant benefits when contrasted to the more frequently-used Total Resource Test.

First, the PAC test is relatively simple to administer because, unlike the Total Resource Cost test, it does not require quantification of costs and benefits that are inherently difficult to quantify. The PAC considers the cost of program administration and subsidies, both of which are easy to measure. Measurement of non-energy benefits and the incremental cost of high-efficiency measures, which are an important part of the TRC test, can be avoided. As a collateral benefit, eliminating the need to measure these factors can result in substantial savings for a program, as the measurement processes are often expensive.

Second, the PAC test does not result in the major asymmetry between supply and demand-side resources that is created by use of the TRC. Applying the TRC as a screening tool creates an artificial barrier for demand-side resources (such as energy efficiency) that supply-side resources, traditional or otherwise, do not have to surmount. This is because demand-side resources must demonstrate that they do not impose a net cost to society, while supply-side resources are judged only by their price relative to the prices of other potential sources of energy. As Neme and Kushler summarize the issue:

> Many observers have pointed out that other supply-side power sources are not evaluated according the cost of production, but only by the cost to the utility. Even when the price of a supply-side resource reflects substantial public subsidies, the cost factors involved in generating the resource are irrelevant to the utility's decision to purchase supply-side resources. (Neme and Kushler 2010: 5-304)

This issue is important because large public subsidies are frequently deployed in support of supply-side resources. The California Standard Practice Manual recognizes this issue in the observation that "[s]upply-side resource options are typically based only on the costs incurred by the power suppliers," (CSPM 2001:21), but does not draw the conclusions that logically follow; namely, that use of the TRC as a primary screening measure results in an inherently unfair comparison.

The third benefit of the PAC test when compared to the TRC test is that the PAC allows consumer expenditures on energy efficiency to be seen as a positive outcome rather than as a cost. While in theory, from a societal perspective consumer spending on energy efficient measures is an expense, it is an expense that the consumer willingly and knowingly assumes, presumably because she or he expects to benefit from it. At a time of limited public resources, programs that successfully leverage consumer spending to meet both public and private goals should be encouraged rather than penalized.

Fourth, use of the PAC rather than the TRC test can help avoid perverse outcomes, such as the one identified by Quinlan in which an energy efficiency program fails the TRC even though it is in both the participants' and the program administrator's interests as measured, respectively, by the Participant and Program Administrator Cost tests (Quinlan 2008: 2).

It should be noted that the PAC does not provide an effective tool for measuring a whole-house program in an area served by separate gas and electric utilities, for the obvious reason that if only a single utility participates it will only benefit from reductions in use of the fuel that it provides (see Optimal Energy 2011: 1-2).

Despite these limitations, however, the PAC test is a relatively straightforward, market-oriented approach to cost-effectiveness testing, and is recommended for adoption as the primary screening tool for ratepayer-funded programs.

Recommendation 2: Best Practices for Implementing the TRC

There are many practical and theoretical problems associated with most applications of the TRC, making the PAC a better test in practice. For commissions that cannot or do not wish to make the Program Administrator Cost test their primary screening tool, however, the Total Resource Cost test remains a widely-used alternative. If TRC is used, a series of best practices for implementation is recommended to enhance the test's fairness and ensure that its application conforms as closely as possible to its stated intent.

Of the five cost-effectiveness tests codified in the California Standard Practice Manual, the TRC, and very similar Societal test, take the most global perspective. The TRC is designed to consider all of the costs and benefits of the program to "society" as a whole – with "society" being defined as all stakeholders in the catchment area of the program administrator. The majority of utilities in the U.S. use the TRC or Societal test as the primary method for evaluating energy efficiency portfolios and programs, although some rely primarily on the PAC, RIM and Societal tests, as discussed below.

It should be noted that the Societal test is essentially a variant of the TRC test. The primary differences are that the Societal test is designed to capture costs and benefits that are more difficult to quantify than those included in the TRC test, and that the Societal test prescribes the use of a societal discount rate. In practice, many jurisdictions include some benefits that were originally designed for incorporation in the Societal test into an "enhanced TRC" test, so that over time the line between the two tests has blurred. For the purposes of this paper, when the TRC test is discussed, it is assumed that the test can and should be expanded to incorporate a number of cost and benefit factors included in the Societal test.[2]

The issue of how the TRC is applied is significant because the California Standard Practice Manual treats a number of issues in general enough fashion that commissions have considerable latitude for deciding how to structure the TRC test. As a result, different jurisdictions interpret and administer the TRC in different ways. The consequences of this variation are significant: a program that fails in one jurisdiction may pass in another as a result of differences in the specifics of test methodology.

Many of the varying applications of the TRC violate the core principle of the test: that it provide a fair assessment of the relationship between the costs and benefits of the program. Many applications simultaneously underestimate the benefits and overestimate the costs of the program, creating artificial barriers for energy efficiency and other ratepayer programs. Some applications also create a number of additional, unnecessary problems for program implementation.

The set of best practices listed below is designed to align implementation of the TRC with the test's stated objective. These practices will result in fairer assessments of ratepayer-funded programs. As an additional measure, a standardized application of the TRC would facilitate comparison between programs.

1. <u>Level of Application</u>

The TRC test can be used to determine the cost-effectiveness of different levels of a program administrator's portfolio. At the broadest level, the test can be applied only to the entire portfolio of energy efficiency programs, allowing the highly efficient programs to "support" less efficient ones. This approach provides the program administrator with some latitude to experiment, bring new efforts on line, and sustain programs that target hard-to-reach market segments, while still ensuring that the overall suite of programs represents an effective use of ratepayer dollars. By contrast, the test is sometimes applied to individual energy conservation measures, which severely curtails the scope of a potential whole-house retrofit program by eliminating the possibility of supporting measures with long pay-back periods. It also burdens the installation contractors and their potential customers with a cumbersome process at the point of sale, endangering the entire transaction and the effectiveness of the program. Applying the TRC test at the

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[2] An alternate approach would be to advocate adoption of the Societal Test, to be administered in accordance with the best practices listed below. This approach is also feasible, and could be implemented in jurisdictions, like Vermont and Oregon, that use the Societal Test as the primary evaluative tool or are willing to adopt it. However, given that the TRC is the most common primary test, this paper focuses on its application.

project level (i.e. the level of a house in the case of a whole-house program) is less restrictive than application at the measure level, but still interferes with the potential for achieving greater energy savings as the result of a comprehensive project. Application at the program level is even less restrictive, although it still does not provide program administrators with the flexibility of a test administered at the portfolio level.

Best practices: Utilities should conduct the TRC test at the portfolio level, and should have full latitude to retain programs that do not pass the TRC but that address other compelling policy objectives if the overall energy efficiency portfolio is cost effective. The TRC test can be applied to individual projects or measures for informational purposes, but these results should not automatically disqualify projects or measure if the program in which they are incorporated passes the TRC.

2. <u>Time frame</u>

Applications of the TRC most commonly consider the costs and benefits associated with a program over the span of one year. This approach does not take into account the fact that a program's cost structure is likely to change over time. As long-standing home performance programs, such as the one sponsored by NYSERDA in New York, have demonstrated, whole-house energy efficiency initiatives require large up-front investments and may only achieve their full impact several years into the program's life cycle, once they have begun to transform local markets. Taking into account average costs and benefits over a multi-year time frame is one way to address this issue.

Best practices: The TRC should make an evaluation based on a multi-year time scale, rather than looking at a single year in which costs may be exceptionally high. Five years should be used as a minimum, and longer time-spans should be considered.

An alternative would be to amortize upfront program costs over a time period in accordance with standard accounting principles.

3. <u>Proportion of Measure Cost Considered</u>

Because the TRC test is designed to measure the cost of a program to society as a whole, it considers the entire cost of energy efficient improvements, whether the cost is borne by a homeowner or by the program (through a subsidy or rebate). However, if a homeowner would have replaced a building system, such as windows or a furnace, even in the absence of the program, then the true cost to society is only the incremental difference between what the homeowner would have paid in the absence of an energy efficiency program and the cost of the higher-efficiency systems supported through the program. In cases in which a homeowner would not have replaced a system in the absence of a program, the total and the incremental costs of a measure are identical, but for many measures, such as HVAC replacement, the difference can be substantial. The most accurate way to calculate the real cost of an improvement is to consider only the incremental cost that would not have been made in the absence of the program.

Best practices: Applications of the TRC should use only the incremental cost of a project or measure, with "incremental costs" defined as the difference between the cost of an average-efficiency measure that the homeowner would have installed in the absence of a program, and the cost of a high-efficiency measure that the homeowner installs in response to programmatic incentives.

4. Discount rate

In calculating the TRC test, costs and benefits are presented in terms of their net present value (NPV) – their value taking into account the opportunity cost of money, or discount rate. Because costs are incurred up front, while savings are realized over an extended period of time, higher discount rates typically result in the program scoring lower on the test. The discount rate can have a substantial impact on test outcomes, and also decrease the value of the effective useful life (EUL) of measures with long life-spans, as discussed below.

In theory, the discount rate to be used depends on the specific test and stakeholder interests. The Participant test, for example, should theoretically use a rate equivalent to an average of consumer loan rates for similar products. For the Societal test, a "societal" rate comprised of a blend Treasury bill rates is commonly employed. The discount rate used in the TRC test varies considerably; some states use a societal discount rate, while others employ the weighted average cost of capital (WACC) for the utility. However, because the TRC is explicitly designed to measure the societal impact of a program – as opposed to helping a utility weigh investment options – the societal discount rate represents a more appropriate choice from a methodological perspective.

Some observers have argued that, as a result of climate change, the value of avoided CO_2 emissions is likely to be higher in the future rather than lower, suggesting that the most appropriate discount rate would be negative, to reflect the fact that the value of the savings grows over time, rather than decreasing, as is the case with most other investments (Hall et al. 2008). While this approach is logically sound, commissions may be unwilling to adopt a practice as unorthodox as a negative discount rate in the short term.

Best practices: Use a societal discount rate as a ceiling for TRC testing, with an option for jurisdictions to use an even lower rate to reflect the increasing value of avoided carbon emissions over time.

5. Value other avoided externalities

The California Public Utilities Commission identifies several avoided externalities, including NO_x (nitrous oxide), SO_x (sulfur oxides), and/or VOC (volatile organic compounds) emissions, and includes an imputed value for these savings and/or avoided externalities as an "adder" (i.e. a multiplier) to the energy savings in the Societal test. These and similar avoided externalities have since been incorporated into applications of the TRC test in a number of jurisdictions. Given the widespread preference for the TRC over the Societal test, there is a strong rationale for including at least the most easily and accurately quantifiable savings and avoided non-energy costs as an enhancement to the TRC.

Best practices: The value of non-energy savings and avoided externalities (e.g. NO_x, SO_x, *VOCs, etc.) should be included in TRC testing. Use of a standard "adder" to energy costs represents a reasonable methodology for approximating the impact of these avoided externalities.*

6. <u>Non-Energy Benefits</u>

Non-energy benefits (NEBs) are the benefits other than energy savings that homeowners realize as a result of participating in an energy efficiency program. They may include comfort, health and safety, aesthetics, and other general quality of life issues, as well as financial savings such that result from causes other than increases in energy efficiency, such as savings on water costs resulting from the installation of a high-efficiency dishwasher or washing machine. These benefits can be substantial: an Oak Ridge National Laboratory study found that non-energy benefits such as comfort slightly outweighed the value of energy benefits for Weatherization program clients (see Schweitzer and Tonn, 2002). The data suggests that these benefits, particularly comfort, are frequently the primary motivator for consumers who implement energy efficiency upgrades. Other social non-energy benefits include local job creation and economic development.

Methods have been developed to quantify the value of these benefits, but they are generally complex and expensive to administer, and there is no widespread consensus regarding which are the most appropriate. As a result, many states have not incorporated NEBs into the TRC, and those that do tend to use conservative estimates for valuing NEBs (Amann 2006: iii). The evidence for the significance of NEBs is so compelling, however, that failure to consider them substantially reduces the ability of the TRC to perform its stated goal of providing an accurate assessment of the costs and benefits of a program. Without consideration of NEBs the test is effectively asymmetrical: it captures the full value of participant costs, but not benefits.

In theory, the value of the NEBs can be considered a benefit for the purposes of applying the TRC test. Given that these benefits fall outside the scope of the utility commission's jurisdiction, however, a more appropriate methodology is to reduce participant costs by the estimated value of NEBs. A simpler method is to determine the average value of NEBs associated with a program and discount participant costs by a percentage that reflects the ratio of the average NEB value to energy savings. Average NEB value could be determined at a national or regional level through well-designed survey research in a cost-effective fashion for use in multiple TRC tests. (See Amann 2006: 13.)

Best practices: For whole-house programs, discount participant costs by a percentage that reflects the average value of NEBs relative to energy savings, using national or *regional average values. For single-measure programs, reduce participant costs by the estimated value of NEBs.*[3]

7. Effective Useful Life (EUL) of measures

The effective useful life (or EUL) of a measure is the span of time that it can be reasonably expected to function as intended. EULs range substantially, depending on the product and the manufacturer: a CFL might typically last between five and ten years, while a window might function for up to 75 years, and building insulation 100 years or more. Many programs, however, cap EULs at around 20 years (Hall et al. 2008), both because of the expectation that homeowners may replace measures prior to the end of their EUL, and because the discount rates frequently used by programs devalue savings that continue beyond 25 years. For the purposes of cost-effectiveness testing, this significantly reduces the value of measures with long useful lives. Such measures include a number that are significant for whole-house upgrades, notably insulation.

Best practices: Programs should not use arbitrary caps on EUL; potential EULs may be adjusted for the possibility of consumer replacement, but such adjustments should not be excessive, and should be based on research on consumer behavior to the greatest extent possible.

8. Value carbon savings

Some states assign a value to the carbon emissions avoided as a result of energy efficiency achieved through the program. There is a clear rationale for doing this: the California Standard Practice Manual explicitly recommends this practice for the Societal test. TRC tests that include the value of avoided carbon emissions and/or other avoided externalities are sometimes termed "TRC plus C" or "enhanced" TRC tests. Jurisdictions that value carbon tend to use existing carbon pricing mechanisms, such as prices established by the Regional Greenhouse Gas Initiative (RGGI). Observers have argued that these market programs establish arbitrary pricing that is only a fraction of the "real" future value of avoiding carbon emissions when considered from a scientific perspective (see for example Hall et al.). This critique is logically correct, but in the short term commissions may want to rely on existing pricing mechanisms, even with the understanding that they are flawed.

Best practices: Incorporate value of avoided carbon emissions as a benefit in the TRC test. The value of avoided emissions should be based on the local price of carbon. Given the scientific evidence indicating that the long-term cost of carbon emissions is substantially higher than prevailing market prices, however, commissions should have the option to increase the cost based on reasonable expectations of future carbon prices.

9. Recognize spillover and market transformation effects in net to gross calculations

[3] The average discount approach is methodologically simple, and it works for whole-house programs. For single-measure approaches, valuing the individual measures might be more effective.

The net to gross adjustment to the TRC calculation is designed to address the fact that projected energy savings may be different than actual energy savings, resulting in net energy savings that are lower than predicted (gross) savings. One of the main challenges in the net-gross calculation is determining the extent of free-ridership, which should affect the calculation such that gross savings are reduced by the amount that program participants would have expended even in the absence of subsidies. In practice, however, the methodological challenges involved in estimating free ridership are substantial. Moreover, whole-house programs are designed to (and do) encourage spillover and market transformation; for example, in cases in which participants decide to implement additional (non-subsidized) measures, or non-participants decide to implement energy efficiency measures with their own resources without participating in the program. These problems highlight an inconsistency in many applications of the TRC: it often measures total costs (including costs that should logically be excluded), but is explicitly designed to capture only net savings (Eckman 7). One way to address this issue is to factor in spillover and market transformation effects, as well as to ensure that only net costs are being measured as per recommendation (3) above.

Best practices: Include spillover and market transformation effects in the net to gross adjustment, or forego attempts to calculate net value in view of the methodological challenges involved.

10. Fuel Neutrality

In areas served by separate electric and gas utilities in which a program is sponsored by only one of the two utilities (most frequently the electric utility), many current applications of the TRC test consider only the savings that result from energy efficiency measures that reduce consumption of the fuel provided by the sponsoring utility. This approach substantially limits the scope of a whole-house program, particularly in areas in which gas or delivered fuels are widely used for heating. To address this issue, some jurisdictions have explored using ratepayer funds for eligible whole-house projects regardless of fuel. This approach promotes provision of whole-house upgrades in a clear, consistent manner within a utility service territory. In accordance with its broad societal perspective, the TRC test should be designed to recognize all energy savings, not just those pertaining to a particular utility.[4]

Best practices: Consider all energy savings, not just those obtained by the participating utility, and allow ratepayer funds to be used for whole-house retrofits provided that the home is served at least in part by the participating utility.

Applied together, these best practices address the many logical inconsistencies that currently characterize many applications of the TRC test, and allow for standardized comparisons of test results across jurisdictions.

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[4] The California Standard Practice Manual recommends use of the RIM in situations where energy is provided by two utilities, but this paper explicitly recommends not using the RIM as a primary test in any circumstance.

Recommendation 3: Work to Develop a Framework for Making Supply-Side and Demand-Side Resources Comparable

Applying the PAC test would enable fairer and less expensive evaluations of the merits of energy efficiency programs than the other California Standard Practice Manual tests. In cases in which the PAC test is not used, applying best practices to TRC test as outlined above would reduce a number of illogical, inconsistent, and arbitrary barriers to efficiency. However, these recommendations, while important, do not address a more fundamental limitation to all of the cost-effectiveness tests. No matter what test is used, from a utility's perspective there is still a basic difference between demand and supply-side resources that results from the fact that the utility's incentives are tied to the provision of energy - not its avoidance. Over the long run, this issue should be addressed as part of a broad effort to ensure fair and accurate cost-effectiveness testing.

The PAC test is sometimes described as an indicator of a utility's interests, but this is not really accurate. The PAC can provide an indication of whether energy efficiency is more or less expensive as a resource than other energy sources. However, even if energy efficiency and a typical supply-side energy source cost the same to provide, under traditional arrangements, the utility's revenue is calculated on the basis of the energy that it supplies. There is no comparable revenue source for "providing" energy efficiency (see Cappers et al.). As a result, supply- and demand-side resources have very different impacts on a utility's return on equity or investment, which are likely to be shareholders' major concerns (see Fulmer and Biewald 7.75-76).

Some analysts have proposed technical adjustments to utility incentive structures that would result in both demand- and supply-side resources being comparable in terms of their impact on the utility's bottom line. These might involve decoupling to address the utility's short-term disincentives to promote energy efficiency (i.e. those incurred prior to a rate case), combined with shareholder incentives that would address long-term disincentives (see Cappers et al.). These sorts of changes to utility incentives should be studied in depth, both at a theoretical level and to the extent that they are actually being implemented, with the goal of developing a strategy for widespread implementation.

If the long-term goal of putting demand-side resources on equal footing with supply-side energy sources can be achieved, energy efficiency programs may still require some cost-effectiveness testing, but the context of the tests will be transformed by the fact that there will be a real market benefit for "producing" energy efficiency. In effect, the market will provide an incentive much stronger than commission-mandated tests for all stakeholders to work together to generate as much savings as possible through energy efficiency measures. More than anything, this would provide the signals needed to create a market for residential energy efficiency upgrades and bring it to a scale that would allow the nation's energy efficiency goals to be met.

Next Steps: Research and Convening

1. Research

The problems caused by current methods of implementing cost-effectiveness tests are becoming more widespread and serious as increasing numbers of states and utilities, encouraged by the success of some of the Home Performance with ENERGY STAR® programs and by the Better Buildings initiative, consider launching new whole-house energy efficiency upgrade programs, and as existing programs develop and seek to change their structure and expand their offerings. Accordingly, use of the PAC test as the primary evaluative tool is strongly recommended. If the PAC cannot be used, the best practices outlined above should be used when applying the TRC test.

Given the foregoing discussion, this paper recommends a program involving both research and stakeholder engagement. The research should test assumptions and explore questions raised in this paper and by the stakeholder process. The stakeholder process should review the findings of this paper and the results of subsequent research, and develop a practical strategy for improving the cost-effectiveness testing process.

The following research projects should be conducted to gain a greater understanding of the impact of adoption of the standardized best practices for implementation of the Total Resource Cost test as listed above:

- Comparison of how existing or proposed programs would score on the TRC if the suite of best practices listed above was used, as opposed to how it scores given the current implementation of the TRC within that jurisdiction. Real data should be used to the greatest extent possible, ideally from a number of jurisdictions;

- A study of methodologies for developing standardized national or regional values for NEBs and incremental costs of measures that could be broadly and easily implemented, as discussed above; and

- An in-depth analysis of whether and how the suite of best practices would affect the evaluation of other programs subject to the TRC or other cost-effectiveness tests.

In an effort to support a longer-term goal of creating true parity between supply- and demand-side resources, an in-depth study should be conducted to determine options for developing utility incentive strategies, including decoupling, to reduce the disincentives to promoting energy efficiency.

2. Stakeholder Convening and Consensus Building

The recommendations proposed above should serve as a starting point for a national discussion among all relevant stakeholders, including commissions, utilities and program administrators, federal agency officials, state energy office officials, program implementers, contractors, and others. The review process should address the utility of adopting the PAC test to the extent feasible. It should address the proposed best practices for implementing the TRC. It should explore strategies for promoting research that can demonstrate a clear path for creating parity between supply- and demand-side resources. The stakeholders should also develop a strategy for educating commissions about the benefits of using the PAC test as a primary test, implementing the TRC best practices, and the merits of research designed to equalize supply and demand-side resources. The stakeholder review process should result in an industry-wide consensus regarding each of these issues.

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