**PENNSYLVANIA**

**PUBLIC UTILITY COMMISSION**

**Harrisburg, PA. 17105-3265**

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|  | Public Meeting held May 5, 2011 |
| Commissioners Present: |  |

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| Robert F. Powelson, Chairman |
| John F. Coleman, Jr., Vice Chairman |
| Tyrone J. Christy |
| Wayne E. GardnerJames H. Cawley, Statement |
|  |  |
| Implementation of Act 129 of 2008 – Total Resource Cost (TRC) Test2011 Revisions  | Docket No. M‑2009-2108601 |

**TENTATIVE ORDER**

**BY THE COMMISSION:**

 Act 129 of 2008, 66 Pa.C.S. § 2806.1, directs the Commission to use a total resource cost (TRC) test to analyze the costs and benefits of the energy efficiency and conservation (EE&C) plans that certain electric distribution companies (EDCs) are required to file. The Pennsylvania TRC Test was adopted by Commission order at this docket on June 23, 2009 (*2009 PA TRC Test Order*). This tentative order seeks comments on proposed further refinements to the PA TRC test for use through May 31, 2013 in compliance with Act 129 and, to a lesser extent, on the use of the TRC test beginning June 1, 2013. Comments on the proposals herein are due May 20, 2011. Reply Comments are due May 31, 2011.

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1. **BACKGROUND AND HISTORY OF PROCEEDING**[[1]](#footnote-1)

 Act 129 requires an EDC with more than 100,000 customers to adopt an energy efficiency and conservation (EE&C) plan, subject to Commission approval, to reduce electric consumption by at least 1% of the EDC’s expected load for the period from June 1, 2009, through May 31, 2010, adjusted for weather and extraordinary loads, by May 31, 2011. Further, by May 31, 2013, the EDC is required to reduce its total annual weather-normalized consumption by a minimum of 3%. Also by May 31, 2013, the EDC is expected to reduce its peak demand by a minimum of 4.5% of the EDC’s annual system peak demand, as measured against the EDC’s peak demand during the period from June 1, 2007, through May 31, 2008. Act 129 also addresses EE and demand reduction targets from June 1, 2013 forward. 66 Pa.C.S. §§ 2806.1(c)(3) and 2806.1(d)(2).[[2]](#footnote-2)

Act 129 requires an EDC to demonstrate that its plan is cost-effective using the TRC test. 66 Pa.C.S. § 2806.1(b)(1)(i)(I). The TRC test is “a standard test that is met if, over the effective life of each plan not to exceed 15 years, the net present value of the avoided monetary cost of supplying electricity is greater than the net present value of the monetary cost of energy efficiency conservation measures.” 66 Pa.C.S. § 2806.1(m). On January 16, 2009, the Commission’s Act 129 *EE&C Implementation Order* was entered.[[3]](#footnote-3) On page 15 of the *EE&C Implementation Order*, the Commission directed that EDCs evaluate the cost effectiveness of energy efficiency or demand reduction programs using a TRC test based on the California model. Subsequently, after soliciting comments, the Commission entered a final order relative to TRC testing on June 23, 2009, at Docket No. M‑2009-2108601 (*2009 PA TRC Test Order*).[[4]](#footnote-4)

Seven EDCs filed EE&C plans. Those plans are docketed as follows: *Petition of West Penn Power*, Docket No. M-2009-2093218 (October 23, 2009); *Petition of PPL*, Docket No. M-2009-2093216 (October 26, 2009); *Petition of Duquesne Light*, Docket No. M-2009‑2093217 (October 27, 2009); *Joint Petition of Met-Ed, Penelec, and Penn Power*, Docket No. M‑2009‑2092222, M-2009-2112952 and M-2009-2112956 (October 28, 2009); *Petition of PECO*, Docket No. M‑2009-2093215 (October 28, 2009).

1. **RECAP OF *2009 PA TRC TEST ORDER***

The *2009 PA TRC Test Order* specified that the TRC test assumptions were generally not intended for use in prudence or cost-of-service inquiries but did not establish a blanket exclusion of such use. If there are significant differences between the TRC test assumptions and the assumptions or facts at issue in other proceedings, parties may inquire into the validity of such differences in those, or in the TRC test, proceedings. With TRC testing at the plan level, new technologies would have the opportunity to establish an ability to contribute to the EE and demand reduction goals of Act 129. Many issues involved in the EE&C plans, program implementation, and operation of the TRC test are ongoing in nature. Pennsylvania is not using the Societal Test as part of the TRC test.

The PA TRC test takes into account the combined effects of an EDC’s EE&C plan on both participating and non-participating customers based on the costs incurred by both the EDC and any participating customers. The benefits calculated in the TRC test include the avoided supply costs and capacity costs valued at marginal cost for the periods when there is a consumption reduction. The avoided supply costs are calculated using net program savings, *i.e.*, savings net of changes in energy use that would have happened in the absence of the program. The persistence of savings over time is considered in the net savings. The costs calculated in the TRC test include the costs of the various programs paid by an EDC or a default service provider (DSP) and the participating customers, and reflect any net change in supply costs for the periods in which consumption is increased in the event of load shifting. The PA TRC test uses the *incremental* costs of services and equipment. For example, equipment, installation, operation, and maintenance costs, cost of removal (less salvage value), and administrative costs, regardless of who pays for them, are included.

 TRC test results are expressed as both a net present value (NPV) and a benefit-cost ratio (B/C ratio). The NPV is the discounted value of the net benefits over a specified period of time, *i.e.*, the expected useful life of the EE measure, and is a measure of the change in the total resource costs due to the program. A NPV above zero indicates that the program is a less expensive resource than the supply option upon which the marginal costs are based. The B/C ratio is the ratio of the discounted total benefits of the program to the discounted total costs over the expected useful life of the EE measure. The B/C ratio gives an indication of the rate of return of a program. A B/C ratio above one indicates that the program is beneficial to the utility and its ratepayers on a TRC basis.

The *2009 PA TRC Test Order* provided that the PA TRC test could be amended based upon experience and/or input from stakeholders.

1. **DISCUSSION**

The purpose of using a total resource cost (TRC) test to evaluate EE&C programs is to track the relationship between the benefits to customers and the costs incurred to obtain those benefits. The TRC test has historically been a regulatory test. Sections 2806.1(c)(3) and 2806.1(d)(2), as well as the definition of the TRC test in Section 2806.1(m), provide that the TRC test be used to determine whether ratepayers, as a whole, received more benefits (in reduced capacity, energy, transmission and distribution costs) than the implementation costs of the EE&C plans. As noted above, we recognized in our *2009 PA TRC Test Order* that many issues involved in the EE&C plans, program implementation, and operation of the TRC test would be ongoing in nature and that several issues would require additional consideration and discussion. This tentative order continues that further consideration and discussion relative to demand response, net-to-gross issues, fuel switching, TRC calculations, and TRC reporting.

1. **Demand Response**
2. **Application of TRC Test Calculation To DR Programs**

The *EE&C Implementation Order* directed the energy distribution companies (EDCs) to evaluate the cost effectiveness of each energy efficiency or demand reduction program using the TRC test. This provision was carried forward in the *2009 PA TRC Test Order*. The EDCs over the past year have questioned the validity of applying the TRC test calculation to Demand Response (DR) programs.

1. Proposed Resolution

The Commission’s proposed resolution is that EDCs continue to evaluate DR programs using the PA TRC test.

1. Discussion of Proposed Resolution

The TRC test measures the net costs of a demand-side management program as a resource option based on the total costs of the program, including both participant and utility costs, and is applicable to conservation, load management, and fuel substitution programs. DR programs are load management programs and are subject to TRC testing under the California model.[[5]](#footnote-5) The California model defines “load management” as programs that may either reduce electricity peak demand or shift demand from on peak to non-peak periods, and the 2002 CA SPM applies the TRC test to load management programs. At this point, the Commission sees no reason to propose excluding DR programs from TRC testing.

1. **Treatment of DR Payments To CSPs And EDCs from PJM**

Treatment in the TRC test of PJM payments to CSPs is a pivotal issue because these payments are substantial and contribute to the development of DR programs. The question is whether these PJM payments should be included in the TRC test as costs or as benefits. Act 129 allows EDCs to provide funding to CSPs who aggregate DR customers for participation in Act 129 DR programs and in PJM economic programs. The interaction of these programs has been encouraged by the Commission as a way to increase market penetration. Current practice has been to allow the EDCs to take credit for demand savings for any participant that has received Act 129 funding. Given the possibility that many customers may be solicited by CSPs for participation in both programs, it is important to define how the TRC will be calculated. The TRC value may be significantly affected by how the PJM payments to CSPs are treated and whether these PJM payments should be considered as a cost or benefit. The resolution of this issue must be considered in two different situations, *i.e.*, when PJM payments are made to a CSP and when PJM payments are made directly to EDCs.

1. Proposed Resolution
	1. PJM payments to CSPs for DR market participation in all

PJM programs would be excluded from TRC test calculations.

ii. PJM payments to EDCs for DR market participation in economic programs would be allowed as benefits for the purpose of the TRC test to the extent that these payments represent benefits (costs avoided) that exceed those costs avoided which are calculated as set forth in the *2009 PA TRC Test Order*. As stated in the *2009 PA TRC Test Order* these predicted avoided cost assumptions are to be developed over 15 years and include generation, transmission, distribution, and capacity costs.

iii. PJM payments for capacity would be excluded from TRC calculations as either benefits or costs relative to the TRC test.

1. Discussion of Proposed Resolution

The Commission proposes that PJM payments to CSPs should be excluded from TRC test calculations for the following reasons:

i. The PJM payments are not made by the program administrator or by the program participant. The 2002 CA SPM does not state that costs expended by other parties should be included in the TRC test as a cost.

ii. The 2002 CA SPM allows payments from the Independent transmission System Operator (ISO) to be included as a benefit for the purpose of the TRC test. For EDCs, there is full disclosure of the costs of the DR transaction. This is not the case for CSPs. The potential TRC benefit from the PJM payment, when it flows to the CSP, supports costs for developing and implementing DR programs. Due to the lack of transparency of CSP transactions, the payment from PJM and a portion of the costs to CSPs to implement programs are considered to offset each other.

We believe that PJM payments to EDCs acting as Load Serving Entities (LSEs) should be included in TRC test calculations as benefits for the following reasons:

1. The payments by PJM for economic program participation represent benefits that are in excess of the retail rate, by definition. The retail rate avoided is approximated by the methodologies in the *2009 PA TRC Test Order*, which add transmission, distribution, and generation prices.
2. The EDCs have full disclosure of program costs and, therefore, these benefits are truly net societal benefits.
3. From a monetary perspective, the LSE experiences a reduction in the cost of sale that is assessed by PJM leaving the LSE in a cash neutral position after receiving payment from PJM.

One further issue concerning treatment of payments from PJM is mentioned in the January 12, 2011 DR Data Reporting Secretarial Letter at Docket No. M‑2008‑2069887, which stated that:

[T]he PJM M&V [Measurement & Verification] protocols for demand response capacity measures are disallowed as a basis for measurement and verification, unless the protocols are consistent with energy protocols. Ultimately, PJM M&V protocols for economic demand response programs must be utilized to value capacity-based demand response measured reductions during an Act 129 curtailment event.

The Commission believes that, for the purpose of this discussion, capacity valuations for TRC benefits should be based solely on the average energy reduction over the highest 100 hours. This issue will be taken up again in the DR study, as set forth in the Secretarial Letter dated March 4, 2011, at Docket Number M-2008-2069887, to determine if a different approach is warranted beyond May 31, 2013.

1. **Treatment of DR Payments To CSPs And Participants from EDCs**

The *2009 PA TRC Test Order,* at page 21, stated that:

The [*EE&C*] *Implementation Order* directs that the TRC test take into account the effects of an EE&C plan on both participating and non-participating customers based on costs incurred by the EDC and participating customers. . . . Accordingly, costs calculated in the TRC test will generally include EE&C plan costs whether paid by the EDC or by the participants. Incentive payments from an EDC to a customer will not, however, be included in the TRC test because such costs are a cost to the EDC and a benefit to the customer that cancel each other out.

The EDCs, over the course of the past year, have sought clarification from the SWE and from CEEP as to whether this directive in the *2009 PA TRC Test Order* applies to DR programs. Specifically, the EDCs wish to have clarified whether DR program payments from an EDC directly to participants or Curtailment Service Providers (CSPs) are cancelled out by an offsetting benefit to the participant or CSP, and are, therefore, excluded from the TRC calculation.

1. Proposed Resolution

The Commission proposes that all direct payments by the EDCs to participants or payments by the EDCs to CSPs in DR programs be treated as follows:

* For Program Years 1 to 4,[[6]](#footnote-6) each EDC would treat such payments (made to CSPs or to DR program participants) in the TRC test in the same manner as each EDC treated such payments in its approved EE&C plan. These payments would be considered to be a proxy for participant transaction costs.
* After Program Year 4 ends on May 31, 2013, each EDC would include all such payments to CSPs or to DR program participants as transaction costs in the calculation of the TRC test. These payments would be considered to be a proxy for participant transaction costs.
1. Discussion of Proposed Resolution

A general approach for economic evaluation of DR is laid out in the California Protocols. The California Protocols provide guidance on treatment of payments from EDCs to CSPs or to participants of DR programs and highlight the importance of considering customer costs arising from the loss of electric service (*e.g.*, losses in productivity and comfort) as an element of TRC in DR.[[7]](#footnote-7) The California Protocols also recognize that, in the case of DR programs, incentive payments to participants are intended to offset participant costs associated with the loss of electrical service. Acknowledging the costs to participants for loss of service validates the need for incentive payments to offset said costs.

The California Protocols also recognize that these costs are difficult to quantify, but for the purpose of TRC test calculations these costs need not be quantified. Because DR participants voluntarily agree to forego electrical service in exchange for the offered incentive, it stands to reason that the incentive amount must, at a minimum, compensate them for any costs resulting from the loss of service costs. The amount of the incentive, therefore, serves as an appropriate proxy for participants’ transaction costs which need not be directly measured. Under the California model, such participant transaction costs are included as a cost in the calculation of the TRC B/C ratio.

Based on a thorough review of rationale underlying the California Protocols, we propose that payments made by EDCs directly to DR program participants or to DR CSPs should be included as a cost in the calculation of the PA TRC test. In order to be fair to EDCs that have excluded such costs from the TRC calculation in their EE&C plans to date, we propose that all payments to CSPs and payments by the EDCs to participants in DR programs be treated under the timelines described in the preceding section.

1. **Treatment of American Reinvestment and Recovery Act of 2009 (ARRA) Funds**

The *2009 PA TRC Test Order* directed that incentive payments from sources outside of the Act 129 programs should be considered benefits that decrease costs to customers participating in programs and should be accounted for in the TRC calculations. These incentives, whether they are rebates or tax credits, would reduce the participating customers’ costs, and they should, therefore, be reflected in lower program costs and be factored into an EDC’s TRC test. Met-Ed was the only EDC to factor stimulus money into its plan. Upon review of the Met-Ed plan, we concluded that ARRA incentive payments should be considered benefits in TRC testing. *Joint Petition of Met-Ed, Penelec and Penn Power*, Docket Nos. M-2009-2092222, *et al.* (October 22, 2009) at 22 (*Met-Ed*). The EDCs, over the course of the past year, have requested clarification from CEEP and the SWE as to how ARRA funds received by EDCs and allocated to Act 129 programs should be accounted for in the TRC calculation.

1. Proposed Resolution

 The Commission believes that this matter was adequately addressed in the *Met-Ed* decision.

1. Discussion

 Since Act 129 funding is fixed, any additional funds will be used to supplement, not replace, funds from the EDCs. The decision not to require pro-ration of benefits does not violate the guidelines for ARRA funding. We believe this result is a necessary, reasonable, consistent, and logical application of the provisions of the *2009 PA TRC Test Order*.

1. **Measure Life For DR Programs**

 In the *2009 PA TRC Test Order*, pages 19 and 20, we affirmed that Act 129 limits the evaluation and TRC test process to consideration of EE and DR effective measure lives of 15 years or less. We recognized that EE&C plans may include the provision and installation of measures that may have shorter or longer useful lives than 15 years. The *2009 PA TRC Test Order* did not, however, provide direction for determining the measure life for DR programs, such as direct load control.

1. Proposed Resolution

 The Commission proposes to define “measure life” for use in calculating the TRC B/C ratio for DR measures as follows: For DR programs delivered by program administrators, “measure life” would include equipment life or program life and measure persistence (but not savings persistence). “Equipment life” would mean the number of years that a measure is installed and operates until failure. “Measure persistence” would take into account business turnover, early retirement of installed equipment, and other reasons measures might be removed or discontinued. “Program life” would be defined as the number of years that a DR program is projected to operate in an EDC’s approved EE&C plan or the EDC’s alternative plan for DR programs. Further, we propose that for calculating the TRC B/C ratio, the measure life shall be the lesser of equipment life or program life, as appropriate. For retrofit/early retirement programs, measure life should take into account both the expected remaining life of the measure being replaced and the expected changes in baselines over time.

1. Discussion of Proposed Resolution

Considerable research on DR measure life issues has already been completed by organizations in other states. The New England State Program Working Group, for example, jointly examined measure life issues and reported findings in a comprehensive report issued in June 2007.[[8]](#footnote-8) We believe that the definition of “measure life” provided in the New England State Program Working Group Report provides satisfactory guidance for use in Pennsylvania as proposed above. We believe that that the other definitions are consistent with this logic.

1. **Net-To-Gross**
	1. **Net-To-Gross Research And Applications**

Net-to-Gross (NTG) research attempts to determine the actual savings from an EE program or measure and ensure that the savings result only from the impact of that program or measure. In other words, the savings need to be “net” of what would have occurred in the absence of the program. Net savings refer to the portion of gross savings that is specifically or uniquely attributable to the program. NTG research and adjustments involve separating out the energy savings impacts that are a result of other influences. Three major factors that need to be addressed when considering NTG adjustments are “free riders,” “take-back effect,” and “spillover effect,” sometimes referred to as “free drivers.”[[9]](#footnote-9)

The verified gross program savings for Act 129 are based on the savings that result from the evaluation, measurement, and verification (EM&V) process carried out by each EDC’s individual evaluation contractor and verified by the SWE. NTG research is not simple or inexpensive. Various evaluation techniques must be employed to determine the non-program influences that created some of the program’s gross savings. The savings from those influences are then subtracted from the gross savings to determine the net savings. Net savings are typically determined using one or a combination of the following approaches:

1. Self-reporting surveys in which information is reported by participants and non-participants without independent verification or review;
2. Enhanced self-reporting surveys in which self-reporting surveys are combined with interviews, documentation review and analysis, and market trends;
3. Econometric models that compare participants’ and non-participants’ energy and demand patterns, their knowledge about efficiency options and/or the trade-offs they are willing to make between efficiency options and the costs of purchasing and installing them; and/or
4. Stipulated NTG ratios that are based on historic studies of similar programs.

NTG research studies can be used for three different applications. The first potential application is to inform program decision makers when a mid-course adjustment in a program should be made. The research looks at whether customers are deciding on their own, for example, to make high efficiency upgrades, even in the absence of program incentives. When most customers are making such decisions, the market is then considered to be transformed, and incentives to encourage the EE behavior are no longer needed or cost-effective. The adjustment would be to drop a measure that is showing a high free ridership trend from the program.

A second potential application of NTG research is to inform program decision makers when an entire program (containing perhaps several measures) should be phased out because it is no longer needed to incent customers to adopt an array of high-efficiency measures, as customers are making such adoptions even in the absence of program incentives. When NTG research indicates this is occurring, it is no longer cost-effective to offer the program incentives.

A third potential use of NTG research would be to adjust the gross verified savings figures by netting out the savings attributable to free riders, spillover, and rebound effects for the purposes of determining net-verified savings that are to be used for compliance purposes. In this regard, the NTG research could potentially be used to discount the gross savings that will be used to determine whether an EDC has met its statutorily-defined savings targets. If adjustments are made through the NTG research that result in reductions to claimed savings because the effects of free riders and take-back effects are not cancelled out by spillover effects, then EDCs would have to implement additional reduction measures to meet the mandated savings targets. The EDCs would likely incur additional program costs to implement the additional reduction measures.

The EDCs’ approved EE&C plans only require savings measured at the gross savings level. The *2009 PA TRC Test Order,* at page 25, did not require a NTG adjustment but deferred consideration of a NTG adjustment to future updates of the TRC test. Also, in the RFP[[10]](#footnote-10) for the SWE, we indicated that the SWE would coordinate the development and approval of methodologies for NTG studies to be conducted by the EDCs. There are at least ten states that require some form of NTG adjustment.[[11]](#footnote-11) Of these states, many use an independent evaluator and primarily use enhanced self-reporting surveys. Some of these states’ plans differ from Pennsylvania as they do not include penalties for failing to meet goals.

1. Proposed Resolution

The Commission proposes to direct the EDCs to develop and conduct NTG studies and that the NTG studies be funded out of the EDCs’ Act 129 2% program budgets. Pursuant to the RFP contract, the SWE would coordinate the development and approval of common methodologies for EDCs’ NTG studies. The results of the studies should be reported to the SWE and utilized by the EDCs to determine when a measure or program should be removed from the EE&C portfolio because it is no longer cost-effective to offer incentives. We do not propose, for the period June 1, 2009, through May 31, 2013, that the NTG research be used to adjust the gross verified energy savings that are used for compliance purposes to determine whether an EDC has met its mandated Act 129 reduction targets.

b) Discussion of Proposed Resolution

The Commission believes that NTG research by EDCs is necessary in order to make informed decisions regarding the continuation of Act 129 measures and programs. NTG research appears to be needed to ensure that Act 129 program and measure offerings continue to be cost-effective. Act 129 incentives are necessary to begin the transformation of the market so that customers make energy efficient purchasing decisions. It is important to know when the market has achieved transformation so that incentives are redirected to other areas of the market that have not achieved an adequate degree of transformation and success. EDCs appear to be the best-suited entities to conduct NTG research and apply the results as the findings are both measure-specific and EDC-service-territory-specific. Markets across the state will not all transform at the same rate for the same measures, so service territory and program-specific research is best conducted at the EDC level.

The EDCs’ current EM & V consultants are paid from the EDCs’ Act 129 2% program budgets. Since the NTG evaluations are part of the impact evaluation, it is consistent to fund the NTG studies from the same funding source as the current impact evaluation.

1. **Fuel Switching**
2. **TRC Inputs For Fuel Switching**

The Commission initiated a Fuel Switching Working Group (FSWG) in June 2009 in the *Implementation of the Alternative Energy Portfolio Standards Act of 2004: Standards for the Participation of Demand Side Management Resources – Technical Reference Manual* (TRM) proceeding at Docket No. M‑00051865. The initial charge of the FSWG was to identify, research, and address issues related to fuel switching with the possibility of the inclusion of fuel switching related deemed energy savings in future versions of the TRM. In the various orders addressing the EDCs’ EE&C plans, we directed the FSWG to provide recommendations on whether changes to the TRM or TRC test were justified. The FSWG Staff Report was released on April 30, 2010.[[12]](#footnote-12) In a May 21, 2010 Secretarial Letter, we directed CEEP to develop recommended changes to the TRC test to analyze the costs and benefits of EE measures that involve switching from electricity to another fuel source.

1. Proposed Resolution

 The Commission proposes to adopt the fuel switching provisions as set out in the FSWG Staff Report. The 2002 CA SPM provides guidance on the costs and benefits that should be included in the TRC test for fuel switching programs. We propose to use the 2002 CA SPM as a guide for defining the costs and benefits that should be included in the TRC test for fuel switching programs. Other proposed fuel source substitution programs should also use the 2002 SPM as a guide in the cost/benefit analysis of each proposed program.

1. Discussion of Proposed Resolution

 This proposal would implement fuel switching provisions for the PA TRC test.

1. **Fuel Switching Appliance Efficiency**

 The FSWG Staff Report, at pages 12 and 13, documents attempts to reach consensus on the minimum efficiency rating for new equipment involved in a fuel switching program. In the report, staff recommended that guidance be provided to determine efficiency standards for any equipment involved in a fuel switching program. Staff advised that the most effective manner in which to develop such guidance is through the annual TRM update process and the TRC test revision process set forth in the *2009 PA TRC Test Order*. As we must consider various issues in approving any EDC EE&C plan revision, the particulars of any proposed fuel switching measure must be justified based on the evidence presented, to include, but not be limited to, the intent of Act 129, the ability of such measures to assist the EDC in meeting the mandated targets, and the costs and the benefits of such measures. The analysis should be predicated upon valid, scientific data and sound formulae.

1. Proposed Resolution

 The Commission proposes that, where applicable, new equipment installed to replace electric equipment should be high efficiency equipment.

1. Discussion of Proposed Resolution

 Act 129 encourages the most efficient use of electricity, and it would appear to be appropriate to encourage the most efficient use of natural gas or other fuels.

1. **TRC Calculations**
2. **Database For Deemed Customer Costs or Incremental Measure Costs As Applicable**

Under consideration is the development of an incremental costs database to assist EDCs with developing incremental costs for TRC ratio calculations and to standardize assumptions across the board. The TRC test measures cost effectiveness considering the total costs of the program, including both the participants’ and the utility’s costs. A portion of the total cost is called the “net participant cost,” defined as initial capital costs plus sales tax, ongoing operation and maintenance costs, removal costs minus salvage value, and value of the customer’s time.[[13]](#footnote-13) These costs represent the additional cost of efficiency improvements beyond the costs incurred absent a demand-side management program. The net participant cost represents the total cost to all program participants and is calculated by summing the costs incurred by a participant for each measure. The cost attributed to each individual measure is called the “incremental cost.” In order to calculate the TRC ratio, EDCs must define incremental costs for each measure. The incremental costs for simple prescriptive TRM based measures can be deemed. For more complex custom measures, costs should be collected from contractor invoices.

Incremental costs must be defined not only for every measure, but for every variant of every measure. For example, although a heat pump is one measure, the incremental cost of a heat pump will depend on the capacity and the efficiency of both the efficient heat pump and the old heat pump. Therefore, although there are about 70 measure categories in the TRM, in reality, considering variants of each measure, incremental costs may need to be defined for hundreds of measure variations. The vast number of assumptions required to cover the incremental costs for a program introduces the possibility of biased or misrepresented incremental costs if they are not standardized.

In addition, in the *2009 PA TRC Test Order*, pages 30 and 31, we recognized that “the incremental cost and saving[s] will vary depending on the type of energy efficiency device or measure being implemented.” In context, the “type of energy efficiency device or measure being implemented” refers to “the manner in which the measure is being implemented.” There are four scenarios: failure replacement, new construction, retrofit, and early replacement. For each of these scenarios, the method to calculate the incremental cost varies. Therefore, for each measure variant there exist four scenarios that need to be defined.[[14]](#footnote-14)

* + 1. Proposed Resolution

The Commission proposes that the EDCs continue to use filed incremental cost data through May 31, 2013. For measure variants not included in the EDCs’ EE&C plans, the EDCs should use the CPUC’s Database for Energy Efficient Resources (DEER)[[15]](#footnote-15) as the primary source of cost data. The DEER database provides cost data for different cases to address all scenarios mentioned above. The EDCs can adjust the DEER cost values for regional and local conditions using appropriate cost multipliers. The cost multipliers should be clarified and included in the EDCs’ annual reports. The EDCs would be allowed to use cost data from local retailers and suppliers if the California DEER database does not provide appropriate values. The EDCs would submit incremental cost data and assumptions to the SWE with their Act 129 annual reports. This data would be compiled for use should future EE goals be required. We further propose that an incremental cost database be developed should future EE goals be required.

* + 1. Discussion of Proposed Resolution

EDCs have already filed incremental cost data in their EE&C plans, which were approved in 2009. We believe that EDCs should continue to use incremental cost assumptions as filed in their original EE&C plans through May 31, 2013. We, recognize, however, that, due to the number of measures and scenarios for each measure, developing a deemed incremental cost database could improve consistency across EDCs and could allow for comparisons of TRC ratios across EDCs in the future.

1. **Basis of TRC Benefits – Reported Savings or Verified Savings; And Basis of TRC Costs – Actual Costs or Committed Costs**

The Commission needs to resolve whether the basis of TRC benefits should be “reported” kWh and kW savings or “verified” kWh and kW savings. We also need to resolve whether the basis of TRC costs should be “actual” costs or “committed” costs.

1. Proposed Resolution

The Commission recommends that the calculation of TRC benefits should be based upon “verified” kWh and kW savings and that costs should be based on “actual” costs.

1. Discussion of Proposed Resolution

Basing the calculation of TRC ratios on verified kWh and kW savings and on actual costs would provide us with the most accurate and reliable data on program costs, savings, and cost effectiveness.

1. **Definition of Incentives In TRC for Energy Efficiency Measures**

The EDCs, over the course of the past year, have requested clarification from CEEP staff and from the SWE regarding the definition of incentives in the TRC calculation for EE measures, *i.e.*, what constitutes an “incentive” and which payments to program participants are treated as a “program cost” versus costs included in the “incremental cost” category.

1. Proposed Resolution

The Commission proposes that “incentive” be defined as a payment made to a program participant by an EDC to encourage the customer to participate in an EE program and to help offset some or all of the participant’s costs to purchase and install an EE measure.

1. Discussion of Proposed Resolution

Incentives paid by EDCs to program participants for EE measures cover part of the incremental cost of the measure. Since the TRC calculation is based on the total incremental measure cost, regardless of what portions are borne by the EDC and the participant, incentive amounts paid to program participants are already factored into the incremental cost of acquiring the energy savings. Including incentive payments made to program participants in the TRC calculation for EE programs would result in double-counting of the EDC’s portion of costs in the TRC calculation.

1. **Avoided Cost Calculations And Forecasts**

The EDCs, over the course of the past year, have requested clarification from CEEP and the SWE on the calculation of the avoided cost of electricity. Specifically, the EDCs seek clarification of the applicability of the U.S. Bureau of Labor Statistics (BLS) factor used to escalate transmission, distribution, capacity and ancillary prices associated with the avoided cost calculations used in calculations of the TRC test.

According to the *2009 TRC test Order*, for the first five years, the wholesale generation electric prices as reflected in the NYMEX[[16]](#footnote-16) PJM futures price were to be used for energy costs. For the second five-year period, NYMEX natural gas futures prices were to be used for energy costs. The natural gas futures price were to be converted into

an estimated wholesale energy price through the use of a spark price spread[[17]](#footnote-17) calculation. The third five-year period was to use the [U.S. Energy Information Administration (EIA) Annual Energy Outlook (AEO)] [[18]](#footnote-18) projections or a suitable substitute. These wholesale electric generation prices were to be modified to reflect: class time-of-use characteristics, congestion, zonal-locational basis differences, losses and a market uncertainty adjustment.

#### The *2009 PA TRC Test Order* stated, relative to capacity costs, that for “estimates of PJM RPM[[[19]](#footnote-19)] between the end of the 2013 program year and the beginning of the use of the EIA AEO data in year 11, we will escalate the RPM at the BLS, the Electric Power GTD sector, industry index for Electric Power Generation, [NAICS 221110](http://data.bls.gov/PDQ/servlet/SurveyOutputServlet?series_id=PCU221110221110).[[20]](#footnote-20)”

#### The 2009 TRC Test Order also addressed transmission, distribution, and ancillary service cost projections. Transmission and distribution (T&D) rates were to be included and based on FERC and PUC tariffs respectively. Ancillary service costs were to be included to the extent known. For future projections, the 2009 TRC Order provided that T&D and ancillary prices be escalated by the BLS factor. (*2009 TRC Test Order*, page 13). The BLS factor was to be used up until year 11, after which, the EIA AEO would be used.

#### The key issues that require clarification are whether EDCs should use historical or forecast data for the BLS Electric Power GTD sector price index as a basis for the escalation rate and for how many years should the BLS factor be applied. Neither the BLS nor the EIA develops or publishes a forecast of this specific price index. Historical data for this price index is available on the BLS web site at <http://data.bls.giv>.

* + - 1. Proposed Resolution

The Commission proposes that EDCs use the historical average annual growth rate in this index for the period 2003 through the most recently available annual data point as a proxy for the rate of escalation between the end of the 2013 program year and the beginning of the EIA AEO in year 11. The Commission notes that as PJM RPM, distribution, transmission, or ancillary service cost data becomes known, it should be utilized in place of the BLS factor. The average annual compound rate of growth in this index is 4.65%, for the period 2003 through 2010. The data for this index is listed below for this time period.



Source: <http://data.bls.gov/timeseries/PCU221110221110>.

* + - 1. Discussion of Proposed Resolution

The federal government does not prepare a forecast of this price index. The EIA AEO also does not provide a forecast of this index. Given this situation, we believe that the historical average annual compound rate of growth for this index for the period 2003 through the most recently available annual data point should be used as the escalator between the end of the 2013 program year and the beginning of the EIA AEO in year 11. The BLS escalator should be applied to calculate future pricing of capacity, distribution, transmission, and ancillary service when direct pricing information is unavailable.

1. **Inclusion or Exclusion of Customer Avoided Operating And Maintenance Costs In The TRC Calculation**

Over the course of the past year, the EDCs have requested clarification from CEEP and the SWE as to whether customer avoided operating and maintenance costs should be included in the TRC calculation. Examples of such customer avoided operating and maintenance costs include the following:

1. Reduced costs for purchases of incandescent bulbs when a customer purchases and installs a compact fluorescent light (CFL) bulb that has a useful life ten or more times longer than an incandescent bulb.
2. Reduced labor costs when a municipal street lighting customer purchases and installs a light-emitting diode (LED) street light that has a useful life of 40,000 to 50,000 hours compared to 10,000 hours for conventional sodium street lights. The municipal street lighting customer saves significant labor costs because LED traffic light bulbs do not burn out as quickly as conventional traffic lights, and thus do not need to be replaced as frequently.
3. Reduced labor costs when a municipal electric customer purchases and installs an LED traffic light that has a useful life of 10 to 20 times that of conventional traffic lights. The municipal customer saves significant labor costs because LED traffic light bulbs do not burnout as quickly as conventional traffic lights, and thus do not need to be replaced as frequently.
4. Proposed Resolution

The Commission proposes that customer avoided operating and maintenance costs should be included as benefits in the TRC calculation.

1. Discussion of Proposed Resolution

The TRC test has the potential to capture total benefits.[[21]](#footnote-21) Reduced costs for equipment and labor are benefits that are quantifiable and measurable. Such savings can be significant for electric customers. Additionally, NAPEE states that the benefits of the TRC test include non-energy benefits. The savings in equipment and labor costs are non-energy benefits. [[22]](#footnote-22)

1. **Avoided Costs In The Benefit/Cost Ratios In The Approved EE&C Plans And Avoided Costs Commencing June 1, 2013**

An important issue for the calculation of the TRC test is the determination of the avoided cost values that an EDC should use when calculating the cost effectiveness of new programs. One issue to be resolved is whether an EDC should use the latest available forecast of avoided costs when calculating the TRC test for a new program, or should a different forecast of avoided costs (such as the forecast of avoided costs included in the EDC’s original approved EE&C plan from October of 2009). A second issue to be resolved is the vintage of avoided cost forecasts that an EDC should use when calculating an overall portfolio TRC B/C ratio for a portfolio of programs with different start dates and different applicable avoided cost forecasts.

1. Proposed Resolution

The Commission proposes that, through May 31, 2013, an EDC should use the most current forecast of avoided costs when filing a new program (or an EE&C plan) for Commission approval. For program measures that have not been changed, regardless of methodology or data used by an EDC to calculate its original Commission-accepted portfolio TRC test, the avoided costs figures included in TRC calculations in previously approved EE&C/DR program plans need not be updated for the period June 1, 2009, to May 31, 2013, by present or future avoided cost figure revisions or updates. However, any new programs proposed by EDCs between now and May 31, 2013, would use the appropriately updated and most current avoided cost forecasts available at that point in time. When calculating and reporting the overall portfolio TRC test B/C ratio in EDC Act 129 annual reports, the EDCs would use the vintage of avoided cost forecasts applicable for each program at the time the program was approved.

1. Discussion of Proposed Resolution

The Commission desires to strike a balance between using the most accurate and up-to-date avoided costs and using avoided costs in effect at the time a program plan was approved.

1. **TRC Reporting**
	1. **Baseline Study Research**

In order to achieve accuracy as to where baseline efficiency is in the marketplace, the baseline must be periodically updated. Baseline research must be conducted so that an EE&C program gives accurate energy savings credit for the difference between baseline and high-efficiency measures. The determination of benefits is a major part of the equation for determining cost effectiveness using the TRC test. In order to maximize the efficiency of the Act 129 evaluation process, we have maintained and expanded the TRM to include a host of stipulated values for standard measures. The stipulated values often incorporate the difference between the energy savings of a high-efficiency measure and a standard-efficiency measure available in the marketplace. Baselines for standard-efficiency measures are typically gleaned from research in other states. Values for high-efficiency products typically come from manufacturer’s specifications and testing data. Over time, the baseline of what is standard-efficiency shifts toward more efficient products. At the same time, what constitutes a “high-efficiency” product will also shift toward a higher level of efficiency.

The Commission acknowledges the need for baseline research in the RFP for the SWE. In the Work Statement, Table 1 (p. 36) of the RFP, when enumerating the roles of the EDCs and the SWE, the Commission noted that the EDCs or their evaluation consultants are responsible for coordinated Statewide Market Assessments and Characterizations (*i.e.*, baseline studies). The SWE, pursuant to the RFP, is responsible for reviewing and approving the common survey instruments and methodologies the EDCs are to use for baseline assessments and characterizations.

1. Proposed Resolution

The Commission proposes that, consistent with the RFP contract, the EDCs conduct baseline studies in consultation with the SWE and that the SWE is to coordinate, review and approve such studies. The results of the studies are to be reported to the SWE by December 1, 2011, so that the SWE can make appropriate recommendations to the Commission on the potential for additional energy savings beyond May 31, 2013. One example of the content and scope of a baseline study is the PECO Baseline Study dated February 2011, which PECO has shared with the Act 129 Technical Working Group.

1. Discussion of Proposed Resolution

Baseline market research is necessary and should to be conducted and reported by the EDCs so that the integrity of the TRM and its stipulated values are consistent with the EE marketplace. The SWE needs accurate baseline research from the EDCs to, in part, prepare recommendations to the Commission about the potential for energy efficiency gains after May 31, 2013. Without accurate and periodic baseline research and values review, the Commission is at risk of making compliance decisions and future target decisions based on over- or under-estimated energy savings.

* 1. **Frequency of Cost-Effectiveness Evaluations And Reporting Results And Timing of TRC Reports (*e.g.*, When To Freeze Data And Inputs)**

The EDCs have requested over the past year that we clarify what the prescribed reporting times are for the TRC. The primary issues concerning TRC reporting are how often the EDCs should conduct cost-effectiveness evaluations and when the results of the evaluations should be reported.

* + - 1. Proposed Resolution

The Commission proposes that the results of the TRC test should be reported annually. The TRC test would be included as a part of the EDCs’ Act 129 annual reports to the Commission. Additionally, the TRC B/C ratio for each EDC program, and the portfolio, should be included in the EDCs’ Act 129 annual report. The B/C ratios should be based upon the latest available program costs and savings.

* + - 1. Discussion of Proposed Resolution

The Commission recognizes that EDCs’ final Act 129 annual reports include mostly verified energy savings and actual program costs, as opposed to estimated savings and costs. Directing the EDCs to submit TRC test results annually in their Act 129 annual reports would ensure that the data set used to identify the savings and costs will be complete and that the actual cost-effectiveness of the programs will be more accurately determined.

1. **CONCLUSION**

With this Tentative Order, the Commission seeks comments on the proposed additions and updates to the PA TRC test. This Tentative Order represents our continuing efforts in establishing a comprehensive TRC test with the purpose of evaluating the EE&C Programs pursuant to Act 129. We look forward to receiving comments from interested stakeholders regarding the proposed changes to the PA TRC test. Comments to this Tentative Order should reflect the identical topical numbering references as used herein. If your comments do not address a particular topic, please note that you are not commenting on that particular topic. If you are raising new topics, please do so after you have commented on the topic raised in this Tentative Order. This Tentative Order and filed comments will be made available to the public on the Commission’s Act 129 Information web page; [[23]](#footnote-23) **THEREFORE,**

 **IT IS ORDERED:**

 1. That the 2011 proposed revisions herein to the Pennsylvania Total Resource Cost Test are issued for comment.

 2. That a copy of this Tentative Order shall be served upon the Office of Consumer Advocate, the Office of Small Business Advocate, the Office of Trial Staff, all jurisdictional electric distribution companies, all licensed electric generation suppliers, the Pennsylvania Department of Environmental Protection and all parties who commented on the *2009 Pennsylvania Total Resource Cost Test Order*.

 3. That interested parties may file comments on or before 15 days after entry of this order. Reply comments are due on or before 10 days thereafter. An original and fifteen (15) copies of the comments shall be filed referencing Docket Number M‑2009‑2108601 with the Pennsylvania Public Utility commission, Attention: Secretary, P.O. Box 3265, Harrisburg, PA 17105-3265

 4. That comments and reply comments shall be electronically mailed to Gregory A. Shawley at gshawley@state.pa.us and Louise Fink Smith at finksmith@state.pa.us. Attachments may not exceed three megabytes.

 5. That this Tentative Order, the proposed 2011 version of the Pennsylvania Total Resource Cost Test, and all filed comments and reply comments related to this Tentative Order be published on the Commission’s website.

 6. That the contact person for technical issues related to this Tentative Order and the proposed 2011 version of the Pennsylvania Total Resource Cost Test is Gregory A. Shawley, Bureau of Conservation, Economics and Energy Planning, 717‑787-5369 or gshawley@state.pa.us. The contact person for legal and process issues related to this Tentative Order and the proposed 2011 version of the PA TRC is Louise Fink Smith, Law Bureau, 717-787-5000 or finksmith@state.pa.us.

**BY THE COMMISSION**

Rosemary Chiavetta

Secretary

(SEAL)

ORDER ADOPTED: May 5, 2011

ORDER ENTERED: May 6, 2011

**Appendix A**

The definitions and formulae to be used for the

Pennsylvania-specific TRC test, consistent with Act 129 of 2008,

are set forth in this Appendix.

The definitions and formulae in this Appendix are taken from

pages 10 – 12, 15-17, and 22 of the

2002 *California Standard Practice Manual* (CA SPM)[[24]](#footnote-24)

without further specific attribution.

**TRC Formulae**

The formulae for the net present value (NPVTRC), the benefit-cost ratio (BCRTRC), and the levelized costs are:

|  |  |  |
| --- | --- | --- |
| NPVTRC | = | BTRC – CTRC |
| BCRTRC | = | BTRC/CTRC |
| LCTRC | = | LCRC/IMP |

The BTRC, CTRC, LCRC, and IMP terms are defined as follows. The first summation in the BTRC equation should be used for conservation and load management programs. For fuel substitution programs, both the first and second summations should be used.

$$B\_{TRC}= \sum\_{t=1N}^{}\frac{UAC\_{t}+ TC\_{t}}{\left(1+d\right)^{t-1}}+ \sum\_{t=1}^{N}\frac{UAC\_{at}+ PAC\_{at}}{\left(1+d\right)^{t-1}}$$

$$ C\_{TRC } = \sum\_{t=1}^{N}\frac{PRC\_{t}+ PCN\_{t}+ UIC\_{t}}{\left(1+d\right)^{t-1}} $$

$$LCRC= \sum\_{t=1}^{N}\frac{PRC\_{t}+PCN\_{t}- TC\_{t}}{\left(1+d\right)^{t-1}}$$

$$IMP= \frac{\sum\_{t=1}^{n}\left[\left(\sum\_{i=1}^{n}∆EN\_{it}\right) or (∆DN\_{it} where I=peak period) \right]}{\left(1+d\right)^{t-1}}$$

#### The utility avoided cost terms (UACt, UICt, ,and UACat) are determined by costing period to reflect time-variant costs of supply:

$$UAC\_{t}= \sum\_{i=1}^{I}\left(∆EN\_{it} × MC:E\_{it} ×K\_{it}\right)+ \sum\_{i=1}^{I}\left(∆DN\_{it} × MC:D\_{it} × K\_{it}\right)$$

|  |  |  |
| --- | --- | --- |
| *UACat* | = | Use *UACt* formula but with marginal costs and costing periods appropriate for the alternate fuel utility. |

$$UIC\_{t}= \sum\_{i=1}^{I}\left(∆EN\_{it} × MC:E\_{it} ×(K\_{it}- 1)\right)+ \sum\_{i=1}^{I}\left(∆DN\_{it} × MC:D\_{it} ×(K\_{it}- 1)\right)$$

**Glossary of Terms**

|  |  |  |
| --- | --- | --- |
| ∆DNit |  | Reduction in net demand in costing period *i* in year *t* |
| ∆ENit |  | Reduction in net energy use in costing period *i* in year *t* |
| BCRTRC | = | Benefit-cost ratio of total costs of the resource |
| BTRC | = | Benefits of the program |
| CTRC | = | Costs of the program |
| D | = | Interest rate (discount) |
| E | =  | Discounted stream of system energy sales (kWh or therms) or demand sales (kW) for first year customers.  |
| Et | = | System sales in kWh, kW, or therms for first year customers |
| I | = | Number of periods of a participant’s participation |
| IMP | = | Total discounted lead impacts of the program |
| Kit | = | 1 when ∆EGit or ∆DGit is positive (*i.e.*, a reduction) in costing period *i* in year *t*, and 0 (zero) otherwise |
| LCRC | = | Total resource costs used for levelizing |
| LCTRC | = | Levelized cost per unit of the total cost of the resource (cents/kWh for conservation programs; $/kWh for load management programs) |
| MC:Dit |  | Marginal cost of demand in costing period *i* in year *t* |
| MC:Eit |  | Marginal cost of energy in costing period *i* in year *t* |
| NPVTRC | = | Net present value of total costs of the resource |
| PACat | = | Participant avoided costs in year t for the alternate fuel devices (*i.e.*, costs of devices not chosen) |
| PCN | = | Net participant costs; in PA, the costs of the end-user customer (participating or non-participating) |
| PRCt | = | Program administrator costs in year *t*; in PA, the EDC |
| TCt | = | Tax credits year t |
| UACat | = | Utility avoided supply costs for the alternate fuel in year *t* |
| UACt | = | Utility avoided supply costs in year *t* |
| UICt | = | Utility increased supply costs in year *t* |

**Appendix B**

**List of Acronyms**

2002 CA SPM: 2002 California Standard Practice Manual

B/C: Benefit-Cost

CEEP: Bureau of Conservation, Economics and Energy Planning

CFL: Compact Fluorescent Light bulb

CSP: Curtailment Service Provider

CPUC: California Public Utility Commission

DSP: Default Service Provider

DR: Demand Response

EDC: Electric Distribution Company

EE: Energy Efficiency

EE&C: Energy Efficiency and Conservation

EM&V: Evaluation, Measurement, and Verification

FSWG: Fuel Switching Working Group

ISO: Independent transmission System Operator

LED: Light-Emitting Diode

LSE: Load Serving Entity

NPV: Net Present Value

NTG: Net-to-Gross

PJM: The RTO covering Pennsylvania

Protocols: Demand Response Cost-Effectiveness Protocols

PUC: Public Utility Commission

RTO: Regional Transmission Organization

SWE: Statewide Evaluator

TRC: Total Resource Cost

TRM: Technical Reference Manual

WACC: Weighted Average Cost of Capital

1. *See* Docket No. M-2009-21808601for a complete history of the proceeding. [↑](#footnote-ref-1)
2. Section 2806.1(c)(3) provides that, based on a review to be concluded by November 30, 2013, if “the commission determines that the benefits of the program exceed the costs, the commission shall adopt additional incremental reductions in consumption.” Section 2806.1(d)(2) provides that, based on a review to be concluded by November 30, 2013, if “the commission determines that the benefits of the plans exceed the costs, the commission shall set additional incremental requirements for reduction in peak demand for the 100 hours of greatest demand or an alternative reduction approved by the commission.” [↑](#footnote-ref-2)
3. *Energy Efficiency and Conservation Program*, Docket No. M‑2008‑2069887 (January 16, 2009). *See* <http://www.puc.state.pa.us//pcdocs/1033196.doc>. [↑](#footnote-ref-3)
4. *Implementation of Act 129 of 2008 – Total Resource Cost (TRC) Test*, Docket No. M‑2009-2108601 (June 23, 2009), corrected by *errata* on page 7 on October 19, 2009 (*2009 PA TRC Test Order*). [↑](#footnote-ref-4)
5. We have previously explained our reliance on the California TRC test model and patterned our TRC test practices and procedures on the California model. *EE&C Implementation Order* at 15. *See* “2002 California Standard Practice Manual, Economic Analysis of Demand-side Programs and Projects,” Governor’s Office of Planning and Research, July 2002, (2002 CA SPM). *See also* “Attachment 1 – 2010 Demand Response Cost Effective Protocols,” California Public Utilities Commission (CPUC), <http://www.ethree.com/documents/CPUCDR/DR%20CE%20Protocols%20Appendix.PDF> (California Protocols). The 2002 CA SPM was developed to measure the cost-effectiveness of EE programs and provide a basis for comparing the costs and benefits of DR programs. The 2010 California Protocols builds upon the foundation in the 2002 CA SPM and provides cost-effectiveness protocols for DR programs. [↑](#footnote-ref-5)
6. 2009 to 2013. [↑](#footnote-ref-6)
7. California Protocols, page 17. [↑](#footnote-ref-7)
8. New England State Program Working Group, “Measure Life Report: Residential, Commercial/

Industrial Lighting and HVAC Measures”, prepared by GDS Associates, Inc., June 2007. <http://www.ctsavesenergy.org/files/Measure%20Life%20Report%202007.pdf>. [↑](#footnote-ref-8)
9. *See* *2009 PA TRC Test Order* at 25, footnote 40, for definitions. [↑](#footnote-ref-9)
10. RFP Act 129 Statewide Evaluator; April 21, 2009; Table 1, Roles and Responsibilities for EDCs, SWE and Commission; page 36. <http://www.puc.state.pa.us/electric/Act129/Act129_SWE.aspx>. [↑](#footnote-ref-10)
11. Messenger, M., Goldman, C., “Review of Evaluation, Measurement and Verification Approaches Used to Estimate the Load Impacts and Effectiveness of Energy Efficiency,” *LBNL-3277E*, Lawrence Berkley National Laboratory, April, 2010. [↑](#footnote-ref-11)
12. <http://www.puc.state.pa.us/electric/Act129/Fuel_Switching.aspx>. [↑](#footnote-ref-12)
13. 2002 CA SPM at page 8. *See* <http://drc.lbl.gov/pubs/CA-SPManual-7-02.pdf>. [↑](#footnote-ref-13)
14. National Action Plan for Energy Efficiency 2009 (NAPEE 2009). Guide to Resource Planning with Energy Efficiency. Price, Snuller, *et al.*, Energy and Environmental Economics, Inc., at page 4-2. *See* <http://www.epa.gov/eeactionplan>. The *2009 PA TRC Test Order* stated that “[f]or the purpose of defining incremental costs, the Commission will look to Section 4.1 of the Guide to Resource Planning with Energy Efficiency, November 2007, for guidance.” [↑](#footnote-ref-14)
15. Currently, California DEER 2008, most recently updated October 2009. *See* [http://www.deeresources.com](http://www.deeresources.com/). [↑](#footnote-ref-15)
16. *See*: <http://www.comex.com/> [↑](#footnote-ref-16)
17. The spark price spread can be defined as the difference between the price of electricity sold by a generator and the price of the fuel used to generate it, adjusted for equivalent units. For definitions, *see*: <http://moneyterms.co.uk/spark-spread/>. The spark spread can be expressed in $/MWh or $/MMBTUs (or other applicable units). The heat rate is defined as the ratio of energy inputs used by a generating facility expressed in BTUs (British Thermal Units) to the energy output of that facility expressed in kilowatt-hours. [↑](#footnote-ref-17)
18. *See* <http://www.eia.doe.gov/>. [↑](#footnote-ref-18)
19. Reliability Pricing Model. The RPM represents capacity costs. *See* <http://www.pjm.com/> [↑](#footnote-ref-19)
20. *See* <http://data.bls.gov/PDQ/servlet/SurveyOutputServlet?series_id=PCU221110221110>. This escalator is widely accepted in the industry and financial markets, energy-industry specific, readily ascertainable, and easy to use. Like its more familiar counterparts, the BLS’ Consumer Price Index (CPI) and the Producer Price Index (PPI), it will produce expected values of future market variables within reasonable limits. The debate, herein, was not whether to use an escalator, but rather which escalator to use. Accordingly, we shall use the BLS escalator. [↑](#footnote-ref-20)
21. 2002 CA SPM at page 21. [↑](#footnote-ref-21)
22. NAPEE, “Understanding Cost Effectiveness of Energy Efficiency Programs; Best Practices, Technical Methods, and Emerging Issues for Policy-Makers,” November 2008, p 6-5. *See* <http://www.epa.gov/cleanenergy/documents/suca/cost-effectiveness.pdf>. [↑](#footnote-ref-22)
23. <http://www.puc.state.pa.us/electric/Act_129_info.aspx>. [↑](#footnote-ref-23)
24. *The California Standard Practice Manual – Economic Analysis of Demand‑Side Programs and Projects*, July 2002, p. 18. *See* <http://www.calmac.org/events/SPM_9_20_02.pdf>. [↑](#footnote-ref-24)