

The Rhode Island Energy Efficiency and Resource Management Council

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October 31, 2016

VIA HAND-DELIVERY AND ELECTRONIC MAIL

Luly E. Massaro
Commission Clerk
Rhode Island Public Utilities Commission
89 Jefferson Boulevard
Warwick, RI 02888

RE: Docket 4654- EERMC Review and Approval of the 2017 Energy Efficiency Program Plan Cost-Effectiveness Pursuant to RIGL §39-1-27.7(c)(5)

Dear Ms. Massaro:

The Energy Efficiency and Resource Management Council ("EERMC") is pleased to submit the attached Cost-Effectiveness Report, submitted pursuant to Rhode Island's Least Cost Procurement Law. The EERMC's review and approval of the cost-effectiveness of National Grid's 2017 Energy Efficiency Program Plan ("2017 EEPP"), is supported by the Vermont Energy Investment Corporation/Optimal Energy's ("Consultant

Team"), which team drafted the attached report. The Consultant Team's report and findings were presented to the EERMC, which voted to approve the findings on October 19, 2016.

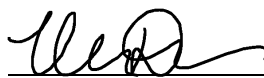
As the PUC is aware, RIGL § 39-1-27.7(c)(5) requires that the EERMC review and approve the cost-effectiveness of National Grid's 3-year procurement plan and any related annual energy efficiency plans.

Pursuant to its cost-effectiveness review and approval responsibilities under RIGL §39-1-27.7(c)(5), the EERMC authorized the Consultant Team to conduct a cost-effectiveness analysis of the 2017 EEPP filed October 14, 2016. The enclosed report is the product of that analysis.

In brief summary, the Consultant Team and the EERMC find that under the Total Resource Cost ("TRC") test, ordered by the Commission in Docket 3931, and ensuing updates in Dockets 4202 and 4443, Revised Standards for Least Cost Procurement, and consistent with national best practices, both the individual programs and in combination, the portfolio of programs presented in the 2017 EEPP are cost-effective and compliant with state statutes and regulations.

The EERMC respectfully recommends that the Commission approve the cost-effective 2017 EEPP as submitted by National Grid and the parties on and as provided for by § 39-1-27.7(c)(5), approve a fully reconciling funding mechanism sufficient to fund the 2013 EEPP's proposed budget within 60 days from the date of the Plan's filing.

Respectfully submitted,
Rhode Island Energy Efficiency
Resources Management Council
By its Attorney



Marisa Desautel, Esq. (Bar #7556)
Law Office of Marisa Desautel, LLC
55 Pine St.
Providence, RI 02903
Tel: (401) 477-0023
Fax: (401) 522-5984

CERTIFICATION

I hereby certify that I filed an original and nine (9) copies of the within Cost-Effectiveness Report and sent a true copy, via electronic mail, of the within Cost-Effectiveness Report on this 31st day of October, 2016, to:

Luly.massaro@puc.ri.gov
Luly E. Massaro, Commission Clerk
Public Utilities Commission
89 Jefferson Blvd.
Warwick, RI 02888



Cost-Effectiveness Report On National Grid's 2017 Energy Efficiency Program Plan and System Reliability Procurement Report

**An Assessment and Report by
The VEIC/Optimal Energy Consultant Team**



Working on Behalf of the



STATE OF RHODE ISLAND
**ENERGY EFFICIENCY &
RESOURCE MANAGEMENT COUNCIL**

**Submitted to the Rhode Island
Public Utilities Commission
On October 31, 2016**

Energy Efficiency and Resource Management Council Consultant Team Findings

The Energy Efficiency and Resource Management Council (EERMC or “the Council”) Consultant Team finds that the *2017 Energy Efficiency Program Plan* (Docket No. 4654) and *System Reliability Procurement Report* (Docket No. 4655) filed on October 14, 2016 by National Grid, are cost-effective according to the Total Resource Cost (TRC) test. We also find that the implementation strategies outlined in the Plans will continue to support a reasonable and credible sustained implementation and moderate ramp-up of National Grid’s energy efficiency implementation efforts, and align with the savings targets proposed by the EERMC in its September 1, 2013 filing and approved by the Rhode Island Public Utilities Commission (“the Commission”) at its Open Meeting held on March 29, 2014. These savings targets were then reflected in the 2015-2017 Energy Efficiency and System Reliability Procurement Plan filed by National Grid on September 2, 2014 and approved by the Commission October 30, 2014.

Overall, we conclude that the programs and portfolio meet the cost-effectiveness requirements of Rhode Island General Laws § 39-1-27.7 (c)(5) and therefore a fully reconciling funding mechanism sufficient to fund the proposed budget should be approved by the Commission within 60 days as required by that section.

This report was presented to the EERMC by the Consultant Team at its October 19, 2016 meeting and the EERMC voted to approve it provisionally, with direction to the Consultant Team to finalize the Cost-Effectiveness Report with minor changes, e.g. inserting the docket numbers once assigned.

I: Introduction

Since 2010, the EERMC has met its requirement in R.I.G.L. § 39-1-27.7(c)(5) to review and approve the cost-effectiveness of National Grid's 3-year procurement plan and any related annual energy efficiency plans:

The Commission shall issue an order approving all energy efficiency measures that are cost effective and lower cost than acquisition of additional supply, with regard to the plan from the electrical and natural gas distribution company, and reviewed and approved by the energy efficiency and resources management council, and any related annual plans, and shall approve a fully reconciling funding mechanism to fund investments in all efficiency measures that are cost effective and lower cost than acquisition of additional supply, not greater than sixty (60) days after it is filed with the commission.

To comply with this requirement for National Grid's proposed *2017 Energy Efficiency Program Plan and System Reliability Procurement Report* ("the Plan"), the EERMC directed its Consultant Team to produce this report. The Plan was presented to the Council at its October 19, 2016 meeting where the Council voted to endorse it.

This report describes that review, including the finding that the Plan is cost-effective, and submits it as evidence to the Commission. It also describes the nature and process of the review, and presents the professional experience and qualifications of the Consultant Team to fulfill this task.

II. The Rhode Island Legal and Regulatory Framework

Rhode Island's Comprehensive Energy Conservation, Efficiency, and Affordability Act of 2006 ("2006 Comprehensive Energy Act") established a comprehensive energy policy that explicitly and systematically requires maximization of ratepayers' economic savings through investments in all cost-effective energy efficiency. By means of this requirement on the distribution utility to procure all cost-effective energy efficiency, Rhode Island ratepayers have saved and will continue to save hundreds of millions of dollars in energy bills over the next decade.

The primary guidelines informing the planning process to achieve this objective are the Standards for energy efficiency and conservation procurement and system reliability ("the Standards"), required in the 2006 legislation. The EERMC proposed the initial Standards in June, 2008, and a subsequent revision was approved by the Commission in July, 2008. Updates to the Standards were proposed by the EERMC in 2011 under Docket No. 4202, and again in 2014 under Docket No. 4443, which were both approved by the Commission. The purpose of these Standards is to provide sufficient direction to guide National Grid in its 3-year and annual Plans.

The Standards ordered by the Commission identify the TRC test as the methodology to use in determining whether the measures, programs, and the portfolio of energy efficiency services are cost-effective. The same TRC methodology has been applied to the evaluation of cost-effectiveness for natural gas energy efficiency since natural gas was added to the Least Cost Procurement mandates in 2010.

III. Summary of EERMC Consultant Team’s Qualifications

The Consultant Team is composed of Vermont Energy Investment Corporation (VEIC) serving as the lead contractor, and co-managed with Optimal Energy Inc., with sub-contractor support from Energy Futures Group, Cx Associates and Prah! Consultant. The Consultant Team is led by Scudder Parker from VEIC and Mike Guerard from Optimal Energy. Key skills and expertise are provided by Kate Desrochers, Sam Dent, Gretchen Calcagni and Craig Johnson on data and analytical issues; Mark Kravatz, Sean Bleything, Richard Faesy and Glenn Reed on the residential sector; George Lawrence, Jennifer Chiodo and Zoe Dawson on the Commercial / Industrial (C&I) sector; and Ralph Prah! on evaluation, measurement, and verification (EM&V) activity. An additional layer of supporting staff is also in place, as well as a full range of industry experts available on an as-needed basis.

This team brings an impressive understanding of, and experience with, energy efficiency policy, regulatory practice, program design, cost-effectiveness analysis, measure characterization, assessment of potential savings, and EM&V. Many of the individual consultants included on the Consultant Team have over 25 years of direct experience in energy efficiency and broader regulatory policy. All participants also practice in jurisdictions outside of Rhode Island and their experience in those settings provides an important context and perspective to inform the EERMC in its oversight role.

IV. Consultant Findings

The Consultant Team finds that both the individual programs and in combination, the portfolio of programs presented in the 2017 Energy Efficiency Program Plan (EEPP) filing by National Grid are cost-effective according to the TRC. We also find that the System Reliability Procurement (SRP) Report is cost-effective. We conclude that the gas and electric programs meet the cost-effectiveness requirements of R.I.G.L. § 39-1-27.7 (c)(5) and therefore a fully reconciling funding mechanisms sufficient to pay for the proposed budgets should be approved by the Commission within 60 days as required by that section.

The review conducted by the Consultant Team to reach these conclusions is described in detail in the following sections:

- Section V: Ongoing Oversight by the EERMC and its Consultant Team

- Sections VI: Cost-Effectiveness Overview
- Section VII: Review of Evaluation, Measurement and Verification (EM&V)
- Section VIII: Cost Effectiveness Review and Findings

V. Ongoing Oversight by the EERMC and its Consultant Team

The EERMC, consistent with its statutory obligations under the 2006 Comprehensive Energy Act, continues to play an involved and active role with National Grid to guide, facilitate, and support public and independent expert participation in the review, oversight, and evolution of utility energy efficiency procurement and program implementation. The EERMC believes this input is critical to having the energy efficiency programs and new cost saving mechanisms evolve into resource acquisition tools that can effectively implement the Rhode Island law to procure all cost-effective natural gas and electric energy efficiency. The updated Standards in Docket No. 4443 require a consistent and effective process to guide the development and submission of National Grid’s 2017 EEPP to the Commission.

The EERMC has met its review and input requirements both at its regularly scheduled meetings with National Grid and through Collaborative meetings and phone calls. The Collaborative is comprised of EERMC members; the EERMC Consultant Team; RI Office of Energy Resources (OER); Acadia Center; the Division of Public Utilities and Carriers with representation from the Attorney General’s Office and support from its consultant; People’s Power and Light; Emerald Cities-Providence; and TEC-RI. National Grid coordinates and hosts the meetings, and has energy efficiency and system reliability representatives in attendance at all meetings.

For the 2017 EEPP and SRP development, a first draft of the EEPP was circulated by National Grid to the Collaborative and EERMC on August 18th and the second and final draft was issued September 19th. The SRP drafts followed within a week of those releases. The activities that supported the process of developing the drafts and subsequent review and input included:

| Event | 2016 Dates | Activity |
|---|--------------------------------------|---|
| Collaborative Meetings | 6/9; 7/21; 8/24; 9/21; 9/30 | On-going Stakeholder review and feedback on Plan content |
| Monthly Strategy & Oversight meetings - Consultant Team, OER and National Grid’s Sector Strategy Groups | 7/14; 7/27; 8/18; 8/24; 9/8; 9/28 | On-going review of program elements with a focus on potential program enhancements and innovation |

| | | |
|--|--|--|
| EERMC meetings | 8/11; 9/8; 9/29 | Plan updates and drafts presented by National Grid and Consultant Team |
| Technical Reference Manual (TRM) working group – Consultant Team and National Grid | Multiple conference calls over the June – October period | Written and verbal exchanges between parties updating all key content in the TRM, and then confirming effective application of values into the Benefit Cost Models |
| CHP Public Meeting | 9/22 | Presentation to CHP stakeholders by National Grid and OER seeking input on program design |
| Ad hoc calls | On-going throughout process | To support quick and effective resolution on key issues, frequent communications between EERMC, Consultant Team, OER, stakeholders and National Grid supplemented the activities above |

Throughout this process, the objectives of the Standards were followed to ensure that program designs and the resulting implementation secure cost-effective energy efficiency resources that are lower than the cost of supply, are prudent and reliable, and deliver hundreds of millions of dollars in bill savings to Rhode Island customers.

VI. Cost-Effectiveness Overview

Cost-effectiveness tests compare the net present value of a stream of benefits over the net present value of a corresponding stream of costs, whether they occur at the time of purchase or over several years. The TRC has been widely accepted and used by regulators and policy-makers to evaluate demand-side management programs. The TRC test indicates that an efficiency measure or program is cost-effective if the benefits outweigh the costs for Rhode Island consumers.

The TRC test compares the value of avoided energy costs and other resource costs to the full incremental cost of efficiency measures plus program administration costs. The TRC test was formally adopted as the best practice for evaluating the cost-effectiveness of energy efficiency

measures and programs in 1983 when it was codified in the Standard Practice for Cost-Benefit Analysis of Conservation and Load Management Programs, published by the California Energy Commission. The “Standard Practice” manual has been revised several times since and has served as the *de facto* basis for determining efficiency cost-effectiveness by the majority of electric and gas utility efficiency programs. The manual is regarded as well-grounded in best-practices for cost-benefit analysis.

As noted above, the Commission ordered the TRC test for use in Rhode Island in Docket No. 3931, and ensuing updates in No. 4202 and 4443. Subsequently, National Grid proposed the specific costs and benefits to be included in the Rhode Island TRC test in its Least Cost Procurement Plan (September 2008) with support and input from the EERMC, which the Commission approved and ordered into effect. The Consultant Team reviewed National Grid’s application of the TRC test in the 2017 EEPP methodology and found it to be consistent with standard practice and the Standards. The Rhode Island TRC test includes the following benefits and costs:

- The benefits in the TRC include the discounted, monetized value of reduced energy (MWh), reduced capacity needs (MW, avoids the costs of providing both peak demand, and the transmission and distribution system), reduced fossil fuel use (or increased use as a negative benefit), reduced water and sewer use, non-energy impacts (generally due to decreased operation and maintenance costs), and Demand Reduction Induced Price Effect (DRIPE, as included in the avoided costs of electricity). The benefits for reduced electric energy and power (MWh and MW) and other resources are monetized based on avoided costs.
- The costs in the TRC are all incurred by the utility and program participants as a whole to acquire the efficiency resources in the Plan. They include the incremental cost of the efficiency measure(s)¹ and the non-incentive costs required to deliver the program. Incremental cost are composed of incentives and customer contributions, while non-incentive costs are composed of program planning and administration, marketing, evaluation, shareholder incentive and related implementation costs,² customer contribution, program evaluation, and shareholder incentive costs, as shown in Tables E-2 and E-5, and G-2 and G-5, of the National Grid’s 2017 EEPP.³

The costs and benefits of an efficiency program, which can occur over many years, are discounted to present-value using a real discount rate in order to discount the future value of money (i.e.,

¹ Incremental cost depends on the market opportunity. In a market-driven situation (when a customer is buying a new piece of equipment or replacing a broken one), it is the difference in cost between the baseline technology and the efficient technology. In a retrofit situation, the incremental cost is the full cost of the project, including equipment and installation (since the baseline condition would be continuing with the existing equipment).

² Cross-program costs (e.g., comprehensive marketing not specific to a single program) are allocated at the sector or portfolio level.

³ Benefit-cost ratio (BCR) at the sector level includes the shareholder incentive as a cost. As shareholder incentive is not calculated at a program level, it is not included in program level BCR

money today is considered more valuable than the same amount of money in the future). A program is considered to be cost-effective if the present value of benefits exceeds the present value of costs, that is, when the TRC benefit-cost ratio (BCR) is greater than 1.0.

VII. Review of Evaluation, Measurement and Verification

Evaluation, Measurement and Verification (EM&V) refers to the systematic collection and analysis of information to document the impacts of energy efficiency programs and improve the effectiveness of these programs. Impact evaluation, a specific type of EM&V activity, refers specifically to efforts to document program impacts. From the perspective of this review of the cost-effectiveness of National Grid's programs and 2017 EEPP, the relevance of National Grid's EM&V process is that this process is responsible for confirming and/or refining over time the values of many of the parameter assumptions that go into National Grid's cost-effectiveness analyses, particularly those pertaining to program benefits.

EM&V activities in Rhode Island have generally been managed by the evaluation department of National Grid, with input from the Rhode Island Collaborative and the EERMC, following high-level regulatory direction set by the Commission, Division, and the Office of Energy Resources. National Grid owns utilities in Massachusetts, Rhode Island, and New York, and National Grid's evaluation department has EM&V-related responsibilities in all of these states. National Grid's evaluation department is highly experienced, and has a strong national reputation in the evaluation industry. In New England, National Grid's EM&V planning, implementation, and reporting activities have historically been tightly integrated between Massachusetts and Rhode Island. Most new EM&V studies that bear on Rhode Island's energy efficiency programs are planned, budgeted, implemented, reported, and filed in Rhode Island and Massachusetts.

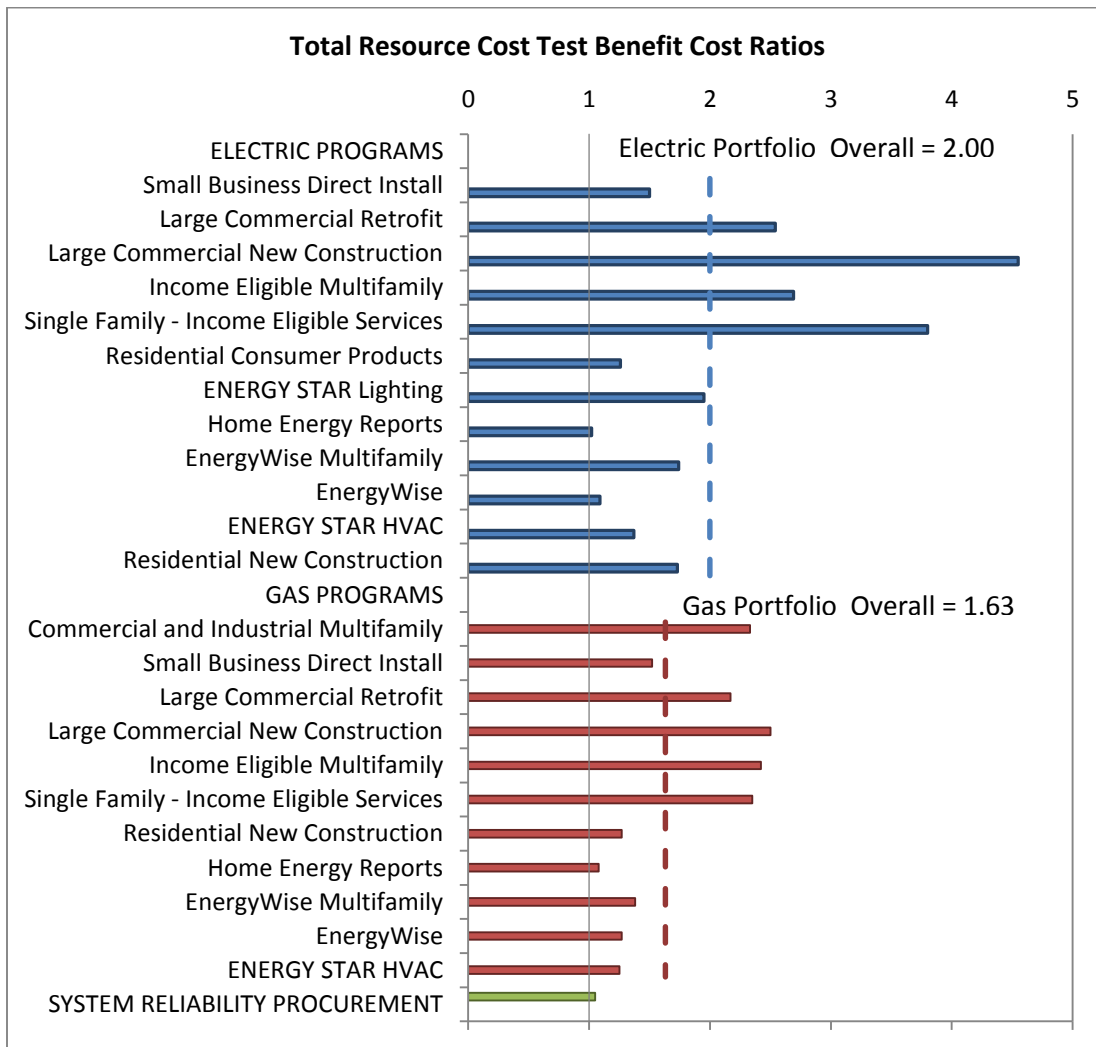
In Rhode Island, the Consultant Team's work with National Grid's evaluation department to date has focused on providing input into evaluation priorities, approaches, and spending levels. We have in-depth familiarity with these methods through our work with National Grid in Massachusetts, on behalf of the Massachusetts Energy Efficiency Advisory Council. On the basis of this familiarity, we believe that National Grid's impact evaluation methods in New England have generally been consistent with prevailing industry standards. We therefore conclude that the strength of National Grid's EM&V process serves to buttress the finding that their programs and plan are cost-effective.

VIII. Cost Effectiveness Review and Findings

This section summarizes the cost-effectiveness of programs presented in the 2017 EEPP and SRP, followed by a description of the Consultant Team's review of methodology and findings. The Standards require that all programs and the overall portfolio must be determined to be cost-

effective by having a TRC benefit-cost ratio greater than 1.0. The Consultant Team’s review has found that all of National Grid’s proposed programs and the overall portfolio meet this standard. National Grid’s program and portfolio cost-effectiveness are provided in Tables E-5 (electric) and G-5 (natural gas) of the 2017 EEPP. These tables provide supporting data on program budgets, avoided costs, and other related data. All of the electric programs are projected to be cost effective, with BCRs ranging from 1.02 (Home Energy Reports) to 4.55 (Large Commercial New Construction). Likewise, the natural gas programs are all projected to be cost-effective with BCRs ranging from 1.08 (Home Energy Reports) to 2.50 (Large Commercial New Construction). The BCR for SRP is 1.05. All programs have a BCR greater than 1.0 as required by the Standards and § 39-1-27.7 (c) (5).

Figure 1: BCR levels



The Consultant Team reviewed the benefit and cost of measures, programs, and portfolio in the TRM, BC Model, and appendix tables to inform an educated review of the cost-effectiveness of

programs offered by National Grid. This review, described in more details below, informed this cost-effectiveness report:

- The review of updates to the 2016 TRM allowed for an assessment of the measures and assumptions used in the calculations of the cost-effectiveness of National Grid's energy efficiency programs.
- The savings values in the TRM are integrated into National Grid's electric and gas BC models, which are used to calculate program savings, incentive costs, benefits, and the cost-effectiveness of programs. The Consultant Team reviewed the two drafts of the electric and gas BC Models thoroughly, ensuring that updates to the TRM are reflected in the BC models, and that the quantity of measures (participation) is appropriate and reflects the program description in the EEPP. Also reviewed were the program design, cost-effectiveness projections, mix of measures, and that net-to-gross values are appropriate and reflect values from the latest evaluations available. The 2017 electric and gas BC Models were compared to the 2016 models to ensure that changes to the program measures are appropriate and reflect changes to the EEPP.

The values from the BC Model, summarized at the program level, are then used to populate tables E-6 and G-6 in the appendix of the EEPP. The Consultant Team conducted an in-depth review of the appendix tables to identify trends between years and between drafts. The Consultant Team also reviewed to see that values from the BC models were correctly reflected in the appendix tables and that the values in the tables added up properly. Overall, analysis of cost-effectiveness focused on the methodology used to calculate cost effectiveness, the processes used to update the model inputs from year to year, and the general model assumptions and inputs.

Consistent and on-going oversight of National Grid energy efficiency planning and implementation activity takes place both through direct interactions with National Grid staff, and through participation in the Collaborative process. For program year 2017, the Consultant Team's oversight of the planning process was comprehensive and in-depth, as illustrated below:

- The Consultant Team worked with National Grid analysts and sector managers to identify, prioritize, and address pertinent issues. The scope of the issues investigated and reviewed was broad and related to both program design and cost effectiveness.
- Consultant Team analysts reviewed two drafts of the BC Model associated with each of the EEPP drafts. As part of this review, some minor issues were identified in the TRM and BC Models and were addressed by National Grid.
- The Consultant Team found that the overwhelming majority of the modeling and cost-effectiveness assumptions reviewed were reasonable and well-supported. Any cost-

effectiveness issues identified in the BC model and in the review of the EEPP were addressed at the portfolio and program level by the National Grid's analyst team.

- Review of the cost-effectiveness of the EEPP was facilitated by the review of updates to the TRM assumptions. The TRM documents the savings algorithms and assumptions used for prescriptive efficiency measures. Starting in 2011, the Consultant Team has annually reviewed assumptions in the TRM and any updates resulting from recent evaluations and changes to federal standards. National Grid used new results from the evaluations that were recently completed to update multiple measure baselines, net-to-gross ratios, measure lives, and other measure assumptions.

Overall, the Consultant Team found that the application of the TRC test follows standard practice, including:

- The cost and benefit components of the TRC test;
- The methodology for monetizing benefits based on avoided costs;
- Adjustments of market effects (i.e., free ridership and spillover);
- Accounting for inflation in the avoided costs and measure costs;
- Net-to-gross assumptions are adjusted following evaluations;
- Discounting the future value of money;
- Inclusion of non-program-specific costs at the sector and portfolio levels;
- Adjustment of baselines following updates to building codes and federal standards;
- Pilot programs are used appropriately to determine the cost-effectiveness and viability of new measures.

In the future, the Consultant Team will continue working with National Grid, the EERMC, and the Collaborative to provide informed review of the savings assumptions used in the BC Model and TRM. The interaction between cost-effectiveness review and solid understanding of program design and implementation provides a high level of confidence to regulators and Rhode Island consumers that they are realizing benefits that will be reflected in their bills and the performance of their buildings and their utility systems.

In conclusion we find, based on this review that National Grid's planned programs for 2017 are cost-effective based on the TRC test, as described in the program plans.

IX. Conclusion

For the reasons stated herein, the EERMC and the EERMC's Consultant Team finds that National Grid's 2017 EEPP is cost-effective and lower cost than the acquisition of additional supply pursuant to R.I.G.L. § 39-1-27.7 (c)(5).