

Cost-Effectiveness Report On National Grid's 2015 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 November 14, 2014**

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 *2015 Energy Efficiency Program Plan (Docket 4527) and System Reliability Procurement Report (Docket 4528)* filed on October 31, 2014 by National Grid, are cost-effective according to the Total Resource Cost (TRC) test. We also find that the implementation strategies outlined in the Plan will 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.

These findings and the remainder of this report were presented to the EERMC by the EERMC Consultant Team at its November 13, 2014 meeting, and were approved and adopted in a vote of the EERMC.

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 *2015 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 16, 2014 meeting where the Council voted to endorse the Plan and formalized the request for cost-effectiveness review.

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 documents 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 #4202, and again in 2014 under

Docket #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 (adjusted appropriately for gas measures and programs) 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 EERMC Consultant Team is composed of Vermont Energy Investment Corporation ("VEIC") serving as the lead contractor, Optimal Energy Inc. ("OEI"), Energy Futures Group, and Prahll Consultant. The Consultant Team is led by Scudder Parker and Mike Guerard. Key skills and expertise are provided by Sam Huntington on data and analytical issues; Sean Bleything, Richard Faesy and Glenn Reed on the Residential market sector; George Lawrence and Phil Mosenthal on the Commercial / Industrial (C&I) sector; and Ralph Prahll 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 evaluation, measurement and verification. Many of the individual consultants included on the Consultant Team have 15-25 years of direct experience in energy efficiency and broader regulatory policy. All participants also practice in jurisdictions outside of Rhode Island (many of those in New England) and their experience in those settings provides an important context and perspective to inform the EERMC in its oversight role.

Over the last seven years in its role as the EERMC's technical consultant, the Consultant Team has developed strong familiarity with Rhode Island's policy, planning, implementation, and evaluation experience which provides a high level of assurance that practices in Rhode Island are consistent with regional and national best practices in Energy Efficiency Least Cost Procurement.

IV. Consultant Findings

The EERMC Consultant Team finds that both the individual programs, and in combination, the portfolio of programs presented in the 2015 Energy Efficiency Program Plan (EPPP) filing by National Grid are cost-effective according to the TRC. We also find that the System Reliability

Procurement (SRP) Report is cost-effective, and that with the recommended adjustments to the TRC as required by Rhode Island law, the combined heat and power (CHP) portion of the plan is cost-effective. We also find that the gas and electric programs and portfolio proposed represent reasonable, prudent and reliable ramp-up of National Grid's implementation efforts to secure cost-effective savings for both electric and natural gas customers. 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 2015 EEPP to the Commission.

The EERMC has met its review and input requirements both at its regularly scheduled meetings with National Grid sector strategy and through the more frequently scheduled EERMC Collaborative Subcommittee meetings and phone calls. The EERMC Collaborative Subcommittee is comprised of EERMC members, the EERMC Consultant Team, the Acadia Center (f/k/a Environment Northeast), the Division of Public Utilities and Carriers with representation from the Attorney General's Office, People's Power and Light, TEC-RI, all interacting with National Grid's energy efficiency and system reliability teams. The EERMC Consultant Team has had repeated direct contact with National Grid staff before, during, and after the Collaborative Subcommittee meetings in order to provide consistent oversight and input.

For the 2015 EEPP, the following process was followed:

August:

- 8/8 – Technical Reference Manual for Estimating Savings from Energy Efficiency Measures (TRM) status review conference call with National Grid
- 8/12 – Meeting with National Grid’s C&I Strategy Group to review elements of C&I plan
- Ongoing Consultant Team review, discussions and exchange of comments with National Grid on the TRM.

September:

- 9/2 & 9/30 – Meetings with National Grid’s Residential Strategy Group to review elements of residential plan
- 9/5 & 9/19 – First two drafts of the 2015 EEPP, as well as Benefit Cost Models (B/C Model), were submitted to the Collaborative and EERMC by National Grid and reviewed by the Consultant Team. Comments and proposed enhancements submitted to National Grid within 10 days of receiving each draft.
- 9/10 – Meeting with National Grid’s C&I Strategy Group to review elements of C&I plan
- 9/11 & 9/22– Collaborative meetings at National Grid to review Plan direction, content and timeline
- 9/12 – First draft of SRP received and reviewed
- 9/16 & 9/25 – Conference calls with National Grid to review BC Model inputs and values
- 9/19 – Conference call with National Grid and Collaborative on SRP first draft
- Ongoing Consultant Team review, discussions and exchange of comments with National Grid on the TRM and BC Models.

October:

- 10/1 & 10/10 – Second and third drafts of SRP received and reviewed.
- 10/9 – Third draft of the 2015 EEPP and BC Model received from National Grid; Comments and proposed enhancements submitted to National Grid within 7 days of receiving draft.
- Ongoing Consultant Team review, discussions and exchange of comments with National Grid on the TRM and BC Models.
- 10/14 – Collaborative Subcommittee conference call to review final draft of Plan
- 10/16 - EERMC meeting for final review and vote to approve the 2015 EEPP and SRP provisionally, pending any minor adjustments approved by the Council’s Executive Committee.

- 10/20 -- Collaborative Subcommittee conference call for final sign off and process review leading to filing.
- 10/31 -- Submittal of 2015 EEPP and SRP by National Grid to the Commission for approval.

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 2015 EEPP methodology and found it to be consistent with standard practice and the Standards. The methodology was also effectively documented in Attachment 4 of the Plan filing. 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

transmission and distribution system capacity), 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). For the CHP program, an economic development and environmental adder are also included in the total benefits, and the assessment of distribution benefits is appropriately modified. The benefits for reduced electric energy (MWh and MW) and other resources are monetized based on avoided costs.

- The costs in the TRC are all costs 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 is 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 2015 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., 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 (EM&V)

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 2015 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.

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

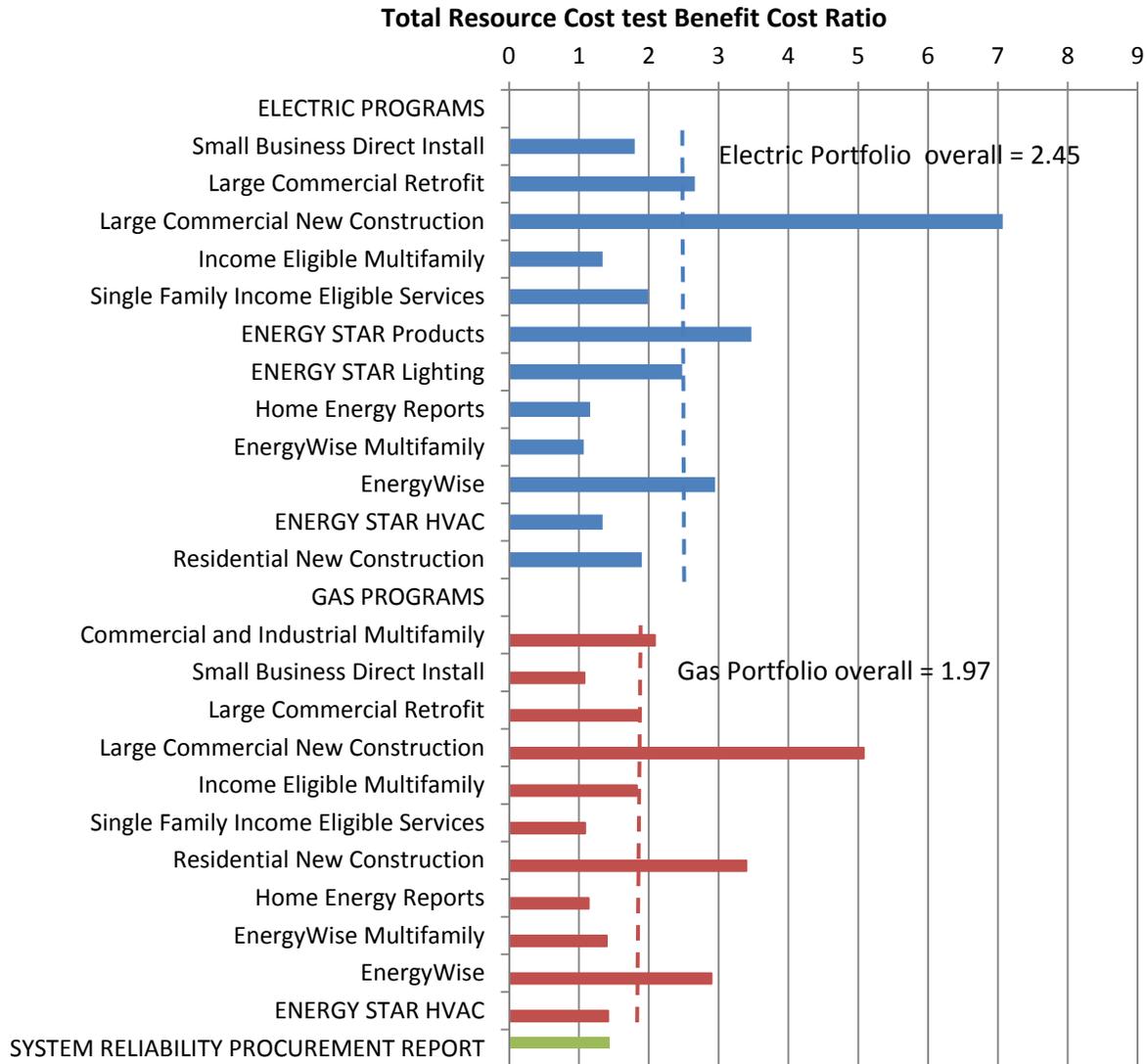
EM&V activities in Rhode Island have generally been managed by the evaluation department of National Grid, with input from the Rhode Island Collaborative Subcommittee and (more recently) the EERMC, following high-level regulatory direction set by the Commission, Division, and the Office of Energy Resources. 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. We have worked with National Grid on behalf of the EERMC on approaches to producing more Rhode Island-specific results within current EM&V budget limitations.

VIII. Cost Effectiveness Review and Findings

This section summarizes the cost-effectiveness of programs presented in the 2015 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 2015 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 1.07 (EnergyWise Multifamily) to 7.07 (Large Commercial New Construction). Likewise, the natural gas programs are all projected as cost-effective with BCRs ranging from 1.08 (Small Business Direct Install) to 5.08 (Large Commercial New Construction). The BCR for SRP is 1.44. 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, benefit/cost 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 2014 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. As part of the review, the Consultant Team ensured that updates from evaluations were incorporated in the 2015 TRM and that any minor issues that had not been addressed in 2014 were addressed in the 2015 TRM. Due to the similarities in

geography and programs, the Consultant Team also reviewed recent evaluations for Massachusetts and incorporated their findings where they were deemed relevant.

- The savings values in the TRM are integrated into National Grid’s electric and gas benefit/cost models, which are used to calculate program savings, incentive costs, benefits, and the cost-effectiveness of programs. The Consultant Team reviewed the four drafts of the electric and gas benefit/cost model thoroughly, ensuring that updates to the TRM are reflected in the benefit/cost 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, the mix of measures, and that net-to-gross values are appropriate and reflect values from the latest evaluations available. The 2015 electric and gas benefit/cost models were compared to the 2014 models to ensure that changes to the program measures are appropriate and reflect changes to the EEPP.

The values from the benefit/cost 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 benefit/cost 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 (timeline documented in Section V). For program year 2015, 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 project 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 several drafts of the benefit/cost model associated with each of the EEPP drafts. As part of this review, several minor issues were identified in the TRM and benefit/cost model and 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 benefit/cost model and in the review of the EEPP were addressed at the portfolio and program level by National Grid’s analyst team. In

addition, the Consultant Team's continued deep involvement in program design review led to heightened scrutiny of cost-effectiveness metrics associated with the programs.

- Review of the cost-effectiveness of the EEP was facilitated by the review of updates to the TRM assumptions. The TRM documents the savings algorithms and assumptions used for prescriptive efficiency measures. In 2011, members of the Consultant Team oversaw National Grid's development of the 2012 TRM. In 2012, 2013, and 2014 the Consultant Team again 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.

In summary, the EERMC Consultant Team's review of the general model assumptions and inputs for measure and program costs and savings was performed via meetings with National Grid and by looking at specific measures in the TRM and cost-effectiveness benefit/cost model. The review focused on the examination of many key measure-level assumptions in the model and consistency with values in the TRM. The Consultant Team also looked for any trends and outliers that would indicate errors. The Team identified minor errors and provided feedback to National Grid to have those errors corrected in the cost-effectiveness benefit/cost model. No significant error was identified that would bring into question the projected cost-effectiveness of the programs or portfolio.

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 Subcommittee to provide informed review of the savings assumptions used in the benefit/cost 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 2015 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 2015 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).