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November 27, 2013

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

RE: Docket 4451 and 4453 – EERMC Review and Approval of the 2014 Energy  
Efficiency Program Plan and System Reliability Procurement Report Cost-Effectiveness  
Pursuant to § 39-1-27.7(c)(5)

Dear Ms. Massaro:

Pursuant to Rhode Island's Least Cost Procurement law, I am transmitting 10 copies of the Energy Efficiency and Resource Management Council's ("EERMC") review and approval of the cost-effectiveness of the 2014 Energy Efficiency Program Plan ("EEPP") and the 2014 System Reliability Procurement Report ("SRP") as supported by its Consultant Team's Cost-Effectiveness Memorandum completed for the EERMC. The Cost-Effectiveness Memorandum and Finding of Cost-Effectiveness with regard to National Grid's proposed EEPP and Budget for 2014, and its SRP for 2014 effectively documents that the conditions to meet the approved definition of cost-effectiveness have been met. The Memorandum is accompanied by Attachment A, a compilation of the qualifications of the EERMC Consultant Team members.

We regret the delay in filing this Memorandum, and will make every effort to assist the PUC in reviewing this document and of course will respond to any questions regarding it as promptly as possible.

It is the purpose of this document to provide the required review and finding of whether National Grid's 2014 SRP and EEPP are cost-effective and submit that review and

finding as evidence to the Rhode Island Public Utilities Commission (“Commission” or “PUC”) necessary for the Commission’s approval of a fully reconciling funding mechanism to fund the 2014 SRP and EEPP filed by National Grid.

Just as the Consultant Team was finalizing this report and presenting it to the EERMC at its November 14 meeting National Grid discovered that it had used an incorrect load forecast for both electric sales and natural gas sales for 2014 that would result in a higher rate for the fully reconciling funding mechanism, known also as the system benefit charge (SBC) in order to fund the proposed programs. While that effect upon the rate of the SBC does not in any way impact the cost-effectiveness of the programs, a number of participants in the Collaborative Sub-Committee of the EERMC were concerned about the change in level of the rate from the original filing, and that concern had been a major issue in shaping the adjustment to the final agreement from the November 1, 2013 filed version, which was signed off upon by other parties.

Once the error in load forecast resulted in a proposed increase in the SBC rate, a new (and hurried) round of negotiation and compromise took place, and resulted in minor modifications to the electric programs and the SRP Report, that were quite readily agreed to. These modifications did not adversely affect (in fact they slightly increased) the cost-effectiveness of the electric programs.

The impact of the possible SBC modification that would have been required to fully fund the original program budget on the natural gas efficiency portfolio was more significant. Therefore the program modifications considered to moderate the proposed SBC increase resulted in greater impact on National Grid’s proposed programs for this sector, including significant cuts in budgets and savings along with certain other program modifications.

While both the proposed budgets and savings for the natural gas program portfolio are reduced in the amended filing, the spending is reduced more than the savings, and therefore we conclude that the portfolio will still be cost-effective, consistent with our original finding. The EERMC also concludes that the reductions, though they will reduce the total benefits to Rhode Island consumers, will not impair the ability of National Grid to continue delivering an impressive level of energy efficiency services, and will allow Grid to continue ramping up its services in the natural gas sector to the levels anticipated in the proposed Savings Targets for 2015-17 filed with the Commission in September.

The EERMC, thus finds that the Electric, the SRP, and the Natural Gas program proposals, savings targets, and budgets, are cost-effective, and consistent with the principles of Least Cost Procurement, and that a fully reconciling funding mechanism for funding them should be approved.

Respectfully Submitted, THE RHODE ISLAND ENERGY  
EFFICIENCY AND RESOURCE MANAGEMENT COUNCIL

By its Consultant Team Representative, Scudder Parker

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sparker@veic.org

CERTIFICATE OF SERVICE I hereby certify that on the 27th day of November, 2013, I delivered a true copy of the foregoing document either by first class mail or by electronic mail to the Rhode Island Public Utilities Commission as required by R.I.G.L. § 39-1-27.7 (c) (5) .

Scudder Parker

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Scudder Parker

# The Cost-Effectiveness of National Grid's 2014 Energy Efficiency Procurement Plan & System Reliability Procurement Report:

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



Working on Behalf of the

State of Rhode Island  
**RI Energy Efficiency & Resource** Management Council

Submitted to the Rhode Island Public Utilities Commission  
On November 27, 2013

## **EERMC Consultant Team Findings**

***This finding and this Cost Effectiveness Report were presented to the Energy Efficiency and Resource Management Council (EERMC or Council) by the EERMC Consultant Team at its November 14, 2013 Meeting, and were approved and adopted by a vote of the EERMC.***

The EERMC Consultant Team finds that both the individual programs and, in combination, the portfolio of programs presented in the 2014 Annual Energy Efficiency Program Plan (EPPP), and the System Reliability Procurement Report (SRP), filings by National Grid are cost-effective according to the Total Resource Cost test (TRC). We also find that the core programs and portfolio proposed represent a reasonable and credible continuing ramp-up of National Grid's energy efficiency implementation efforts. We note that the 2014 EPPP includes an unprecedented (but probably not precedent-setting) inclusion of a very large Combined Heat & Power project that has a significant impact on the total electric savings and costs for this year's portfolio. 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.

The EERMC Consultant Team reports that the proposed EPPP for 2014 includes a significantly higher level of electric savings than originally planned; achieves the targeted level of natural gas savings, and improves cost-effectiveness for both electric and natural gas relative to the projections for 2014 contained in the 2012-2014 Energy Efficiency and System Reliability Procurement Plan (2012-2014 Plan) filed with the Commission by National Grid on September 7, 2011.

### **I: Introduction**

In 2010, R.I.G.L. § 39-1-27.7 (c)(5) was amended to state:

*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.*

It is the purpose of this document to provide the required review and finding of whether National Grid's 2014 EEPP is cost-effective and submit that review and finding as evidence to the Rhode Island Public Utilities Commission ("Commission" or "PUC") necessary for the Commission's approval of a fully reconciling funding mechanism to fund the 2014 EEPP filed by National Grid.

The original legislative definition of least cost procurement is found at R.I.G.L. § 39-1-27.7 (a)(2) and is:

*Least-cost procurement, which shall include procurement of energy efficiency and energy conservation measures that are prudent and reliable and when such measures are lower cost than acquisition of additional supply, including supply for periods of high demand.*

The Energy Efficiency and Resource Management Council ("EERMC" or "Council") instructed its Consultant Team to conduct a formal review and present written evidence of its findings regarding the cost-effectiveness of National Grid's 2014 EEPP, filed November 1, 2013 with the Commission in Docket No. 4451. The Consultant Team conducted its review as requested by the EERMC and has presented its findings to the EERMC Sub-Committee for its review.

At its October 17, 2013 meeting the EERMC: (1) approved the Consultant Team's preliminary Cost Effectiveness determination – that National Grid's 2014 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) and, (2) directed that this Cost-Effectiveness Report be prepared in consultation with the EERMC Sub-Committee and be submitted to the EERMC at its November 14<sup>th</sup> meeting.

At its November 14<sup>th</sup> meeting the EERMC also approved this Cost-Effectiveness Report and its conclusion – that National Grid's 2014 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) -- and directed that the Cost-Effectiveness Report be submitted to the Commission as required by that Section.

The Consultant Team also recommended that the 2014 SRP, also filed on November 1, 2013 under docket 4453, is cost-effective and should be approved and funded. This finding was approved by the EERMC at its November 14, 2013 meeting.

This document represents a formal statement of the Consultant Team's conclusion on behalf of the EERMC, describes the nature and process of the review it conducted, and documents the professional experience and qualifications of the Consultant Team to conduct such a Cost-Effectiveness Review of National Grid's 2014 EEPP.

## **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, all Rhode Island ratepayers stand to save hundreds of millions of dollars in energy bills over the next decade.

The EERMC proposed to the PUC a draft set of "standards for energy efficiency and conservation procurement and system reliability" ("Standards"), as required in the 2006 legislation, which the EERMC recommended for adoption by the PUC on June 1, 2008. The purpose of these Standards was to guide National Grid in its 2009-2011 Plan and its System Reliability Procurement Plan filed by the Company on September 1, 2008. The EERMC filed its draft Standards on February 29, 2008. Through Docket No. 3931 the Commission conducted a process that included both written evidence and public hearings. The PUC ordered a slightly revised version of those standards in Open Meeting on June 12, 2008, and in a formal Report, issued July 18, 2008.

On September 2, 2008 National Grid filed its 2009-2011 Energy Efficiency Procurement Plan. The 2009-2011 Procurement Plan was informed in part by the Phase I Opportunity Report submitted by the consulting firm KEMA, as required in R.I.G.L. § 39-1-27.7 (c) (3), submitted July 15, 2008. The PUC conducted extensive hearings, and parties participated in substantial review and revisions, and the 2009-2011 Procurement Plan was approved by the PUC in Open Meeting on March 31, 2009, and in written Order, on April 17, 2009. This first 3-year plan was based on the guidance afforded by the Standards, and substantial input from the EERMC and its Consultant Team, as well as the Collaborative Subcommittee of the EERMC.

In accordance with Rhode Island's Least Cost Procurement law, the EERMC proposed revisions to the Standards in preparation for the second three-year planning cycle (2012-2014). Revised Standards were adopted by the Commission in Docket No. 4202, Order #20419, on July 25, 2011. In compliance with R.I.G.L. § 39-1-27.7.1(f), the EERMC also proposed, and the PUC approved in that same Order, Annual Energy Saving Targets for both electric and natural gas least cost procurement for the years 2012, 2013 and 2014.

The Standards ordered by the PUC identify the Total Resource Cost (TRC) test as the methodology to use in determining whether the measures, programs, and the portfolio of energy efficiency (EE) services are cost effective and less expensive than supply under the law. In Section 1.2, A, 2, (a) and (b), the standard for determining cost-effectiveness is stated:

*(a) The Utility shall assess measure, program and portfolio cost-effectiveness according to the Total Resource Cost test (“TRC”). The Utility shall, after consultation with the Council, propose the specific benefits and costs to be reported and factors to be included in the Rhode Island TRC test.*

*(b) That test shall include the costs of CO<sub>2</sub> mitigation as they are imposed and are projected to be imposed by the Regional Greenhouse Gas Initiative. They shall include any other costs associated with greenhouse gas reduction that are actually being imposed on energy generation and can be identified and quantified.*

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.

On June 21, 2012, an amendment to Rhode Island’s Least Cost Procurement Statute, R.I.G.L. §39-1-27.7, to support the installation and investment in clean and efficient CHP was signed into law.<sup>1</sup> The new CHP provision requires that National Grid document this support annually in its energy efficiency program plan by including a plan for identifying and recruiting qualified CHP projects, incentive levels, contract terms and guidelines, and achievable megawatt targets. In addition, the law requires that the following criteria be factored into the Company’s CHP plan: (i) economic development benefits in Rhode Island; (ii) energy and cost savings for customers; (iii) energy supply costs; (iv) greenhouse gas emissions standards and air quality benefits; and (v) system reliability benefits.

In accordance with the requirement of this amendment, National Grid proposed a number of adjustments to the TRC as defined in the Standards approved by the PUC in Dockets No. 3931 and No. 4202. The Consultant Team, the EERMC Collaborative Sub-Committee, and the EERMC CHP sub-committee reviewed these proposed TRC modifications and agree that they are consistent with the requirements of Rhode Island law, and represent reasonable estimates of the benefits mandated for inclusion in the assessment of CHP projects in Rhode Island. These adjustments include:

- An Economic Benefit adder of \$2.51 of lifetime gross state product increase per dollar of program investment;
- A schedule of benefits from reduced Volatile Organic Compounds, SO<sub>2</sub>, and Particulate Matter emissions;

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<sup>1</sup> See R.I.G.L. § 39-1-27.7(c)(6)(ii) through (iv); For the legislative history, see P.L. 2012, Ch. 363, S2792 Sub A (Enacted June 21, 2012).

National Grid has agreed to assess each CHP installation as a custom project, thereby ensuring that the specific costs and benefits of each project are appropriately evaluated. This will help assure that each installation is cost-effective.

### **III. Summary of EERMC Consultant Team's Qualifications**

The Consultant Team is composed of Vermont Energy Investment Corporation (VEIC) as the lead contractor, Optimal Energy Inc. (OEI), Energy Futures Group, and two independent consultants. Scudder Parker (VEIC) is the Project Manager. Mike Guerard (OEI), a Rhode Island resident, coordinates the Consultant Team interactions with National Grid, Council members and other stakeholders. Gabe Arnold (OEI), George Lawrence (VEIC), Erin Carroll (VEIC), Phil Mosenthal (OEI), and Doug Baston of North Atlantic Energy Advisors provide a deep level of expertise in Commercial and Industrial program design. Sean Bleything (VEIC), Nick Lange (VEIC) and Energy Futures Group (Richard Faesy and Glenn Reed) provide deep knowledge of residential program design. Juliette Juillerat (VEIC), Cliff McDonald (OEI), Sam Dent (Dent Consulting), and Sam Huntington (OEI) form the analytical team that reviews screening and modeling assumptions. Ralph Prah, of Prah Consulting assists on EM&V issues. 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.

A full listing of qualifications of the various team members and the resumes of the participating individual consultants is provided in **Attachment A**.

The Consultant Team has been involved in the Rhode Island oversight, program design, and implementation process since it was hired early in 2008. The Consultant Team:

- Helped draft the Standards for Least Cost Procurement proposed by the EERMC in 2008 and the revision to the Least Cost Procurement Standards and System Reliability Procurement Standards in 2011, both of which were approved by the Commission;
- Oversaw the development of Phases I and II of *The Opportunity for Energy Efficiency that is Cheaper than Supply* (KEMA) report;
- Contributed to the development and review of EEPF filings by National Grid for 2009, 2010, 2011, 2012, 2013 and 2014.

- Analyzed the cost-effectiveness of the annual EEPP filings in 2009, 2010, 2011, 2012 and 2013.
- Documented the findings of the cost-effectiveness of the 2011, 2012 and 2013 EEPP filings for the PUC on behalf of the EERMC.
- Contributed to the development and review of National Grid's 2012-2014 Energy Efficiency Procurement Plan;
- Analyzed the cost-effectiveness of the 2012-2014 Energy Efficiency Procurement Plan and documented those findings for the PUC on behalf of the EERMC;
- Developed the Natural Gas Opportunity Report for the EERMC and identified new natural gas (and other delivered fossil fuel) energy efficiency technologies and strategies. This report was presented to the EERMC in July, 2012.

In 2013, the Consultant Team has also worked closely with the Office of Energy Resources (OER). In this context it:

- Provided support as the OER worked with stakeholders to develop a new Rhode Island State Energy Plan;
- Advised the OER as it worked to secure legislative authorization for a new Property Assessed Clean Energy (PACE) Program and for a new approach to securing efficiency savings from street lighting;
- Provided input as the OER developed its proposals for allocation of Regional Greenhouse Gas Initiative (RGGI) funds;
- Worked closely with the OER staff in developing and delivering the Rhode Island Public Energy Partnership (RIPEP) program;
- Worked with OER, the EERMC and National Grid in developing working partnerships with Green and Healthy Homes, the Alliance for Healthy Homes, Emerald Cities-Providence and the Rhode Island Housing Authority.
- Worked with OER and National Grid to design pilot program to locate solar installations in System Reliability Plan (SRP) target areas.

This strong familiarity with the Rhode Island policy, planning, implementation, and evaluation experience 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.<sup>2</sup>

#### IV. Consultant Findings

The Consultant Team finds that both the individual programs and in combination, the portfolio of programs presented in the 2014 EEPP filing by National Grid are cost-effective according to the TRC. We also find that the System Reliability Procurement Report is Cost-Effective, and that with the recommended adjustments to the TRC as required by Rhode Island law, the CHP portion of the Plan is cost-effective. We also find that the programs and portfolio proposed represent a reasonable and credible continued ramp-up of National Grid’s implementation efforts to secure cost-effective savings for both electric and natural gas customers. We conclude that these 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 budget should be approved by the Commission within 60 days as required by that section.

The annual savings targets proposed in the 2014 EEPP meet or exceed those established for 2014 in the 2012-2014 Energy Efficiency Procurement Plan, and the TRC benefit-cost ratio (BCR) of the 2014 EEPP is higher than previously estimated:

*Figure 1: Savings and BCR comparison*

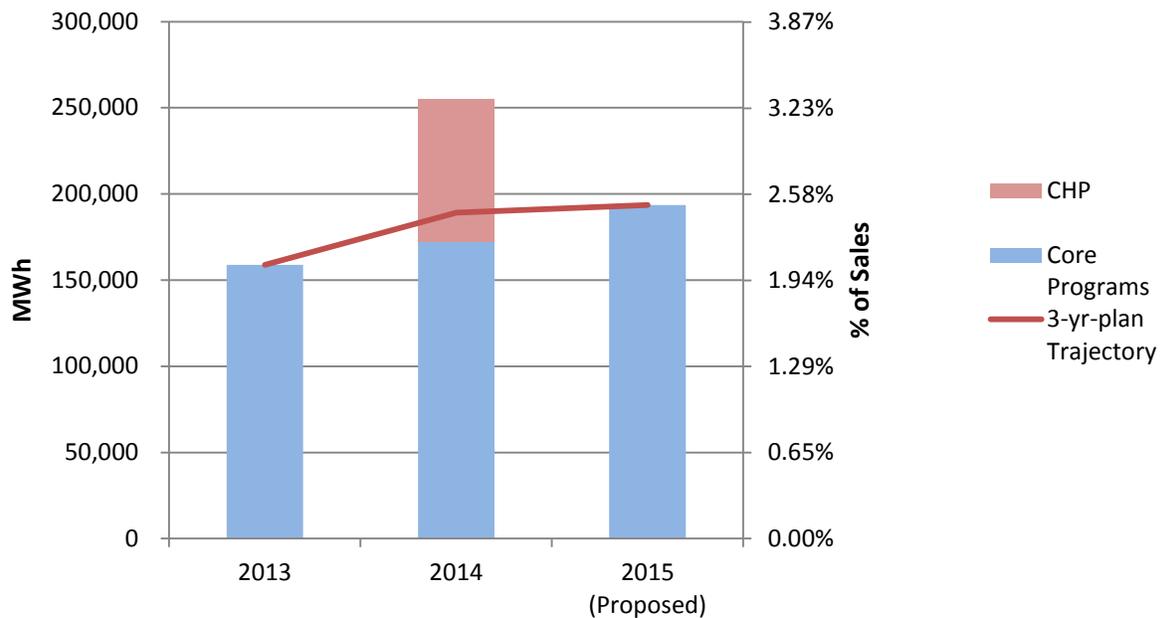
	<b>Projected 2014 savings / BCR in current 3-Year Plan</b>	<b>2014 Proposed EEPP savings / BCR</b>
<b>Electric</b>	189,068 MWh / 2.26	255,314 MWh / 3.15
<b>Natural Gas</b>	355,917 MMBtu / 1.51	355,923 MMBtu / 1.69

The primary driver for the increased electric cost-effectiveness and savings is the 2014 EEPP’s inclusion of both the program cost impact and the dramatic savings to be derived from the large CHP project. This represents a significant increase in savings in the 2014 EEPP from the level of savings projected in the 2012-2014 Three Year Plan. National Grid provides a discussion of this significant change on pages 2 and 4 of its Settlement filing under Docket No. 4451. Table 2 illustrates the effect of this CHP project in the context of three years of planned program implementation.

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<sup>2</sup> The EERMC and its Consultant Team also work closely with the Division and its Consultant through the Collaborative Sub-committee.

Figure 2: Savings Impact of CHP project



For the purposes of this Cost Effectiveness Memorandum, the Consultant Team finds that:

- The planned electric savings are significantly in excess of projected savings for the year; the gas savings are in line with the 2014 projection.
- The savings are cost-effective according to TRC analysis adjusted as instructed by Rhode Island legislation (and approved by the Commission).
- The actual cost of acquiring savings for the CHP project are lower per unit of savings than the cost of other energy efficiency savings and therefore;
- The level of electric savings is higher, but the cost per unit of savings is lower than projected for the total portfolio.
- This unique CHP project has the effect of driving savings up for 2014, but the structure of the 2014 Plan is designed to maintain and not inhibit the ability and capacity of National Grid to meet the savings targets that the EERMC has proposed to the PUC on September 1, 2013 for the 2015-17 planning cycle.

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

- Section V: 2014 EEPP review timeline

- Sections VI and VII: Overview of the cost-effectiveness screening test and discussion of the Consultant Team’s in-depth review of the 2014 EEPP.
- Section VIII: Review of National Grid’s Evaluation Process.

Finally, the Consultant Team’s requisite skills, experience, and demonstrated expertise in the subject matter are documented in Attachment A.

## **V. Ongoing Oversight by the EERMC and its Consultant Team**

The EERMC, consistent with its statutory obligations under the Rhode Island “Comprehensive Energy Conservation, Efficiency & Affordability Act of 2006,” plays an active role with National Grid to guide, facilitate, and support public and independent expert participation in the review, assessment, and evolution of utility efficiency procurement and programs. The Council believes this input is critical to having the programs and related new institutional capabilities evolve into resource acquisition tools that can effectively implement the Rhode Island law to procure all cost-effective energy efficiency. It is also anticipated that as the targets increase and the challenge grows, this level of input and oversight will continue to increase to assure goal attainment.

The Consultant Team was hired in 2008 through a competitive bid. In October 2011, the Consultant Team was selected again by the EERMC in a competitive bid to provide oversight of the planning and implementation of energy efficiency in Rhode Island going forward for 2012. Since 2008, the Consultant Team has served as the EERMC’s resource in reviewing energy efficiency policy generally, identifying best practices, reviewing energy efficiency programs, and providing oral and written testimony as appropriate. The Consultant Team has engaged National Grid staff directly over its five years of service to the EERMC, and is very familiar with Rhode Island law, regulatory policy, and utility practice. Its qualifications are detailed in Section VI of this Report. As mentioned in Section II, above, the Consultant Team provided active oversight of both phases of the electric Opportunity Report and conducted the 2012 Gas Opportunity Report.

As required by Docket No. 3931 and the Energy Efficiency Procurement Standards, a consistent and effective process has been carried out to guide the annual development and submittal of National Grid’s EEPP to the PUC. The primary forum for this process has been the Collaborative Subcommittee to the EERMC. The Collaborative functioned as the “DSM Collaborative” until 2008. Given the overlapping responsibilities of the DSM Collaborative and the EERMC in working with National Grid on energy efficiency planning, the Collaborative was made into a subcommittee of the EERMC in 2008. This enables the critical expertise and experience of the existing group to be leveraged to help meet the Council’s statutory responsibility of monitoring,

evaluating, and proposing changes to existing programs and new procurement and program strategies. The composition of the Collaborative has varied since 1991, as some organizations have withdrawn and others have joined. Members of the Collaborative currently include representatives from National Grid staff, the Division, the Office of Energy Resources (OER), The Energy Council (TEC-RI), and Environment Northeast (ENE), along with participation from several EERMC members and representatives from the Consultant Team. People's Power and Light, representing primarily residential customers and small business re-joined the Collaborative in the summer of 2013. Although the Collaborative Subcommittee meets regularly throughout the year, beginning in July more frequent meetings, and between-meeting correspondence is typically initiated to begin formulation of the subsequent year's program planning, and ultimate filing.

In addition, the EERMC this year created a SRP subcommittee that included representatives of National Grid, the EERMC and the OER.

For the 2014 EEPP, the following process was followed:

**July / August:**

- Collaborative meeting held on July 30<sup>th</sup> to review proposed timeline and high level discussion on 20143 EEPP and SRP areas of focus.
- Collaborative meetings held on August 22<sup>nd</sup> to review and revise preliminary program design concepts, as well as savings and budgets reflected in the 2012-2014 Plan that will translate into the 2014 EEPP.
- Consultant Team members researched and developed reports on best practice areas to help inform the 2014 EEPP, along with "Top 10" areas of focus for both residential and C&I sectors, and presented these to National Grid Sector Strategy Groups.
- Members from the Consultant Team held strategy meetings covering the C&I and residential (including income-eligible) sectors on the 2014 EEPP development process on July 24<sup>th</sup> and August 27<sup>th</sup> with National Grid staff.

**September:**

- First (Sep. 4<sup>th</sup>) and second drafts (Sep. 20<sup>th</sup>) of the 2014 EEPP, as well as excerpts from the 2014 Technical Reference Manual (TRM), were submitted to the Collaborative by National Grid and reviewed by Consultant Team. Comments and proposed enhancements submitted to National Grid within 10 days of receiving each draft. The TRM provides formulas and assumptions used for estimating savings for efficiency measures promoted by National Grid's energy efficiency programs.

- First draft of the SRP submitted by National Grid and reviewed by the Consultant Team on September 6<sup>th</sup>
- Conference call with stakeholders on the first draft of the SRP on September 11<sup>th</sup>.
- Collaborative meeting on Sep. 12<sup>th</sup> and 20<sup>th</sup> to review drafts and feedback from stakeholders.
- National Grid presentation to EERMC on Sept. 13<sup>th</sup> on status of EEPP drafts; EERMC appoints a 2014 EEPP subcommittee to support review of plan leading up to October 18<sup>th</sup> EERMC vote.
- First and second drafts (Sep.17<sup>th</sup> and 28<sup>th</sup>) of the 2013 cost-effectiveness benefit/cost model received from National Grid.
- CHP Community Review Meeting (Sep. 17<sup>th</sup>)
- Ongoing Consultant Team review, discussions and exchange of comments with National Grid on the TRM.

#### **October:**

- Multiple conference calls between National Grid staff and Consultant Team members to resolve program design, savings, cost, and budget issues, and between the Consultant Team and the EERMC's 2014 Plan Subcommittee.
- Second draft of SRP submitted and reviewed by Consultant Team.
- Third draft (Oct. 8<sup>th</sup>) of the 2014 EEPP received from National Grid; comments submitted by Consultant Team.
- Third draft of benefit/cost model provided by National Grid to the EERMC Consultant Team on Oct. 11<sup>th</sup>.
- Consultant Team presentation to EERMC on October 18<sup>th</sup> on the 2012, and recommendation to approve 2014 EEPP and SRP since they were deemed cost-effective and less than the cost of supply.
- EERMC approves the 2014 EEPP and SRP provisionally, pending any minor adjustments approved by the 2014 EEPP Subcommittee and informed by Collaborative stakeholder clarifications.
- Post-EERMC meeting (Oct. 22<sup>nd</sup>); Collaborative Subcommittee works with National Grid to assure all EERMC issues are factored into final version.
- Final discussion with Consultant Team and EERMC 2014 Plan Subcommittee on October 24<sup>th</sup>, providing guidance to the Consultant Team to provide a complete review of the final draft of the plans, and to direct the EERMC's attorney to sign on to the Settlement.

## November 1st

- Submittal of 2014 EEPP by National Grid to the Commission for approval.

Throughout this process, the objectives of the Standards are 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 Total Resource Cost (TRC) has been widely accepted and used by regulators and policy-makers to evaluate demand-side management programs. Most jurisdictions, including Rhode Island, use either the TRC or the Societal Test to assess efficiency program cost-effectiveness and the TRC test is widely accepted as one “best practice” option for evaluating energy efficiency programs.<sup>3</sup> 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 Rhode Island Public Utilities Commission ordered the TRC test for use in Rhode Island in its 2008 Docket No. 3931, and again in the 2011 EERMC proposed modifications under Docket 4202, on “Standards for Energy Efficiency Procurement.” 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 2014 EEPP methodology and found it to be consistent

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<sup>3</sup> A significant difference between the Societal test and the TRC is that the Societal test attempts to account for the full value of environmental externalities that are not already embedded in the avoided costs of energy.

with standard practice and the Standards. The Rhode Island TRC test includes the following benefits and costs:

- The benefits of the Total Resource Cost test 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). 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.<sup>4</sup>
- The costs include the costs of program planning and administration, marketing, rebates and other customer incentives, related implementation costs,<sup>5</sup> 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 Company's 2014 EEPP.<sup>6</sup> The costs included in the TRC are those incurred by customers and the utility as a whole to support the efficiency programs that would not have been incurred without those programs.

The costs and benefits of an efficiency program 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. Cost Effectiveness Review and Findings

This section summarizes the cost-effectiveness of programs presented in the 2014 EEPP and SRP, followed by a description of the Consultant Team's review of methodology and findings. The Standards for Energy Efficiency Procurement require that all programs and the overall portfolio must be determined to be cost-effective by having a TRC benefit-cost ratio greater

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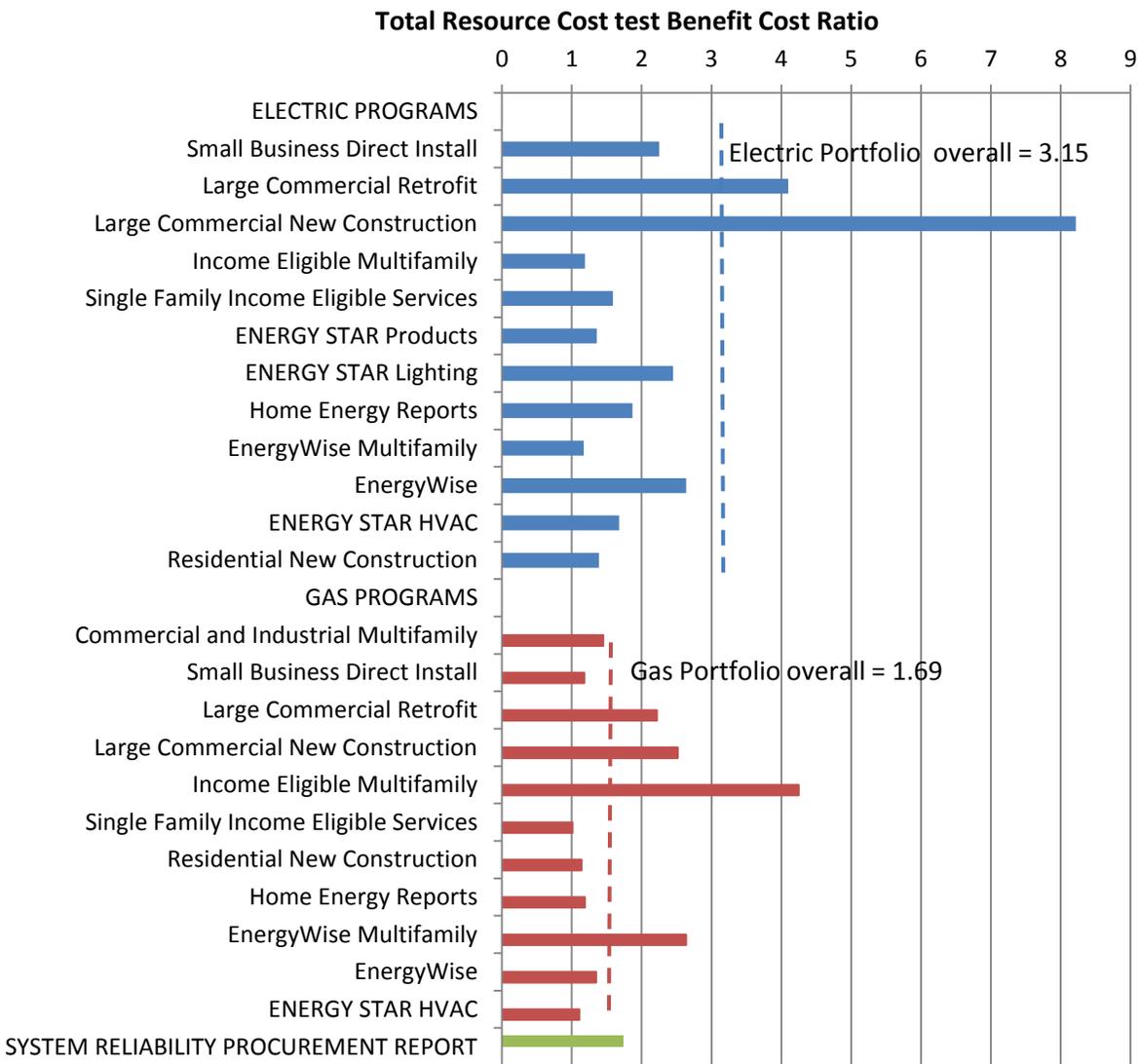
<sup>4</sup> The EERMC notes that the current TRC methodology does not fully account for the economic costs (and benefits of avoiding) environmental externalities or other un-quantified economic costs and benefits. In contrast, the legislatively mandated inclusion of economic and environmental benefits in CHP analysis represents a more comprehensive treatment of externalities than is currently applied to other energy efficiency measures on either the gas or electric energy efficiency portfolios.

<sup>5</sup> Cross-program costs (e.g., comprehensive marketing not specific to a single program) are allocated at the sector or portfolio level.

<sup>6</sup> 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

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 2014 EPP (as submitted in revised tables). 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 1.17 (EnergyWise Multifamily) to 8.22 (Large Commercial New Construction). Likewise, the natural gas programs are all projected as cost-effective with BCRs ranging from 1.01 (Single Family Income Eligible Services) to 4.25 (Income Eligible Multifamily). The BCR for SRP is 1.74. All programs have a BCR greater than 1.0 as required by the PUC’s Standards for Energy Efficiency Procurement and § 39-1-27.7 (c) (5).

Figure 3: BCR levels



The cost-effectiveness of several of the programs has changed from the 2013 EEPP to the 2014 EEPP. The program-level BCRs are determined by the measure mix and a very large number of measure-level assumptions regarding savings, costs, penetrations, avoided costs, and freeridership. The general driving factors behind some of the changes include the application of recent evaluation results, field experience of recent implementation costs, and changes to state or federal standards. At the sector and portfolio level, the cost-effectiveness is determined by the aforementioned factors as well as changes in programs offered.

The 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 memo:

- The review of updates to the 2013 Technical Reference Manual (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 Team ensured that updates from evaluations were incorporated in the 2014 TRM and that any minor issues that had not been addressed in 2013 were addressed in the 2014 TRM. Due to the similarities in geography and programs, the Team also reviewed recent evaluations for Massachusetts and incorporated their findings where they were deemed relevant.<sup>7</sup>
- 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 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. The team also reviewed 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 2014 electric and

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<sup>7</sup>Some measure-level issues were not fully resolved by the filing date. The adjustments are complicated by the fact that the issues are being addressed simultaneously in Massachusetts, and National Grid strives to coordinate savings methodology between the two states. Nevertheless, the issues are at the measure level and the programs and portfolio are all expected to remain cost-effective regardless of the changes, as either the measures would remain cost-effective or the measure mix could be changed so that programs remain cost effective. The Team will continue to discuss these topics with National Grid during PY 2014 so an agreement can be reached for 2015 and the next Three-Year Plan.

gas benefit/cost models were compared to the 2012 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 Team conducted an in-depth review of the appendix tables to identify trends between years and between drafts, and to ensure that all sectors reflect the cost-effectiveness goals of the Three-year Plan. The 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.<sup>8</sup>

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 2013, 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. Program design often impacts cost-effectiveness and many program design

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<sup>8</sup> While most measures can be found to be "cost-effective" or "non-cost-effective" in most standard applications; there may be highly cost-effective measures that are not cost-effective in certain applications; and some generally non-cost-effective measures that are cost-effective in certain situations. One challenge facing energy efficiency program designers is to keep refining the knowledge base of such situations, and tailoring programs and services to avoid situations in which a measure is not cost-effective; and discover the conditions and market segments in which a measure may prove to be cost-effective. The program and portfolio level analysis, combined with increasing service delivery sophistication are characteristics of programs that help secure all cost-effective opportunities.

recommendations are made to improve program cost-effectiveness (e.g. a change in measure mix).

- Review of the cost-effectiveness of the EEPP was facilitated by the review of updates to the TRM assumptions. The *Technical Reference Manual for Estimating Savings from Energy Efficiency Measures* (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 and 2013, 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 2014 are cost-effective based on the TRC test, as described in the program plans.**

### **Cost of efficiency – cheaper than supply**

There are different ways to compare the cost of energy efficiency to the cost of energy supply. The EERMC Consultant Team notes that in addition to the TRC being the test ordered by the PUC, it is also a preferred measure of whether efficiency is cheaper than the cost of supply. The TRC test takes account of the costs and benefits of energy efficiency for both the utility and the customer. The benefits are calculated based on the avoided costs of electric energy and demand, and fossil fuels, and it takes account of measure costs (both utility incentive and customer contribution) thus it inherently compares the costs of efficiency to the total cost of energy supply. When an efficiency measure or program passes the TRC cost-effectiveness test, it is lower cost than supply as defined by the TRC in Rhode Island pursuant to the Standards and TRC definition.

Another way that National Grid expresses the results of the TRC analysis is as a Total Net Benefits value that translates the benefit/cost ratio into a figure that represents the total benefits to society over the lifetime of the measures. We agree that National Grid’s assessment of net benefits is an accurate and appropriate measurement the magnitude of program benefits.

## **VIII. Review of Evaluation, Measurement and Verification (EM&V)**

Process 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 2014 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 the Company’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 (more recently) the EERMC, following high-level regulatory direction set by the PUC, Division, and the Office of Energy Resources. Recently, Northeast Energy Efficiency Partnerships (NEEP) has been playing a larger and more important role in establishing regionally harmonized EM&V standards. 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, New Hampshire<sup>9</sup> 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, if not superior to, prevailing industry standards. We therefore conclude that the strength of National Grid's EM&V process serves to buttress the finding that the Company's 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. We also recommended that National Grid's and the EERMC's EM&V budgets increase to support more Rhode Island-specific work.

## **IX. Conclusion**

**For the reasons stated herein, the EERMC and the EERMC's Consultant Team finds that National Grid's 2014 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).**

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<sup>9</sup> Liberty Utilities has recently acquired National Grid's customer base in New Hampshire, but historically, EM&V was integrated between Rhode Island and New Hampshire.

# **Attachment A: EERMC Consulting Team Qualifications**

## **Vermont Energy Investment Corp.**

Scudder Parker, Director, Policy  
Erin Carroll, Director, Consultative Services  
David Hill, Managing Consultant  
Peter Adamczyk, Managing Consultant  
Sean Bleything, Consultant  
George Lawrence, Consultant  
Nick Lange, Consultant  
Juliette Juillerat, Senior Analyst

## **Optimal Energy, Inc.**

Phil Mosenthal, President  
Mike Guerard, Managing Consultant  
Gabe Arnold, Senior Consultant  
Cliff McDonald, Senior Analyst  
Sam Huntington, Analyst

## **Energy Futures Group**

Richard Faesy, Principal  
Glenn Reed, Principal

## **Dent Consulting**

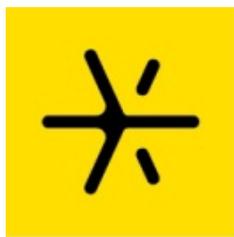
Sam Dent

## **North Atlantic Energy Advisors**

Doug Baston

## **Prahl Consulting**

Ralph Prahl



# Vermont Energy Investment Corporation

## ENERGY EFFICIENCY QUALIFICATIONS

### **Vermont Public Service Board (Efficiency Vermont)**

**2000 - Present**

VEIC is well known for its highly successful role designing, developing and implementing Efficiency Vermont (EVT), the nation's first statewide energy efficiency utility. Efficiency Vermont has a three-year, \$100 million budget and supports technical assistance, customer service, training, and financial support for investment in efficiency by residential, commercial, and industrial customers throughout the state of Vermont. Through Efficiency Vermont, VEIC conducts extensive market development work with manufacturers, vendors, contractors, and retailers who play critical roles in bringing efficiency products and services to customers.

Efficiency Vermont is also responsible for research, development, and pilot testing new efficiency and retrofit technology. VEIC has operated Efficiency Vermont under contract to the Vermont Public Service Board since its inception in 2000 and has met or exceeded every contract goal during this period. In 2008 alone, Efficiency Vermont achieved incremental annual savings equal to 2.5% of Vermont's sales – more than any other state in the country - resulting in a second straight year of negative load growth in the state.

Efficiency Vermont is also a prime example of VEIC's extensive experience developing protocols and algorithms for efficiency measure savings and renewable energy generation. As part of its EVT work, it has developed an extensive Technical Reference Manual (TRM). (See *Vermont & Ohio Technical Reference Manuals* below for further information).

### **Vermont & Ohio Technical Reference Manuals Present**

**2000/2009 -**

VEIC has extensive experience developing protocols and algorithms for efficiency measure savings and renewable energy generation. As part of its EVT work, it has developed and actively maintained an extensive (i.e., 350+ page) Technical Reference Manual (TRM) that documents all assumptions concerning: measure savings, load shapes, incremental costs, measure lives, free rider rates, and spillover rates.

The basis for these assumptions, including specific evaluation references and engineering algorithms, is detailed for all of the efficiency measures that EVT implements to claim prescriptive savings. This manual was the first of its kind in the Northeast. VEIC has also developed, in cooperation with the Vermont Public Service Board (a client) and its Contract Administrator, a formal process by which new measure characterizations can be added to the TRM and older characterizations can be updated.

VEIC has also recently delivered a full TRM to the public Utilities Commission of Ohio for use by all regulated electric and gas utilities in the state, including recommendations for the design and implementation of an electronic platform for the Ohio TRM and for an ongoing TRM update and maintenance process.

## **New Jersey Board of Public Utilities**

**2006 - Present**

The New Jersey Clean Energy Program is part of a master plan initiated by the state to achieve a 20% reduction in energy consumption by the year 2020.

As part of a comprehensive team working on this program, VEIC leads work on program design, technical support (for a variety of initiatives including new construction, HVAC, lighting and appliances, and Home Performance with ENERGY STAR), preparing regulatory filings, modifying savings algorithms and evaluation planning for all statewide residential efficiency programs.

The residential efficiency initiatives offered by the program provide a wide range of market services, including contractor training, consumer education, and direct rebates and financing incentives to NJ homeowners. Through the end of 2008, these highly successful programs surpassed several major savings milestones including:

- Nearly 100 million dekatherms of natural gas savings installed or committed.
- Over 210,000 kilowatts and 7.5 million megawatt hours of electric savings installed or committed.
- Over 170,000 metric tons reduction in carbon dioxide emissions (annual).

## **ISO New England Forward Capacity Market**

**2005 - Present**

ISO New England, which oversees New England's bulk electric power system and wholesale electricity markets, established a Forward Capacity Market (FCM) that pays suppliers to ensure sufficient capacity is available to meet future peak loads. Under the FCM, ISO New England projects the needs of the power system three years in advance and then holds an annual auction to purchase the resources necessary to satisfy the future regional requirements. This market is unique in that it allows energy efficiency and other demand resources to compete directly with generators. Participating in the FCM requires a considerable and complex bid including financial assurance, and associated claim activities.

In December 2006, after soliciting and considering input from stakeholders, the Public Service Board of Vermont issued an order directing VEIC to participate in the FCM on behalf of the State. VEIC was also authorized by the PSB to become a NEPOOL member, to participate in negotiations of final rules for the FCM, to support Vermont's efforts to secure resource parity for demand resources in the FCM, and to develop the necessary information for participating in the FCM auctions.

VEIC was one of the few efficiency program administrators to participate in workshops and negotiations with ISO-NE to delineate the rules and procedures for Demand Resources to participate in the FCM. The VEIC team continues to support and refine the market processes and mechanics necessary to ensure that efficiency resources are treated in a way that benefits ratepayers. VEIC has designed, and is implementing, extensive Measurement and Verification procedures for use by Efficiency Vermont to assure ISO, and other market stakeholders, that savings are reliable and accurate. VEIC has participated on behalf of Vermont's ratepayers in three successful auctions and continues to develop forecasts, materials, and related market processes. They continue to coordinate and advise other market participants, as well, including participation in regional and national forums to help develop future wholesale markets.

## **American Public Power – Ohio**

**2007 - Present**

In August of 2007, American Municipal Power-Ohio (now American Municipal Power or "AMP") contracted with VEIC to evaluate how energy efficiency might fit into the portfolio being developed for its 124-member municipal utilities. AMP's goal was to find a stable, affordable, and

sustainable portfolio of energy resource options that would help buffer their member utilities from volatility in the wholesale power market - while also providing customer, community and environmental benefits.

VEIC provided AMP with an analysis of efficiency services, a proposed budget for deploying those services, and an estimate that showed that AMP could ramp up to 1% in annual energy savings for its members by 2015. Based on this initial analysis and subsequent negotiations, VEIC proposed to partner with AMP to become a full-service energy efficiency implementation entity referred to as the Efficiency Smart Power Plant (ESPP). The ESPP proposes to deliver efficiency services to a participating group of AMP's member utilities over a 3 year time period.

Through the relationship with AMP, VEIC is now planning the development of a "turnkey" integrated, performance-based implementation service, based on the Efficiency Vermont model. Assuming critical mass participation is achieved, VEIC estimates the ESPP will yield:

- Projected cumulative annual savings of approximately 70,000 MWh for the first 3 years
- Levelized cost of 3.9 cents/kWh over life of the benefits
- Benefit/cost ratio of 2 to 1
- Creation of a roadmap for continued growth in energy efficiency gains
- Improvement in local economies and job growth

## **NYSERDA**

## **2002, 2005 and Present**

VEIC performed electric efficiency, gas efficiency and renewable potential studies for New York State and five load zones within the state. The studies examined the potential available from existing and emerging efficiency technologies and practices to lower end-use electricity requirements in residential, commercial, and industrial buildings. They also estimated renewable electricity generation potential from biomass, fuel cells, hydropower, landfill gas, municipal solid waste, solar, and wind. The study assessed New York's efficiency and renewable potential over three time horizons: five years (through 2007), 10 years (through 2012), and 20 years (through 2022)

## SCUDDER H. PARKER

### Policy Director

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#### PROFESSIONAL EXPERIENCE

2013 – Present

**Policy Director, VERMONT ENERGY INVESTMENT CORPORATION (VEIC)** Burlington, VT  
Help shape policy direction and innovative approaches to increasing the economic and environmental benefits of energy uses for a major, nation-leading not-for profit. Focused on the daily interplay between policy and aggressive implementation of energy efficiency and distributed resources development in ways that empower and reduce costs for customers, provide benefits for the energy system, and yield significant societal benefits.

**Director, Consulting Division** (2010 – 2013)

Lead strategic direction for consulting division. Hire, direct, and manage senior-level staff. Provide overall direction to staff work on projects that analyze energy efficiency and renewable energy markets, programs, and policies; client base is national and international. Provide training, mentoring, and other support. Lead marketing and business development efforts for new projects, including developing and maintaining relationships with key clients and business partners.

**Managing Consultant** (2007 – 2010)

Managed complex projects focusing on achieving aggressive efficiency and renewable energy targets. This included energy policy recommendations for several jurisdictions; analysis of the role efficiency can play in deferring the need for new power plants and other supply side investments; plans for structuring and launching new and/or improved efficiency operations; led negotiations with utilities and other stakeholders regarding efficiency goals, budgets, efficiency program designs, integration of efficiency and renewable energy efforts; and the development and defense of regulatory testimony in both the U.S. and Canada. Current and recent projects include:

**American Municipal Power.** Led team in developing a new implementation strategy for energy efficiency service delivery in Ohio. Designed a suite of programs for their 120+ municipal utilities, as well as approaches for dealing with the non-contiguous nature of their service territories.

**Ontario Green Energy Coalition.** Provided regulatory testimony proposing and defending a aggressive suite of energy efficiency and distributed resource acquisition strategies as part of Ontario's energy resource planning.

**Iowa Consumer Advocate.** Provided and defended testimony stating that a proposed 640 MW coal plant could be avoided or deferred through more aggressive and comprehensive implementation of energy efficiency programs.

**Rhode Island Energy Efficiency Resource Management Council.** Led team in supporting implementation of an energy efficiency least-cost procurement design and aggressive distributed resource acquisition. Led negotiations with local utilities on goals, budgets, and designs of efficiency and renewable energy programs and strategies.

**New Generation Partners.** Assisted development of a new business venture designed to support development of community scale renewable energy and combined heat and power projects.

2007

**Independent Consultant** Montpelier, VT  
Assembled and led a coalition to develop legislation that would expand Vermont's Energy Efficiency Utility, Efficiency Vermont, to be a permanent provider of all-fuels efficiency. Excellent legislation passed; vetoed by Governor. Helped form and worked with a coalition of business, advocacy, utility, low-income groups, and professional associations.

2004-2005

**Public Policy Coordinator, VERMONT BUSINESSES FOR SOCIAL RESPONSIBILITY,** Montpelier, VT  
Provided staff leadership for a Policy Committee on issues and policy development activities. Worked effectively with new Chair and members (of both political parties) of the House Natural Resources and Energy Committee to secure passage of innovative energy legislation, including expansion of authority of and funding for Efficiency Vermont, and passage of the SPEED program, an approach to affordable renewable energy development in Vermont.

2003-2004

**Independent Consultant**

Montpelier, VT

Provided energy consulting services to a range of clients. Key clients and projects included:

**Conservation Law Foundation.** Filed testimony in Docket No. 6860 on alternatives to construction by VELCO of a high-voltage power line in Vermont's northwest region.

**Vermont Public Interest Research Group (VPIRG).** Assisted in preparation of an alternative electric energy supply plan for State of Vermont in 2020.

**Synapse Energy Economics.** Co-authored paper on Independent Administrative Systems for delivery of energy efficiency programs.

**Vermont Electric Cooperative.** Advised as VEC sought to acquire the larger adjoining service territory of an investor-owned electric utility. Assisted on all matters relating to acquisition terms, conditions and price. Facilitated process of integration planning between both utilities. Helped write the Integrated Resource Plan (IRP) for both utilities as an integrated and coherent document. Advised on energy efficiency, distributed generation, load control, and purchased power.

1990-2003

**Director-Energy Efficiency Division, VERMONT DEPARTMENT OF PUBLIC SERVICE (DPS)**

Montpelier, VT

Appointed by Governor and served as the first Director of the Energy Efficiency Division. Created an entity that became an effective and innovative force to implement a landmark approach to providing energy security and affordability. Directly responsible for formulating and implementing policy related to Demand Side Management and renewable energy development. Worked with Commissioner and other Department Directors in policy development and implementation. Significant activities included:

Co-authored two editions of the Vermont Comprehensive Energy Plan, and one edition of the Vermont Twenty Year Electric Plan.

Built staff capacity to take responsibility for Demand Side Management activities in Department.

Developed concept of a "consumerco," a consumer cooperative to deliver comprehensive energy and efficiency services for customers.

Proposed and developed the concept of an Energy Efficiency Utility (EEU) to deliver integrated statewide energy efficiency programs. Oversaw all aspects of designing, screening, writing, presenting, and defending this proposal. Led the transition process from utility programs to creation of the EEU. After implementation of Efficiency Utility, oversaw design and implementation of an evaluation effort involving DPS staff and consultants. Budget for this activity was over \$1 million for a 3-year period.

Played a lead role in development of Distributed Utility Planning Collaborative under Docket 6290, resulting in settlement with numerous Vermont utilities on how to apply principles of Least Cost Planning to distribution and transmission constraints.

Played major role in supporting development of renewable energy businesses in Vermont, including farm methane, biomass energy, solar energy, wind energy. Work included grant writing and administration, securing "earmark" funds for Vermont projects, and work with Vermont renewable energy businesses and trade association (REV). Led Department in creating the Biomass Energy Resource Center (BERC),

Developed and secured legislative approval for proposals to use \$1.6 million in Oil Overcharge Funds, including programs in energy efficiency, working with Administration, state agencies, and the Legislature.

Initiated efforts to promote energy efficiency with other state agencies, including State Buildings, Education, Labor and Industry, Transportation, and work with ANR on Air Quality and Act 250.

Represented DPS and the Administration in successful legislative efforts including: passage of "least cost planning" legislation (1992), development and passage of Residential Building Efficiency Standards (1997), comprehensive electric utility restructuring legislation, (passed by Vermont Senate, 1997), and passage of "net metering" legislation" (1998). Prepared and presented legislative testimony, negotiated with parties, helped draft and revise legislation.

Filed, presented, and defended expert testimony in numerous Dockets before the Vermont Public Service Board and in other venues.

## EDUCATION

**Union Theological Seminary:** MS Divinity, *cum laude*, 1968

**Williams College:** BA English Literature, *magna cum laude and Phi Beta Kappa*, 1965

**ERIN CARROLL**  
**Director, Consultative Services**

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**PROFESSIONAL EXPERIENCE**

2011 – Present

**Director, Consultative Services, VERMONT ENERGY INVESTMENT CORPORATION** Burlington, VT  
(2012 – present)

Oversees 80 employees, sets direction for departments, manages targeted projects.

**Managing Consultant** (2011 – 2012)

- Project manager for development of Illinois *Technical Reference Manual*, other TRMs.
- Managed high-profile technical projects, analysis projects, and other data-driven projects requiring utility and governmental expertise.
- Senior advisor and mentor for projects managed by other staff.

2007 – 2011

**Managing Director, POWERADVOCATE**

Boston, MA

(2008 – 2011)

- Managed and directed teams on clients' strategic sourcing engagements:
  - Utility spend analysis, AQCS environmental upgrades, wind construction projects, solar construction projects, gas turbine cogeneration projects, and a fuel cell installation project.
- Provided technical and strategic support to sales and marketing and guided employee development via internal training and performance reviews.

**Director** (2007 – 2008)

- Managed strategic sourcing engagements for capital projects for various utilities.
- Developed and managed solicitations from development of bid documentation through bid evaluation and final vendor negotiations.

2003 – 2007

**Director of Engineering, NORTHERN POWER SYSTEMS**

Waitsfield, VT

(2005 – 2007)

- Set department direction and ensured alignment with overall corporate strategy, developed department process and procedures, resource allocation, reviewed engineering documents for technical compliance, ensured engineering quality, and developed and monitored department budgets.

**Manager of Project Engineering** (2003 – 2005)

- Managed project engineering support for remote power and combined heat / power projects.
- Managed the project technical team, ensured client requirements were implemented in the project design, maintained the project engineering budget, and developed technical project change orders.

1999 – 2003

**Senior Mechanical Engineer. AEP PROSERV**

South Portland, ME

**EDUCATION AND CERTIFICATION**

- **MBA, Walden University** (NTU High Tech), 2008
- **MS, Union College**, Mechanical Engineering, 1989
- **BS, Worcester Polytechnic Institute**, Mechanical Engineering, 1986
- **Registered Professional Engineer**, ME #8383

DAVID G. HILL, Ph. D.  
Managing Consultant

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## PROFESSIONAL EXPERIENCE

1998 - Present

**Managing Consultant, VERMONT ENERGY INVESTMENT CORPORATION** Burlington, VT

- Policy and program design advisor for renewable energy and efficiency initiatives at the national and state levels.
- Directs VEIC's renewable energy activity, responsible for senior-level management of design, delivery, and evaluation of energy efficiency and renewable energy projects.

Key activity:

- *United States Department of Energy:* Member of expert peer review panel providing comments on evaluation plan and forward-looking evaluation strategies for the DOE's State Energy Program state block grants from the Recovery Act. Activity involved \$3.5 billion of investment spending in support of accelerated renewable energy / energy efficiency market development.
- *American Solar Energy Society:* Chair of ASES Board, former Chair of the Policy Committee. Led a team of more than fifteen national experts to produce the ASES report, *Policy Recommendations for the 111<sup>th</sup> Congress: Tackling Climate Change and Creating a Green Economy*.
- *New Jersey Clean Energy Programs:* Program design and evaluation advisor for the team providing renewable energy market manager services for New Jersey's Clean Energy Programs. Advises and leads the VEIC team responsible for daily administration and program implementation services for the Customer On Site Renewable Energy (CORE) program, which has supported the installation of more than 1,000 MW of photovoltaic capacity, making New Jersey the second leading solar electric market in the United States. Assisted the Office of Clean Energy with the development of New Jersey's solar market transition, designed to depend more heavily on the solar renewable energy credit market to meet the renewable energy portfolio standard goals for solar. Assisted in the design and implementation of efforts to increase participation and development in the non-solar markets for Class I renewable resources.
- *Long Island Power Authority (LIPA) Clean Energy Initiative:* Provided program design and implementation support for residential efficiency and solar programs in LIPA's Clean Energy Initiative. Starting in 1998, with initial drafting of program portfolios, roles have included program technical advisor, team manager, and senior advisor. Senior team advisor for renewable energy initiatives.
- *New York State Energy Research Development Authority (NYSERDA):* Renewable team project manager for a comprehensive assessment of technical and achievable potential of renewable and energy efficiency technologies for New York. The renewable energy analyses estimated the full economic costs and benefits for eight renewable energy resources, and more than 20 specific technologies under four planning scenarios.
- *Massachusetts Technology Collaborative:* Led a team from VEIC, Optimal Energy Inc., and the Natural Resources Defense Council on a project to assist the MTC and Renewable Energy Trust in framing case studies of renewable and green building projects. The team provided expert assistance and recommendations on content, marketing channels, format, and materials for meeting the priorities of target audiences.
- *Vermont's Million Solar Roofs Partnership:* Managed the Renewable Energy Resource Center, providing marketing and analytic support for consumers and the renewable energy industry in Vermont. Initial design and administration of Vermont's Solar and Small Wind Incentive Program, which has since become the Vermont Small Scale Renewable Energy Incentive Program, offering incentives for customer-sited renewable systems since 2003. Managed a U.S. Department of Energy Solar Hot Water Market Development grant, and assisted two Vermont utilities in the design and implementation of renewable energy pilot programs.
- *Alliance for Climate Action:* Lead author for Burlington's *Climate Protection Action Plan*. Founding Alliance Board Member.

**Research Associate, TELLUS INSTITUTE**

Boston, MA

- Responsible for program design and marketing assessment, as well as monitoring and evaluation of residential, commercial, and industrial energy efficiency activities.
- Contributed to dozens of projects for domestic and international clients, including work in Asia, Africa, and South America.
- Managed assignments from the Inter-American Development Bank, the United Nations Industrial Development Organization, and the United Nations Development Program.
- Provided training and ongoing technical support for representatives from six countries on the use of the Long-range Energy Alternatives Planning / Environmental Database (LEAP / EDB) system for conducting greenhouse gas mitigation analyses.
- Contributed to a review of the Inter-American Development Bank's lending and support for renewable energy and energy efficiency projects.

**EDUCATION****PhD, University of Pennsylvania**, Energy Management and Policy Planning, 1993

Fulbright Scholar; conducted research on energy decision-making in rural Nepal, 1991-1993

**MA, University of Pennsylvania**, Appropriate Technology and International Development, 1989**BA, Middlebury College**, Geography and Political Science, 1986**ADDITIONAL QUALIFICATIONS****Chair of the Board, American Solar Energy Society**, 2012 – present

Board member and Chair of Policy Committee, 2009 - 2012

**Acting Director**, VEIC Planning and Evaluation Group (2008, during Director's Sabbatical)**Member of the Plenary Working Group, Vermont Governor's Climate Change Committee**, 2007**Founding Board member**, Renewable Energy Vermont, 2000 - 2008

Chair of the Board, 2005 – 2007

**Founding Board member**, Alliance for Climate Action, 1999 – 2007**Member of the Board**, Charlotte Central School, 2003 – 2008**US Peace Corps volunteer**, Sierra Leone (1984-1986)

## SEAN BLEYTHING

### Consultant, Consulting Division

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#### PROFESSIONAL EXPERIENCE

2011 – Present

**Consultant, VEIC**

Burlington, VT

- Provide residential technical assistance to energy-efficiency programs nationwide.
- Conduct research and perform economic analysis of efficiency measures, programs, and policies.
- Create and deliver energy efficiency training to residential construction industry professionals.

2005 – 2011

**SOUTHFACE ENERGY INSTITUTE**

Atlanta, GA

***Weatherization Program Manager (2009 – 2011)***

- Managed daily operations for Georgia Weatherization Assistance Program training.
- Created and delivered multiple building science training courses for 500+ weatherization professionals.
- Conducted in-field trainings while completing comprehensive site investigations and home retrofits.
- Designed and oversaw construction of 5,000 sf Southeast Weatherization and Energy Efficiency Training Center.
- Managed DOE Weatherization Training Center grant.
- Consultant for design and creation of Charleston Energy Efficiency Partnership.

***EarthCraft House Program Manager (2006 – 2009)***

Managed daily operations for regional green building program with 300 builders and 2,000+ inspections per year.

- Maintained partnerships with local and regional home building associations, government and industry leaders.
- Delivered classroom / field trainings to builders, architects, contractors, and code officials.
- Designed program standards and guidelines for EarthCraft Light Commercial.
- Performed comprehensive home energy inspections.

***EarthCraft House Technical Advisor (2005 – 2006)***

- Performed daily home energy inspections for regional green building program.
- Conducted home diagnostic testing, including blower door, duct blaster, and combustion safety testing.
- Certified homes under multiple green building and energy efficiency programs: EarthCraft House, ENERGY STAR<sup>®</sup>, LEED for Homes, and Building America Builders Challenge.
- Conducted energy analysis using REM/Rate<sup>™</sup> energy modeling to determine cost-effectiveness of energy upgrades.

#### EDUCATION & CERTIFICATIONS

**BA, University of Kansas, History, 2003**

- BPI Building Analyst, Envelope Professional, Heating Professional, Air Leakage Control Installer, Test Proctor
- Level I Infrared Thermographer
- LEED Green Associate, AP HOMES
- EPA Certified Lead Inspector
- NAHB Certified Green Professional

#### ADDITIONAL QUALIFICATIONS

- Chair, BPI Residential Whole House Air Leakage Control Installer Certification Scheme Committee
- DOE Weatherization Training Center Directors Group
- DOE National Weatherization Training Platform Technical Review Team
- DOE Standard Work Specification Regional Review Team
- Weatherization Assistance Program National Trainers Consortium
- Weatherization Assistance Program Minimum Energy Audit Subcommittee

## GEORGE LAWRENCE

### Consultant

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#### PROFESSIONAL EXPERIENCE

2006– Present

**VERMONT ENERGY INVESTMENT CORPORATION**

Burlington, VT

***Consultant, Consulting Division (2011 – Present)***

- Ongoing C&I energy efficiency consulting for the Rhode Island Energy Efficiency Resource Management Council (to collaborate on the National Grid electric and gas programs) and to support the RI State Office of Energy Resources.
- Managed a recent project for ComEd to identify the potential for C&I technical and behavioral energy efficiency in Chicago.
- Managed the renewable energy potential part of the 2012 NYSERDA efficiency/renewable potential study which informed the New York State energy plan.
- Managed the renewable energy potential part of the 2011 NYPA efficiency/renewable potential study.

***Planning and Development Manager, Efficiency Vermont (2007-2011)***

- Designed and managed energy efficiency programs for K-12 schools, agriculture, ski areas, water and wastewater treatment, and compressed air market sectors.

***Energy Consultant, Efficiency Vermont (2006-2007)***

Identified and implemented a wide range of energy efficiency projects. Achieved 2,000 MWh savings in one year.

2004-2006

***Sales, THE MCKERNON GROUP***

Brandon, VT

Sold structural insulated panels, insulating concrete forms and other green building products.

2000-2004

***Sales, NORTHERN POWER SYSTEMS***

Waitsfield, VT

Sold renewable energy and CHP power systems for manned and remote applications.

#### EDUCATION

**BS, Middlebury College, Physics, 1989**

#### ADDITIONAL QUALIFICATIONS

**Certifications:** Certified Practitioner in Industrial Energy Management Systems (Institute for Energy Management Professionals)  
Certified Energy Manager (Association of Energy Engineers)  
Certified Energy Auditor (Association of Energy Engineers)  
AirMaster+ Specialist (US DOE)  
Building Performance Institute: Building Analyst Certification  
Building Performance Institute: Envelope Certification  
Building Performance Institute: Heating Certification

## NICHOLAS C. LANGE

### Consultant

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#### PROFESSIONAL EXPERIENCE

2007 – Present

##### **VERMONT ENERGY INVESTMENT CORPORATION**

Burlington, VT

###### ***Consultant (2009 – Present)***

Conducts a wide array of complex analytical and qualitative research and consulting in regulatory and political contexts to develop, implement, and evaluate progressive energy efficiency and renewable programs:

- ***New Jersey Clean Energy Program.*** Team Lead for HVAC program: annual and multi-year forecast budgeting, savings protocol evaluation and development, R&D project design. Broad engagement in market transformation planning activities, marketing, distribution channel development, Contractor / consumer education and awareness to support increased valuation and traction of energy efficiency technologies.
- ***Efficiency Vermont.*** Research and development of programming and new efficient technology characterizations in lighting and HVAC technology.
- ***Ontario Gas Utilities.*** Critiques and guides thought leadership on DSM plans, savings assumptions and performance representing stakeholder interests throughout planning, implementation, and auditing phases.
- ***Clean Energy District Financing.*** Consults and researches development of eligibility criteria for municipally structured finance of energy efficiency upgrades to facilities via PACE programming.

###### ***Project Manager, Business Energy Services (2007–2008)***

Identified, assessed, advocated, and developed economically compelling energy efficiency projects in new construction and existing buildings for commercial and industrial facilities in Vermont. *Key Areas: Large Grocery, Real Estate, Lighting Profiling, Transportation Study*

- Collaborated with customers and trade allies to influence design and review across project cycle.
- Structured evaluation of efficiency opportunities for broad application and roll-out across organizations and facilities across regions.

2005 – 2007

##### **NORTHERN POWER SYSTEMS**

Barre, VT

###### ***Lead Mechanical Engineer (2006 – 2007)***

Responsibilities: specification, design, procurement, construction, commissioning, maintenance of distributed CHP, and remote power; and high-efficiency equipment, products, and systems.

- Product development: Containerized Integrated Reciprocating Engine-based Co-Gen System.
- Product / system performance evaluation. Acoustic analysis and design.
- Failure analysis and product improvement process. Bid evaluation, oversight and team support.

###### ***Mechanical Engineer (2005 – 2006)***

- Design, engineering, and analysis of mechanical systems. Developed department standards, templates, database development, drawing tools, recurring design element modules.

#### EDUCATION & AWARDS

**BS, Cornell University**, Biomedical Engineering

**First Place**, 2003 Northeast Agricultural and Biological Engineering Conference (*Capstone Design Project—Hybrid Wind / PV System*)

## JULIETTE JULLERAT

### Senior Analyst

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#### PROFESSIONAL EXPERIENCE

2007 – Present

**VERMONT ENERGY INVESTMENT CORPORATION**

Burlington, VT

***Senior Analyst (2011 – Present)***

- Researches and analyzes energy efficiency and renewable energy projects.
- Performs economic screening of energy efficiency and renewable energy measures and programs.
- Reviews current energy consumption and efficiency opportunities at the building and market levels.
- Calculates measure-level to sector-level efficiency savings and renewable energy potential.
- Designs and conducts online and mail-in market surveys.
- Summarizes analysis findings and recommendations in targeted reports.

***Retail Market Coordinator, Efficiency Vermont Contract (2007 – 2011)***

- Coordinated Efficient Products program promotions with field staffs, marketing specialists, retailers, manufacturers, subcontractors, other market players, and governmental agencies.
- Planned, created, and implemented specific tactical approaches to retail market services.
- Queried a large database to create complex program performance reports.
- Designed customer surveys, created maps and digests for planning.
- Researched and analyzed market activity and trends, prepared market data and analysis reports.

2007 – 2010

***Research Assistant, UNIVERSITY OF VERMONT***

Burlington, VT

- Coordinated a research project on carbon storage in managed stands in the Northern Forest.
- Collaborated with foresters working on private and public land and with other researchers.
- Measured forest, soil characteristics in the field using the FIA protocol and standard lab protocols.
- Created and managed a large database.
- Created a website summarizing the project goals, methods, and outcome.

2005 – 2006

***Freelance Translator (French / English)***

Burlington, VT

1999 – 2006

***Seasonal Field Biologist (contractor)***

- **University of Vermont**, 2006
- **Swiss Ornithological Society**, Payerne, Switzerland, 2005
- **United States Fish and Wildlife Service**, Barrow, Alaska, 2004
- **Long Point Bird Observatory**, Ontario, Canada, 2004
- **Institute for Bird Populations**, Sequoia National Park, CA, 2003, and Fort Leavenworth, KS, 2002
- **Sea Turtle Protection Society of Greece**, Crete, Greece, 1999

#### EDUCATION

**MS, University of Vermont**, Plant and Soil Science

**BS, *magna cum Laude*, McGill University**, Agricultural and Environmental Sciences

#### AWARDS

Outstanding Student Paper Award, American Geophysical Union, 2009

Eliza Jones Award and Dean's List of Honor, McGill University, 2002

#### PEERED-REVIEWED SCIENTIFIC PUBLICATION

Juillerat, J. I., Ross, D. S. and Bank, M. S. (2012), Mercury in litterfall and upper soil horizons in forested ecosystems in Vermont, USA. *Environmental Toxicology and Chemistry*, 31: 1720–1729. doi: 10.1002/etc.1896.



## **OPTIMAL ENERGY: COST-EFFECTIVENESS SELECTED PROJECTS**

Optimal Energy Inc. has extensive experience in cost-effectiveness issues relating to all aspects of energy efficiency program planning and implementation. The work ranges from cost-effectiveness screenings to expert testimony; Optimal even produced the EPA Guide for Conducting Energy Efficiency Potential Studies, which includes guidance on selecting appropriate cost-effectiveness methodologies.

Optimal has established and implemented appropriate cost-effectiveness tests for a number of different utility program portfolios in a wide range of jurisdictions, to reflect the long-term benefits of energy efficiency. This work includes energy efficiency potential studies as well as program planning and measurement and verification. Recent work includes:

**Forecast 20** – This project was a collaborative effort with Vermont Energy Investment Corporation (VEIC). The study examines the cost-effective potential of a variety of current and future technologies in an effort to direct future program effort over a 20 year time horizon. One of the many notable aspects of this study are several unique methodologies for estimating cost-effectiveness of emerging technologies, a market typically overlooked by most traditional potential studies.

**Efficiency Maine Trust Triennial Plan** – For this project Optimal collaborated with Dunsky Energy Consulting in Montreal. The plan addressed 8 goals set forth by the Maine state legislature, centering on energy efficiency, by targeting all fuels, including un-regulated fuels. The goals ranged from reducing energy consumption in residences and business, to limiting greenhouse gas emissions, to jobs creation, but were focused through the lens of capturing all cost-effective energy efficiency opportunities.

**Natural Gas Energy Efficiency Resource Development Potential in New York** – The NYSERDA Gas Study, identified several goals that centered on calculating the potential cost-effective natural gas efficiency savings in the state over a 10-year time horizon. The study also examined the level of cost-effective savings from a portfolio of recommended efficiency program efforts and a funding levels during that same time period. This project included a collaboration with VEIC.

**NYPA Program Cost-Effectiveness Review** – Optimal was contracted by NYPA to review recent project files for their current demand-side management programs, assess program cost-effectiveness and compare NYPA's results to results found in other similar jurisdictions. The cost-effectiveness test results had to be analyzed using parameters specific to NYPA programs due to NYPA's financial assistance structures. As a result, Optimal developed a unique methodology for comparing alternative funding mechanisms with traditional funding mechanisms while maintaining comparable benefit/cost test results.

NEEP New England Meta-Analysis – Optimal conducted a meta-analysis of electric energy efficiency potential studies in New England. The results were compared to current forecasts and screened for cost-effectiveness in an effort to develop a cost-effective potential estimate for the New England region. As well as producing cost/benefit ratio metrics, Optimal also developed supply curve cost-effectiveness metrics. Based on end-use energy groupings, the supply curve metrics are designed to display savings potential and levelized cost simultaneously, and when compared to avoided energy cost projections, serve as another means of visualizing cost-effectiveness.

In these efforts, Optimal utilizes their proprietary Portfolio Screening Tool which compares the myriad costs associated with implementing energy efficiency programs, both now and in the future, against the avoided costs of supply-side resources. The cost-effectiveness methodology embodied in this tool was developed in response to a thorough public review process while keeping in line with the principles of the California Standard Practices Manual. In order to provide a precise accounting of both costs and benefits of efficiency investments, it incorporates several complexities that many other approaches lack. Optimal has also used this platform to develop project-level cost-effectiveness screening tools for efficiency program administrators at several utilities in New York and Massachusetts.

In addition to program planning and potential studies, Optimal has provided expert testimony on cost-effectiveness in a wide variety of contexts in New York, Vermont, Indiana, Florida, Virginia, Iowa, Illinois, South Carolina, Arkansas, Texas, Oklahoma, and several Canadian provinces.

Optimal also produced the EPA Guide for Conducting Energy Efficiency Potential Studies. This guide was commissioned by the EPA and the DOE as part of the National Action Plan for Energy Efficiency. The Guide provides guidance on standard approaches for building the policy case for energy efficiency, evaluating efficiency as an alternative to supply-side resources, and formulating detailed program design plans by understanding the potential for cost-effective energy efficiency. In short, this guide is a comprehensive, how-to manual for selecting and conducting cost-effectiveness studies analyzing the potential for energy efficiency.



## **PHILIP H. MOSENTHAL**

### **PARTNER**

Mr. Mosenthal has over 25 years' experience in energy efficiency consulting, including facility energy management, utility and state planning, program design, implementation, evaluation and research. He has particular expertise in the commercial, industrial and institutional sectors. Mr. Mosenthal has developed numerous utility, state and region integrated resource and DSM plans, and designed and evaluated residential, commercial and industrial energy efficiency programs throughout North America and in Europe and China. He has also been the lead analyst on numerous energy efficiency potential assessments. Mr. Mosenthal has played key roles in utility collaboratives and has successfully worked to build consensus among diverse parties in various assignments. Mr. Mosenthal also has designed program implementation procedures, managed implementation contracts, trained efficiency program and planning staff, and performed over 400 commercial and industrial facility energy efficiency analyses for end users.

## **PROFESSIONAL EXPERIENCE**

### **Optimal Energy, Inc.**

**Hinesburg, VT**

#### **Founding Partner, 1996-present**

Consult with electric and gas utilities, governments and other non-utility parties on energy efficiency, resource planning and regulatory issues. Develop strategies for achieving energy efficiency and least-cost resources, including administrator funding and incentive mechanisms, and program and market design and analysis. Current or recent projects relevant to this procurement include:

Advisor for the commercial and industrial programs for the Massachusetts Energy Efficiency Advisory Council, led by the Massachusetts Department of Energy Resources. Responsible for representing non-utility parties interests on the design, development, implementation and evaluation of all Massachusetts Program Administrator's portfolios of C&I programs. This project involves supporting the PAs in developing and implementing a set of SBC-funded C&I programs. (2000-present)

Chief architect of Efficiency Vermont, the nation's first and only state efficiency utility, as well as advisor on C&I planning and program design to Efficiency Vermont. Managed program design, development and planning. Includes design, development and start-up of programs to serve the commercial, industrial, institutional and agricultural sectors in Vermont. (2000 – present)

Advisor to the Illinois Attorney General on policy, planning, program design and evaluation and utility oversight regarding Commonwealth Edison's and Ameren Illinois' efficiency programs. This project included expert testimony on development of initial plans, funding mechanisms, policy and evaluation and verification issues. Currently, Mr. Mosenthal represents the AG in a

collaborative addressing all issues surrounding planning, development, implementation and evaluation. For ILL AG (2007 – present).

Lead researcher on energy efficiency issues for EPA's Clean Energy Partnerships with State and Local Government to advance State Clean Energy Action Plans. (2006 – present)

Developed an innovative "efficiency rate tariff" designed to benchmark commercial facilities energy efficiency and price electricity to them based on their efficiency levels. This electric rate would develop threshold efficiency levels by facility type with increasing block rates that remove current disincentives to efficiency that exist with traditional electric rate design. For Wal-Mart™ (2005 – 2006)

Manager of electric and natural gas efficiency and renewable potential assessments for New York State Energy Research and Development Authority. (2005 – present)

Report and testimony on performance of DSM initiatives and proposed shareholder performance incentives for administrators of conservation and load management programs in Connecticut, on behalf of Connecticut Office of Consumer Counsel. Led C&I analysis. (2003 – 2004)

## **Resource Insight, Inc.**

**Middlebury, VT**

### **Senior Research Associate, 1995-1996**

Consulted on DSM planning, program design, monitoring and evaluation, and resource characterization, specializing in the commercial and industrial sectors. Projects performed on behalf of utility and non-utility parties, in both cooperative settings and in contested regulatory proceedings.

## **Xenergy, Inc. (now Kema)**

**Allendale, NJ**

### **Chief Consultant, 1990-1995**

Managed the consulting division for Xenergy's (now Kema's) Research, Planning and Evaluation Group (RP&E) in its Mid-Atlantic Region. Responsibilities included direct utility consulting, as well as marketing, administration and staff management for RP&E. Consulting activities focused on assessment of DSM technology potential, DSM planning, program design and development, and process and impact evaluation for electric and gas utilities.

## **EDUCATION**

M.S., Energy Management and Policy, University of Pennsylvania, Philadelphia, PA, 1990, 4.0 GPA.

B.A., Design of the Environment, University of Pennsylvania, Philadelphia, PA, 1982.

Certificate in Electrical Engineering, Pennsylvania State University, Ambler, PA, 1984.



## **MIKE GUERARD**

### **MANAGING CONSULTANT**

Mike Guerard, an Optimal Energy, Inc. Managing Consultant, has over 20 years of experience in the energy efficiency, green building and the renewable energy industry. He has developed and managed a wide-range of energy efficiency programs throughout New England and the Pacific Northwest. These have included large-scale residential retrofit and new construction programs, green building initiatives, and projects funded by federal and state entities. His role in delivering these efforts included overseeing dozens of internal staff covering field delivery, technical specifications and enhancements, marketing and administration, while also working collaboratively to achieve positive program results and significant energy savings with a wide range of stakeholders including utility staff, government officials, state building code and energy office staff, and leading building scientists. In his current role as Managing Consultant, he brings the experience gained in implementation to support design, planning and oversight of residential and C&I programs in multiple jurisdictions for a wide variety of clients.

### **PROFESSIONAL EXPERIENCE**

#### **Optimal Energy, Inc.**

**Providence, RI**

#### **Managing Consultant, July 2008 to present**

Primary role is to provide project management, research, stakeholder coordination and technical analysis to support clients' development of strategies for achieving energy efficiency and attainment of least-cost resources. Main clients have included:

Rhode Island Energy Efficiency and Resources Management Council.

Massachusetts Energy Efficiency Advisory Council.

Tennessee Valley Authority

Long Island Power Authority for the Clean Energy Initiative.

#### **Conservation Services Group, Inc. (1991 – 2008)**

**Westborough, MA**

#### **Senior Project Manager, 2006-June 2008**

Primary responsibility to direct CSG's research, development and delivery of LEED for Homes provider services; the launch of a Northeast regional green building program, Earth Advantage; and multi-family new construction initiatives.

Provided coordinated development of the technical, program, staff and business strategies to address serving these new initiatives for the company.

## **Program Manager, Pacific Northwest New Construction Programs, 2004-2006**

Developed, launched and managed the ENERGY STAR-labeled Home™ Program in the Pacific Northwest for the Energy Trust of Oregon and the Northwest Energy Efficiency Alliance, covering Oregon, Washington, Idaho, and Montana

Hired and managed staff; coordinated operations with primary partner and minor partners; served as primary liaison with multiple stakeholders including state energy offices and universities

Served on board of PNW Technical Review Committee, to establish and advance program technical standards and protocols

## **Director, New England Residential Energy Services, 2000-2003:**

Overall management of over 50 staff delivering thousands of energy audits and new home certifications annually throughout New England, along with the associated building science training and contractor infrastructure development required to successfully complete production levels.

Provided primary interface with multiple utility clients and other funding sources, and oversight of all required tracking, reporting and analysis

## **Program Management Roles, 1991-2000**

1998-2000, Program Manager, ENERGY STAR Homes

1996-1997, Developed successful grant request, and subsequently managed and delivered *HERS: Infrastructure Development for the Northeast HERS Alliance* funded by the U.S. Department of Energy

1995-1997, Developed successful grant request, and subsequently managed and delivered *Promotion and Evaluation of Energy Efficient New Construction in the Northeast* funded by the U.S. EPA

1994-1998, Program Manager, EUA Lighting Program

1994-1995, Program Manager, Advanced Retrofit pilot program

1991-1997, Program Manager, Energy Crafted Homes Program

## **EDUCATION**

University of Kansas and Goethe Institute, graduate studies

University of Rhode Island and Rhode Island College, Bachelor's degrees



## **GABE ARNOLD, PE, LC, CEM**

### **SENIOR CONSULTANT**

Gabe Arnold is a Senior Consultant with Optimal Energy Inc. with over 12 years in energy efficiency program design and implementation. He is a nationally recognized in the field of energy-efficient lighting and brings a wealth of experience in lighting technologies, markets, and strategies to reduce energy-use in both commercial and residential markets and buildings. Gabe speaks regularly at local and national conferences on energy-efficient lighting technologies and program approaches. Gabe has served on many industry boards and helped create and co-chaired the DesignLights Consortium Qualified Products List Initiative for utility-supported commercial LED products. Gabe is a registered Professional Engineer, Lighting Certified by the NCQLP, and a Certified Energy Manager.

### **PROFESSIONAL EXPERIENCE**

#### **Optimal Energy, Inc.**

**Hinesburg, VT**

#### **Senior Consultant, January 2011 to present**

Primary role is to provide project management, research, stakeholder coordination and technical analysis to support clients' development of strategies for achieving energy efficiency and attainment of least-cost resources.

#### **Vermont Energy Investment Corp.**

**Burlington, VT**

#### **Planning and Development Manager (Lighting), 2005-2010**

Responsible for design and implementation of Efficiency Vermont's Commercial Lighting Programs:

- Lighting Program Design and Implementation

- Market strategies for deployment of new technologies

- Outreach and Education to lighting market stakeholders and service providers

- Technical and strategic lighting support to VEIC / Efficiency Vermont staff and subcontractors

#### **Technical Coordinator, 2003-2005**

Multi-faceted role providing technical and market-strategy support to Efficiency Vermont's Business Energy Efficiency Programs:

- Lighting Program Design and Implementation

- Providing lighting technical support to in-house Energy Efficiency Project Managers

Evaluating new technologies for applicability, cost-effectiveness, and savings/market potential

### **Project Manager, 2000-2003**

Collaborate with customers to apply energy efficient technology to decrease energy costs in Vermont businesses:

Communicate with customers, contractors, and the public about energy efficiency opportunities and building designs that save energy.

Influence design process, review plans, and coordinate efficiency measures in new construction, renovations, and retrofits in various building and business types.

### **Integrated Planning and Engineering Inc.**

**Lakewood, CO**

### **Project Engineer, 1997-2000**

Responsible for project management and engineering of electrical and lighting design projects in commercial buildings and exterior environments.

### **EDUCATION / CERTIFICATIONS**

Bachelor of Science in Engineering, Colorado School of Mines, Golden, CO 1998

Professional Engineer (PE), State of Vermont

Lighting Certified (LC), National Council for Qualifications of Lighting Professionals

Certified Energy Manager (CEM), Association of Energy Engineers

### **SAMPLE OF RECENT PRESENTATIONS & WORKSHOPS**

“LED Lighting Workshop,” Better Buildings by Design Conference, 2009

“Overcoming the HPT8 Availability Barrier,” CEE June Program Meeting, 2009

“Upstream Incentives to Lighting Distributors,” CEE June Program Meeting, 2009

“Capturing the Retail LED Opportunity,” DOE Retailer Webinar, 2009

“Designing Early SSL Programs,” DOE SSL Market Introduction Workshop, 2008

“Efficiency Vermont SSL Lighting Programs,” ENERGY STAR Lighting Partner Meeting, 2009

“LED Streetlighting Workshop,” VT PSB Streetlighting Workshop, 2009

“Utility Funding of LED Street and Area Lighting,” IESNA Street and Area Lighting, 2010

“Implementing LED Lighting Programs,” DOE SSL Market Introduction Workshop, 2010

“New Opportunities in Outdoor Lighting,” ACEEE Market Transformation Symposium, 2011

“MassSave: A New Model for Statewide Energy Efficiency Programs,” ACEEE Summer Study on Energy Efficiency in Buildings, 2012

“Forget Watts, It’s Lumens,” Better Buildings by Design Conference, 2012

“Understanding the Impact of the Federal Lighting Efficiency Standards on C&I Programs,” CEE Winter Program Meeting, 2012



## **CLIFFORD S. MCDONALD**

### **CONSULTANT**

Mr. McDonald has over 3 years of experience with various policy and technical issues relating to energy efficiency, renewable energy, and LEED. In addition to his professional experience, Mr. McDonald has performed long-term volunteer work in South America promoting environmental causes and sustainable development.

### **PROFESSIONAL EXPERIENCE**

#### **Optimal Energy, Inc.**

**Hinesburg, VT**

**Analyst 2006-2007/Senior Analyst August 2009-2011/Consultant January 2012-present**

- Perform financial and cost-effectiveness analyses of efficiency programs and measures
- Develop measure characterizations for TRMs and cost-effectiveness screenings
- Develop memos and white papers on energy efficiency best practices
- Perform program reviews, including savings and incentive analyses
- Provide energy efficiency project technical support to utilities and program implementers

#### **Viridian Energy and Environmental**

**New York, NY**

**Energy Analyst, 2008- 2009**

- Used DOE2 to create energy models to analyze the energy use in existing and new construction buildings
- Developed specific recommendations on the implementation of energy efficiency measures
- Worked with architects and developers to get LEED certification on new construction projects and building renovations

**Medical Physics Researcher, Summers 2004 and 2005, April – August 2008**

Used computer simulations and Monte Carlo algorithms to support development of new, state-of-the-art proton therapy center for cancer treatment

Developed recommendations on materials and dimensions to be used in multi-leaf collimator

Created micro-dosimetry simulations to investigate neutron doses at a molecular level

**Volunteer Experience**

Taught environmental issues and alternative income methods in the Peruvian Amazon

Taught English and environmental issues in Quilotoa, Ecuador, a small indigenous village

Developed bio-diesel capability at an organic permaculture farm in Bahía, Ecuador

**EDUCATION**

B.S., Physics, Middlebury College, Middlebury, VT, 2006

**HIGHLIGHTS OF PROJECT EXPERIENCE**

Created in analysis of electric-sector emission reductions for the New York State Climate Action Plan

Provided implementation support for Orange & Rockland Utilities, including verifying savings estimations, screening custom projects for cost-effectiveness, and reviewing the incentives offered

Used building modeling to develop prescriptive savings recommendations for VFDs.

Wrote paper on the potential of continuing Pennsylvania's efficiency programs, and their economic and environmental benefits.

Performed review of NYPA's efficiency projects, and developed recommendations concerning NYPA's Evaluation, Measurement, and Verification protocols

Developed recommendations for an industrial sector energy efficiency program for NYPA, and provided an analysis of its potential costs and benefits

Developed an operations manual for LIPA's commercial efficiency programs

Researched efficiency program best practices in data centers and commercial leased spaces

Developed measure characterizations for Technical Resource Manuals in New Brunswick, Vermont, and Long Island

Completed market analysis of energy efficiency opportunities for commercial kitchen equipment

Wrote white papers on the costs and benefits of commissioning and power factor correction

Co-authored US Environmental Protection Agency guides to action on potential studies and clean energy funds

Provided retro-screening information to Connecticut Municipal Utilities



## **SAMUEL C. HUNTINGTON**

### **SENIOR ANALYST**

Mr. Huntington joined Optimal Energy in 2009 where he provides analytical support on a variety of projects, including development of technical reference manuals, efficiency measure characterization, potential studies, and critical review of efficiency program plans. In addition, he manages the development and maintenance of Optimal Energy's various cost-effectiveness screening and DSM-forecasting tools. Recently, Sam has been involved with technical analysis, program assessment, and forecasting efforts in support of Efficiency Vermont, the Massachusetts Energy Efficiency Advisory Council, and the New York State Energy Research and Development Authority. Sam also assists the Connecticut Municipal Electrical Energy Cooperative with submissions and compliance reviews for their participation in the ISO NE Forward Capacity Market. Mr. Huntington holds a B.S. in Mathematical Sciences from Colby College.

## **PROFESSIONAL EXPERIENCE**

### **Optimal Energy, Inc.**

**Providence, RI**

#### **Analyst, 2009-present**

Lead Analyst on a statewide energy efficiency and renewable energy potential study for the New York State Energy Research and Development Authority

Lead Analyst on a statewide energy efficiency potential study for the Delaware Department of Natural Resources and Environmental Control

Contributing Analyst to a study of the statewide energy efficiency in Vermont, as well as a study of the energy efficiency potential in New York's government-owned facilities

Contributing Analyst to the development of commercial and industrial measure characterizations for a Technical Reference Manual for use by various Ohio municipal utilities

Ongoing support Analyst to the Massachusetts Energy Efficiency Advisory Council with regards to the annual update and release process of their technical reference manuals.

Ongoing support Analyst to the Rhode Island Energy Efficiency and Resource Management Council. Responsibilities include: goals tracking,

Ongoing support Analyst to the Connecticut Municipal Electrical Energy Cooperative with regards to their ISO-NE Forward Capacity Market submissions and DSM program implementation

Contributing Analyst to market and measure characterizations of emerging technologies for Duke Energy in Ohio, North Carolina, and South Carolina

Contributing Analyst to the modeling analyses and reports on the economic impacts of ratepayer funded energy efficiency investments in Vermont and Michigan

Contributing Analyst to the critical review and development of residential program strategies in the Five-Year Energy Efficiency Plan for the Tennessee Valley Authority

Contributing Analyst to market research and analysis, and program strategy recommendations in support of commercial efficiency programs in Ohio

Primary contributor to a market research report on commercial refrigeration for Efficiency Vermont

Primary contributor to a market research report on the hospitality and commercial kitchen market sectors for Efficiency Vermont

Lead developer of Optimal's Project Tracking Database

Contributing developer and maintenance lead for Optimal's Portfolio Screening Tool and Project Screening Tool

## **New England Housewrights**

**Charlotte, VT**

### **Assistant Homebuilder, 2007-2009**

Assisted with design and construction of LEED certified homes

Worked with various tradespeople to install critical building systems such as the electric, plumbing, and HVAC

## **EDUCATION**

B.S. Mathematical Sciences, Colby College, Waterville, ME, 2008

Summer Study in Urban Design, Harvard Graduate School of Design, Cambridge, MA, 2009

## **PUBLICATIONS**

"Economic Impacts of Energy Efficiency Investments in Vermont," *2012 ACEEE Summer Study on Energy Efficiency in Buildings*, Pacific Grove, CA, August 2012.



## **CORPORATE DESCRIPTION**

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Energy Futures Group (EFG) is an energy efficiency consulting firm established in Hinesburg, Vermont in April 2010 by Chris Neme, Richard Faesy and Glenn Reed, each of whom has more than 20 years experience in the energy efficiency industry. We specialize in the design, implementation and evaluation of programs and policies to promote investments in efficiency, with particular emphasis on cutting edge strategies to achieve both broad participation and deep levels of savings. We have worked for program administrators, government agencies and advocacy organizations in more than 20 states and provinces, as well as several countries in Europe.

We bring to our work a unique combination of technical, economic, program and policy expertise. EFG staff have critically reviewed literally hundreds of efficiency programs and played key roles in developing a number that have won national awards for excellence. Recent work includes serving as lead advisors on the development of efficiency program portfolios and policies in five of the eight highest ranking states in ACEEE's 2012 State Energy Efficiency Scorecard, the publication and presentation of a report that summarizes lessons learned from leading residential retrofit programs in North America and Europe, an analysis and presentation on the key pitfalls that can be encountered in performing potential studies, the development and updating of a regional residential lighting strategy for the Northeast, and an assessment of the effectiveness of leading efficiency financing initiatives.

Our staff has served on the Board of Directors of Residential Energy Services Network (RESNET) and the Program for the Evaluation and Analysis of Residential Lighting (PEARL); the Air Conditioning Contractors of America's (ACCA's) national quality installation committee; the Northeast Energy Efficiency Partnerships' Evaluation, Measurement and Verification forum's various committees, and various other regional and national efficiency forums. They have also taught courses on efficiency program design and implementation for both Affordable Comfort and AESP.

### **Contact Information**

P.O. Box 587, Hinesburg, Vermont 05461. 802-482-5001 • fax: 802-329-2143

<http://www.energyfuturesgroup.com/>



## **Brief Descriptions of Relevant Projects**

- **Alliance for Affordable Energy.** Provided technical support for this New Orleans-based stakeholder organization. As part of on-going IRP proceeding, completed detailed review of recently completed energy efficiency potential study. Provided guidance as to how results should be integrated into IRP process to inform Entergy's next set of planned efficiency program efforts.
- **Connecticut Energy Efficiency Board.** Lead residential team to provide oversight of the state's energy efficiency programs. Work closely with the state's utilities to develop cost-effective program designs and goals for the annual Conservation and Load Management Plan.
- **Connecticut Fund for the Environment/Environment Northeast.** Developed comparison paper of seven prominent residential energy efficiency financing programs across the nation, analyzing successes and challenges of various models. Interviewed chief executive officers, former executives, and leading staff regarding key elements of effective financing initiatives. Presented findings at U.S. DOE Better Buildings Neighborhood Program conference.
- **DC Department of the Environment (Washington DC).** Provided technical support to the Vermont Energy Investment Corporation on the administration of the DC Sustainable Energy Utility (SEU). Responsibilities included leading the characterization of efficiency markets and opportunities, supporting program prioritization and design, and providing input on policy issues.
- **Efficiency Vermont.** Serve as Senior Advisors for residential program design and policy guidance for Vermont's statewide, award-winning energy efficiency utility. Also provided input to NEEP's regional EM&V forum and technical support on Efficiency Vermont's bidding of efficiency resources into New England's Forward Capacity Market.
- **Green Energy Coalition (Ontario).** Represent a coalition of environmental groups in various regulatory proceedings. Present recommendations on DSM policies, critically review and negotiate with utilities on proposed DSM Plans, serve (elected by non-utility stakeholders) on utility Evaluation/Audit Committees which oversee an annual savings verification process and evaluation planning, and defend expert witness testimony.



- **Green Mountain Power.** Leading new program to introduce an emerging ultra-efficient heating technology, cold-climate heat pumps, to Vermont residential and small business markets. The program will support two alternative approaches to the application of heat pump technology: 1) mini-split ductless heat pumps for targeted heating within a building, and 2) whole-house heat pumps as a central heating and domestic hot water system.
- **High Meadows Fund (Vermont Community Foundation).** Conducted in-depth interviews of Vermont Home Performance Contractors and fuel dealers, and prepared findings, recommendations, presentation and report. Following up with statewide effort to develop new partnerships and business opportunities to drive more building retrofit projects.
- **Iowa Consumer Advocate.** Provide support to the Office of Consumer Advocate in their oversight of the utilities' statewide energy efficiency programs. Critically reviewed statewide potential study and utility plans, and provide strategic guidance for the state's energy efficiency programs and DSM plans.
- **Massachusetts Energy Efficiency Advisory Council.** Provide on-going technical and programmatic advice to, and oversight of, the Massachusetts gas and electric program administrators' residential efficient products (lighting, appliances and consumer electronics), multifamily, and HVAC programs. This includes review of key screening tool inputs and development of three year program savings goals. Also assist Council evaluation consultants and lead Council engagement on the development of the residential measure characterizations for Massachusetts' new Technical Resource Manual.
- **Natural Resources Defense Council (Illinois & Michigan).** Critically reviewing utility DSM plans and, as needed, filing expert witness testimony on those plans before both the Illinois and Michigan public utility commissions. Also represent NRDC in monthly stakeholder meetings with utilities and other parties in which program designs, evaluation priorities, input on draft evaluation reports and other related issues are discussed.
- **Natural Resources Defense Council (National).** Drafted memo to provide NRDC with a review and analysis of effective building energy efficiency labeling and disclosure policies and strategies, as well as to identify certain jurisdictions that may be interested in adopting these policies.
- **New York State Energy and Research Development Authority (NYSERDA).** Part of evaluation oversight team assisting NYERDA with planning, coordinating, implementing and reviewing a wide range of program evaluation efforts. Principal engagement has been on evaluation of NYSERDA's residential lighting program and transportation RD&D activities.



- **Northeast Energy Efficiency Partnerships.** Managing project to develop savings estimates for emerging technologies. Responsibilities include drafting RFP to hire a contractor to perform the work, managing the contractor’s work, and facilitating a committee of utility and other program administrators overseeing the project.
- **Northeast Energy Efficiency Partnerships (NEEP).** Lead author on recently published Northeast Residential Lighting Strategy (March 2012) and its subsequent update (January 2013). Worked with regional advisory group to characterize current lighting technologies, develop estimates of remaining residential lighting potential in the Northeast, and develop recommended strategies to cost efficiently procure this large savings potential.
- **Ohio Public Utilities Commission.** Senior Advisor to a project to develop a web-based Technical Reference Manual (TRM). The TRM includes deemed savings assumptions, deemed calculated savings algorithms and custom savings protocols. It was designed to serve as the basis for all electric and gas efficiency program savings claims in the state.
- **Ohio Sierra Club** – Filed and defended expert witness testimony on the implications of not fully bidding all efficiency resources into the PJM capacity market. Also critically reviewed First Energy’s and other utilities’ multi-year DSM plans. Participating in periodic stakeholder-utility collaborative meetings.
- **PennFUTURE and Keystone Energy Efficiency Alliance.** Provided technical support for these two efficiency stakeholder groups in Pennsylvania. Completed review of recently completed energy efficiency potential study. Provided guidance as to how results inform proposed goals for utilities’ next four year plan. Assisted with comments on implementation of Act 129, state legislation that frames utilities’ energy efficiency activities.
- **Regulatory Assistance Project - Europe.** Providing support on a variety of energy efficiency policy and program areas. This has included:
  - Drafting (and presenting at 2011 ECEEE conference in France) a 64-page report that reviewed leading residential retrofit programs in North America and Europe and proposed a “roadmap” for achieving deep retrofits in half of the building stock;
  - Drafting a policy brief on the policy and design considerations for an Energy Efficiency Feed-in-Tariff and presenting the results of that work to the United Kingdom’s Department of Energy and Climate Change;
  - Reviewing draft European Union policies on Energy Savings Obligations; evaluation, measurement and verification protocols; and other related issues; and
  - Providing technical support to RAP partners in the United Kingdom, Germany, Belgium, Hungary and other countries on the design of efficiency policies and programs.



- **Regulatory Assistance Project - U.S.** Providing support on a variety of energy efficiency and program areas. This has included:
  - Drafting a report on the U.S. experience with using efficiency programs to cost-effectively defer transmission and distribution system investments.
  - Drafted a “white paper” on common weaknesses in the design and conduct of efficiency potential studies and their implications for both short and long-term planning.
  - Assisting the Arkansas Public Service Commission in assessing options for improving efficiency policies and programs in the state.
  - Providing technical support to Connecticut regulators on efficiency policies and programs.
  - Helping to administer an initiative to provide technical support on efficiency program planning and evaluation to Energy Foundation grantees and regulatory staff.
  - Leading a series of national webinars to train energy efficiency and environmental advocates on key energy efficiency issues, policies and initiatives.
  
- **Regulatory Assistance Project – Global.** Co-authored an extensive “Best Practices Guide” on government policies for achieving energy efficiency.
  
- **Rhode Island Energy Efficiency and Resource Management Council.** Residential sector advisors providing on-going technical and programmatic advice to, and oversight of, Rhode Island’s residential efficient products (lighting, appliances and consumer electronics), HVAC, existing homes and residential new construction programs. Work closely with National Grid staff to develop cost-effective program designs and goals for their energy efficiency plans. Also critically reviewing and providing feedback on National Grid’s system reliability plans, including a new pilot project to use geographically targeted energy efficiency and demand response to defer a substation upgrade.
  
- **Tennessee Valley Authority.** Assisted CSG team providing input to TVA on the redesign of its residential efficiency program portfolio to meet aggressive new five-year savings goals.
  
- **U.S. Department of Energy/Better Buildings Neighborhood Program (BBNP).** Supported Eastern Resources Group (ERG) and other DOE subcontractors in development of strategic approaches and support materials in moving BBNP programs to success and sustainability.
  
- **U.S. Department of Energy/Oak Ridge National Laboratory.** Senior Advisor and Aggregated Products lead for Program Design Team of DOE’s Technical Assistance Project



**RICHARD FAESY, PRINCIPAL**

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for American Recovery and Reinvestment Act (ARRA) communities and states.

- **U.S. DOE/National Renewable Energy Laboratory/Integrated Building and Construction Solutions (IBACOS).** Led development of a series of fact sheets as part of a guide to assist HVAC contractors in becoming whole-house home performance contractors.
- **Vermont Thermal Task Force Committee** – Committee chair of Funding and Finance Committee of Vermont’s Legislatively-mandated Thermal Efficiency Task Force charged with developing a plan to weatherize 25% of Vermont’s homes by 2020.



## GLENN REED, PRINCIPAL

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### Education

M.S. Coursework in Energy Management & Policy, University of Pennsylvania, 1986

B.S., Resource Economics and Environmental Studies, University of Vermont, 1983

### Experience

2010-present: Principal, Energy Futures Group, Hinesburg, VT

2000-2010: Energy Efficiency Division Manager, Vermont Energy Investment Corporation (VEIC), Burlington, VT

1986-2000: Director, Energy Rated Homes of Vermont (ERH-VT), Burlington, VT

1989-2000: Development Director, Single Family Services, VEIC, Burlington, VT

### Professional Summary

As a Certified Energy Rater and LEED Accredited Professional, Richard Faesy specializes in residential energy efficiency programs and markets, with a focus on retrofit, new construction, home energy rating systems (HERS), building codes, financing, green building, and effective market characterization, program design, policy and implementation. He has been active locally, regionally, and nationally in all of these areas for more than 25 years. Richard helped create and was the founding president of the board of the Northeast HERS Alliance and was a founding board member of the Residential Energy Services Network (RESNET) until 2010, including a term as president. Richard was featured in a national Dateline/NBC story on energy efficiency in 2001 and was also awarded RESNET's Lifetime Achievement Award. As a leader and technical expert, he has a reputation for delivering fresh thinking grounded in reality and experience in energy efficiency policy, program design and projects.

### Projects

- **Connecticut Energy Efficiency Board.** Residential programs advisor assisting the Board with goal setting, utility oversight and planning and technical assistance. 2007-present.
- **Efficiency Maine.** Team lead for development of Maine Residential New Construction Technical Baseline Study, resulting in influencing adoption of Maine's energy code. 2007- 2008.
- **Efficiency Vermont.** Senior Advisor for residential program design, implementation support and policy guidance for Vermont's statewide, award-winning energy efficiency utility. 2000-present.
- **Green Mountain Power.** Led the development of a new cold climate heat pump program to introduce this emerging technology to Vermont. Supported partnership between Efficiency Vermont and Vermont Fuel Dealers Association in promoting efficiency services. 2013-present.
- **High Meadows Fund (Vermont Community Foundation).** Interviews and research of Vermont Home Performance contractors and fuel dealers, report, presentations and follow-on market support, including development of partnership with Vermont Fuel Dealers Association, energy savings guarantee and business support. 2012-present.
- **New York State Energy Research and Development Authority (NYSERDA).** Senior Advisor in development of New York Energy Code Compliance Study. 2010 – 2011.
- **Northeast HERS Alliance.** President of the Board and manager of the regional initiative involving dozens of organizations and individuals working to further HERS and Energy Mortgages in the region. 1998-2007.



## GLENN REED, PRINCIPAL

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- ***Rhode Island Energy Efficiency and Resource Management Council.*** *Consultant leading the residential team and overseeing the residential new construction and existing homes programs in Rhode Island. 2008-present.*
- ***U.S. Department of Energy/Oak Ridge National Laboratory.*** *Senior Advisor and Aggregated Products lead for Program Design Team of DOE's Technical Assistance Project for American Recovery and Reinvestment Act (ARRA) communities and states. 2010-2011.*
- ***U.S. Environmental Protection Agency.*** *Assisted with enhancements and modifications to EPA's ENERGY STAR Homes Program. Assisted with development of multifamily ENERGY STAR program, Advanced Lighting Package and remodeling program. 2003-2010.*
- ***Vermont Public Service Department:*** Led consulting team in the development of the Vermont Energy Code Compliance Plan. 2011 - 2012. Senior Advisor to NMR Group on baseline study of residential new construction and remodeling in Vermont. 2011 - 2013.
- ***Vermont Residential Energy Code.*** Consultant and negotiator in the update of the Code and development of a mechanical ventilation standard for Vermont. 1999-2003. Representative for Efficiency Vermont on the Code Steering Committee for the Code update process. 2010-2011.

## Selected Publications

- Attributing Building Energy Code Savings to Energy Efficiency Programs, with the Cadmus Group, Inc. for Northeast Energy Efficiency Partnerships (NEEP), The Edison Foundation and Institute for Market Transformation, February 2013.
- Accelerating Energy Efficiency in the New Construction Market with Stretch Codes, Proceedings of ACEEE 2012 Summer Study on Energy Efficiency in Buildings, August 2012.
- Interviews with Vermont Home Performance Contractors and Fuel Dealers, for the High Meadows Fund, May 2012.
- Vermont Energy Code Compliance Plan, for the Vermont Department of Public Service, January 2012.
- The Costs and Benefits of Measuring if States Meet 90% Compliance with Building Codes, (with R. Wirtshafter et. al.), Proceedings of the International Energy Program Evaluation Conference (IEPEC), August 2011.
- New York Energy Code Compliance Study, (with VEIC et. al.) New York State Energy Research and Development Authority (NYSERDA), pending publication.
- "Maine New Homes: How a Baseline Study Can Set You Straight", (with L. Badger, P. Scheckel and D. Conant), 2008 Summer Study on Energy Efficiency in Buildings Proceedings, American Council for an Energy-Efficient Economy, Washington, DC, August 2008.
- Maine Residential New Construction Technical Baseline Study, for Efficiency Maine, May 2008.
- Long Island Residential New Construction Technical Baseline Study, for the Long Island Power Authority. May 2004.
- Vermont Residential Energy Code Handbook, (with D. Cawley and D. Keefe), for Vermont Department of Public Service, Montpelier, VT, February 1998.



## GLENN REED, PRINCIPAL

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### Selected Presentations

- “HERS Ratings and IECC Code Compliance”, **RESNET Conference**, Orlando, Florida, February 2013.
- “Vermont’s Thermal Efficiency Task Force: The Outcome and the Opportunities”, **Vermont Community Energy & Climate Action Conference**, Fairlee, Vermont, December 2012.
- “Implementing New Residential Building Energy Standards”, **Vermont Statewide Housing Conference**, Burlington, Vermont, November 2012.
- “Home Performance Contractors and Fuel Dealers – Key Players in Vermont’s Energy Future”, **Vermont Fuel Dealers Association**, Fall Workshop Series, Manchester and Middlebury, Vermont, September 2012.
- “Accelerating Energy Efficiency in the New Construction Market with Stretch Codes”, **ACEEE Summer Study on Energy Efficiency in Buildings**, Pacific Grove, CA, August 2012.
- “Supporting Energy-Efficiency Codes and Standards through DSM/EE Programs”, **Regulatory Assistance Project Advocates Webinar**, April, 2011.
- “Vermont Residential Code Update”, **Northeast Energy Efficiency Partnerships (NEEP) Regional EMV Forum and Public Policy Workshop: Roadmap to Claiming Savings from Building Energy Codes and Appliance Standards**, Marlborough, MA, September 2010.

### Professional Affiliations

- Board Director, **Energy Co-op of Vermont**, 2013 - present
- Board Director, **Building Performance Professionals Association (Vermont)**, 2012 - present
- Chair, **Funding and Finance Committee, (Vermont) Thermal Efficiency Task Force**, 2012
- Member, **(International) Zero Energy Homes Task Force**, 2012
- Member, **Vermont Legislature’s Building Energy Disclosure Working Group**, 2011
- Board Director, **Residential Energy Services Network (RESNET)**, 2002 – 2010
- Board Director, **Building for Social Responsibility**, 1996 – 2000, 2005 - present



## **EDUCATION**

M.S., Energy Management and Policy, University of Pennsylvania, 1982  
B.A., Biology, Wesleyan University, 1979

## **EXPERIENCE**

2010-present: Principal, Energy Futures Group, Hinesburg, VT  
2005-2010: Managing Consultant, Vermont Energy Investment Corporation, Burlington, VT  
2001-2005: Director of Regional Initiatives, Northeast Energy Efficiency Partnerships, Lexington, MA  
1987-2000: Deputy Director of East Coast Consulting, XENERGY, Inc. (now KEMA), Burlington, MA  
1983-1987: Principal Planner, Massachusetts Executive Office of Energy Resources, Boston, MA

## **PROFESSIONAL SUMMARY**

Glenn Reed has more than 25 years of expertise in demand-side management (DSM) program planning and evaluation; energy-efficiency policy development and implementation; building codes and appliance standards development; and group facilitation and consensus building. While at MEOER Mr. Reed managed all codes and standards work including overseeing the first state adoption of significant portions of ASHRAE standard 90.1. While at XENERGY Mr. Reed managed a residential code compliance study for Massachusetts and managed several residential and commercial new construction baseline studies in Connecticut, Georgia, North Carolina and Massachusetts. While at VEIC he was principal-in-charge of a large code residential and non-residential compliance study for NYSERDA. Prior to co-founding EFG, Mr. Reed was a Managing Consultant at the Vermont Energy Investment Corporation, Director of Regional Initiatives at the Northeast Energy Efficiency Partnerships (NEEP), and Deputy Director of East Coast Consulting at XENERGY (now KEMA).

## **EXPERTISE RELEVANT TO THE STATEMENT OF WORK**

### ***Programmatic and Technical Support, Massachusetts Energy Efficiency Advisory Council.***

Provides on-going technical and programmatic advice to, and oversight of, the Massachusetts gas and electric program administrators' residential efficient products (lighting, appliances and consumer electronics) and HVAC programs.

***Residential Team Lead, Connecticut Energy Efficiency Board (EEB).*** Leads residential team to provide oversight of the state's electric and gas residential efficiency program, including the utilities successful residential Zero Energy Challenge program.

***Programmatic and Technical Support, Rhode Island Energy Efficiency Resource Management Council (EERMC).*** Senior Advisor providing on-going technical and programmatic advice to, and oversight of, the Rhode Island's gas and electric utilities' residential efficient products (lighting, appliances and consumer electronics) and HVAC programs.

***New York State Energy Research and Development Authority.*** Principal-in-charge for commercial/residential code compliance study. This is one of the first studies in the nation undertaken to meet federal requirements to demonstrate 90 percent code compliance.



## **GLENN REED, PRINCIPAL**

***New York State Energy and Research Development Authority (NYSERDA).*** Part of evaluation oversight team currently assisting NYERDA with planning, coordinating, implementing and reviewing a wide range of program evaluation efforts.

***Connecticut Commercial Baseline Study.*** Managed a data collection and analysis project to determine new construction practices in ten commercial building categories. This project, for Northeast Utilities, involved 70 on-site surveys.

***Long Island Power Authority (LIPA).*** Led the VEIC residential team to provide ongoing technical and programmatic advice to LIPA on the design, implementation, and evaluation of their residential and renewable energy program.

***Massachusetts Statewide C&I Baseline Study.*** Managed a joint research project to characterize new construction practices in the commercial and industrial sectors. This project for four Massachusetts utilities analyzed data collected from 100 on-site surveys.

***New Jersey Residential HVAC Baseline Study.*** Managed a residential HVAC baseline study for the New Jersey HVAC working group consisting of the state's electric and gas investor owned utilities. Nearly 70 on-site surveys characterized HVAC specification and installation practices including system sizing, duct leakage, refrigerant charge and airflow over the indoor coils.

***Georgia Power C&I Baseline Study.*** Managed an on-site survey and analysis project to determine new construction baseline practices. For this study for Georgia Power, data were collected on-site at 480 facilities representing over 13 million square feet of new building space.

***Carolina Power& Light Residential New Construction Program.*** Managed a comprehensive impact and process evaluation of CP&L's Common Sense Home residential new construction program. To support the simulation analysis, 100 detailed on-site surveys were completed; 50 of participants and 50 of nonparticipants.

***Massachusetts Residential Code Impact Study.*** Managed a residential code impact study for the Massachusetts Board of Building Regulations and Standards (BBRS). Nearly 200 on-site surveys of recently built homes were completed.

***New York Gas Group Gas Cooling Study.*** Managed the development of a research agenda to accelerate the commercialization of gas cooling technologies in New York. This analysis addressed both technical and market acceptance issues.

## **SELECTED PUBLICATIONS**

*Northeast Residential Lighting Strategy.* (With Optimal Energy, D&R International, and Ecova). Northeast Energy Efficiency Partnerships. Lexington, MA. March 2012

*The Costs and Benefits of Measuring if States Meet 90% Compliance with Building Codes.* R. Wirtshafter, Glenn Reed, et. al.), Proceedings of the International Energy Program Evaluation Conference (IEPEC), August 2011.

*Do CFLs Still Pass the Test.* Chris Granda and Glenn Reed. Home Energy. May/June 2010.

*Comparative Performance of Electrical Energy Efficiency Portfolios in Seven Northeast States.* Stuart Slote, Glenn Reed, and John Plunkett. 2006 ACEEE Summer Study on Energy Efficiency in Buildings, Pacific Grove, California, August 2006.



## **GLENN REED, PRINCIPAL**

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*Savings Without Rebates: Moving Toward Claiming Savings from Market Transformation.* Glenn Reed, Toben Galven, and Blair Hamilton. 2006 ACEEE Summer Study on Energy Efficiency in Buildings, Pacific Grove, California, August 2006.

### **REFERENCE**

Jamie Howland. First Vice-Chair. CT Energy Efficiency Board. 860.246.7121. [jhowland@env-ne.org](mailto:jhowland@env-ne.org)

## SAM DENT

Consultant, Dent Energy Consulting Ltd.  
(802) 658-6060 Ext.7754 - sdent@veic.org

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### PROFESSIONAL EXPERIENCE

*Consultant, Dent Energy Consulting Ltd.,* Frome, United Kingdom August 2009-Present  
Provide continued consulting support to Vermont Energy Investment Corporation as detailed below:

*Senior Energy Analyst, Vermont Energy Investment Corporation (VEIC),* Burlington, Vermont 2008 –2009  
Performing complex analytical research and consulting in various regulatory and political contexts to develop and implement progressive energy efficiency and renewable programs throughout the United States. Projects include:

- *Efficiency Vermont:* Project manager of Residential Energy Services market strategy and technical support. Research and develop new efficient technology characterizations. Technical review all external marketing and technical documents. Savings analysis tool development and maintenance.
- *Mid-Atlantic Technical Reference Manual (TRM):* Residential lead in the characterization of electric measures for the creation of a TRM for Mid-Atlantic States.
- *Ohio TRM:* Review and development of residential electric measure characterizations for a TRM in Ohio.
- *Vermont Forecast 20:* Member of team tasked by the State Department of Public Service to prepare a twenty year forecast of economically achievable efficiency for the state of Vermont.
- *Iowa Office of Consumer Advocates:* Developed written testimony and rebuttal in review of five year efficiency plans of three investor owned utilities.
- *Ontario Power Authority:* Coauthored testimony critiquing the Ontario Power Authority's twenty year Integrated Power System Plan for Conservation and Demand Management.
- *Groton School, Massachusetts:* Developed comprehensive utility data tracking tool allowing the school to track change in energy usage due to efficiency improvements.

*Business/Residential Services Technical Coordinator,* VEIC, Burlington, Vermont 2006 – 2008

Responsible for providing technical, policy and analytical support for Efficiency Vermont's Business and Residential services departments.

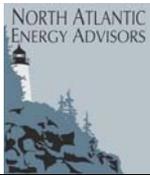
- *Analytical Tool Development:* Built and maintained multiple comprehensive Excel tools for internal staff to analyze energy usage and calculate potential savings from efficiency measures, including Lighting Power Density, Demand Control Ventilation, Walk-in Refrigeration units, Heat and Energy Recovery Ventilation, Compressed Air Systems, Residential Home Performance.
- *Technical Resource Development, Training and Support:* Researched and created technical resource policies, analysis methodologies and measure characterizations for new energy efficient technologies. Provided technical training and both analytical and procedural support to in house and external energy professionals.
- *Consultation with State Department:* Participated in consultation with the Vermont department of Public Service in issues relating to the verification of energy savings.

### EDUCATION

University of East Anglia, Norwich, UK, BSc Environmental Sciences, 1998 – 2002

### ADDITIONAL TRAINING

- Home Energy Rating System Training, October, 2008
- Fundamentals of Heating Ventilation and Air Conditioning Systems, February 2008
- Building Analyst (Auditor) Course, September 2004



**NORTH ATLANTIC ENERGY ADVISORS QUALIFICATIONS**

**NEW JERSEY JOINT ELECTRIC AND GAS ELECTRIC CLEAN ENERGY COLLABORATIVE**

**Client:**  
Natural Resources Defense Council and NJ Utilities

**Client Contacts:**  
Jim Cinelli,  
PEPCO Holdings

609.625.5268

Fred Link  
Public Service Gas & Electric

973.430.8155

**Period of Contract:**  
2000 -2003

**PROJECT OVERVIEW** – Doug Baston coordinated a joint NRDC/Utility team which designed a complete portfolio of gas and electric energy efficiency programs for the State of New Jersey – the New Jersey Clean Energy Program.

**PROGRAM BACKGROUND** – The New Jersey utility restructuring law created a System Benefit Fund a directed the state’s utilities to design a portfolio of commercial, industrial, residential efficiency and renewable energy programs. As a result of environmental advocate and other stakeholder concerns, the utilities agreed to conduct program design through a collaborative process, with the Natural Resources Defense Council to serve as the lead non-utility party.

**NAEA ROLE** – Doug Baston was selected by the parties to coordinate C&I program development. He headed co-chaired program team consisting of efficiency program managers from the state’s four electric and three gas utilities and outside consultants and experts.

**SUMMARY OF RESULTS** –

- An orderly, documented, harmonious and consensus-based program design process that resulted in unanimous agreement of all parties on program designs and budgets.
- The nation’s first fully integrated portfolio of gas and electric programs.
- Budgets for “lost opportunity”- based commercial and industrial efficiency programs of \$34.1 million annually.

**MASSACHUSETTS ENERGY EFFICIENCY ADVISORY COUNCIL**

**Client:**  
Massachusetts Utilities and Non-Utility Parties

**Client Contacts:**  
Mike Sherman,  
Massachusetts Division of Energy Resources

617.626.7387

Frank Gundal NSTAR Electric

**PROJECT OVERVIEW** – The Massachusetts Division of Energy Resources, working with a representative citizen stakeholder Energy Efficiency Advisory Council appointed by the governor, is charged with reviewing and approving plans submitted by the four Massachusetts electric and five gas utilities to delivery efficiency programs in the Commonwealth. DOER and the Council, through its consultants, is also responsible for monitoring utility performance against these plans.

Doug Baston was selected by, and represents, the DOER and Council in this oversight role. As Coordinator of the Commercial & Industrial Advisor Team, he participates in and helps guide all efficiency program development and enhancement activities at National Grid Electric and Gas, NSTAR Electric and Gas, Western Massachusetts Electric, Cape Light Compact, Fitchburg Gas & Electric, Bay State Gas, Berkshire Gas, and New England Gas. He works in collaboration with his counterpart managers at each utility and staff from three other advisor firms. He also participates in formal and informal evaluations of program performance and helps guide the Joint Utility Standing Technical

<p>781.441.8151</p> <p><b>Period of Contract:</b> 2008 - Present</p>	<p>Committee.</p> <p><b>SUMMARY OF RESULTS –</b></p> <ul style="list-style-type: none"><li>• This “collaborative process” has proven over time to be a successful and cost-effective program development and oversight model.</li><li>• Massachusetts programs are recognized as being in the first tier nationally and internationally by almost all independent best practices assessments or surveys.</li><li>• Budgets for both retrofit and “lost opportunity”- based commercial and industrial efficiency programs of over \$250 million annually.</li></ul>
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# NORTH ATLANTIC ENERGY ADVISORS

**DOUGLAS C. BASTON**

**Principal**

**18 Sheepscot Road, Alna, Maine 04535**

**Phone: 207.882.7221**

**Fax: 207.882.4194**

**dcbaston@northatlanticenergy.com**

## **NORTH ATLANTIC ENERGY ADVISORS, Alna, Maine (1992-Present)**

**Principal:** Firm concentrates in the areas of conservation and renewables program design and management for utilities and public programs, market research and strategy, energy efficiency advocacy support, and policy analysis of the regulatory issues which accompany utility-sponsored conservation programs and electric utility deregulation.

### **PAST and PRESENT CLIENTS:**

American Council for an Energy Efficiency Economy  
Aspen Systems Corporation  
Boston Edison Company  
Boston Edison DSM Settlement Board  
Carolina Power & Light Company  
Clean Air Task Force  
Connecticut Non-Utility Parties  
Conservation Law Foundation  
Conserve Nova Scotia  
Commonwealth Edison Company  
Consortium for Energy Efficiency  
Dalhousie University  
Efficiency New Brunswick  
Energoprekt, Republic of Bulgaria  
Energy Foundation  
Hungarian Electrotechnical Association, Republic of Hungary  
Jacksonville Electric Authority  
Kendall Foundation  
Long Island Power Authority  
Maine Office of the Public Advocate  
Maine Public Utilities Commission  
Maine School Management Association  
Maine State Planning Office  
Massachusetts Division of Energy Resources  
Massachusetts Electric Company  
Massachusetts Energy Efficiency Council  
National Grid USA  
Natural Resources Council of Maine  
Natural Resources Defense Council  
New Hampshire Governor's Office of Energy  
New Jersey Institute of Technology  
New Jersey Electric and Gas Utility Collaborative  
NY State Energy Research & Development Authority  
Niagara Mohawk Power

Northeast Energy Efficiency Partnerships  
Northeast Utilities  
Northern Indiana Public Service Corporation  
Nova Scotia Department of Energy  
Nova Scotia Power  
Pacific Northwest National Laboratory  
Penobscot Indian Nation  
PEPCO  
Rhode Island Energy Efficiency Board  
Southern California Edison  
Vermont Department of Public Service  
World Bank/People's Republic of Vietnam  
U.S. Department of Energy  
- Federal Energy Management Program  
- Rebuild America Program  
- U.S. Country Studies Program  
- New England Support Office, Boston  
- Mid-Atlantic Support Office, Philadelphia  
- Mid-West Support Office, Chicago  
- Northwest Support Office, Seattle  
Union of Concerned Scientists

## **PRIOR PROFESSIONAL EXPERIENCE**

### **Central Maine Power, Augusta, Maine (1992)**

**Legislative Representative:** Developed Company positions with regard to state and federal energy policy. Drafted proposed legislation as well as legislative and regulatory testimony.

### **Central Maine Power (1988-1992)**

**Director, Energy Management Program Design:** Managed development of CMP's Demand Side Management programs from design through filing with the Maine Public Utilities Commission.

### **Central Maine Power, Lewiston, Maine (1986-1988)**

**Supervisor, Commercial and Residential Services:** Directed staff delivering all energy management and customer service programs in the Company's Western Division.

### **Bonneville Power Administration, Portland, Oregon (1985-1986)**

**Manager, Commercial Audit Program:** Managed \$12.5 million program which provided audits to 4,000 businesses in Oregon, Washington, Idaho, and Montana.

### **Bonneville Power Administration, Lower Columbia Area Office (1984-1985)**

**Assistant to Area Manager:** Agent for the Manager in resolving contractual disputes between BPA and the State of Oregon and several customer utilities.

### **Bonneville Power Administration, Portland, Oregon (1982-1984)**

**Conservation Finance Specialist:** Analyzed options to finance conservation programs; designed and implemented mechanisms to do so.

### **Cape & Islands Self-Reliance Corporation, Hyannis, Massachusetts (1980-1982)**

**Executive Director:** Established a not-for-profit corporation providing energy conservation services to businesses and individuals in a three-county area. Managed a staff of fourteen.

### **National Center for Appropriate Technology (1979-1980)**

**Director, Rocky Mountain Field Office:** Managed NCAT services in the Rocky Mountains & High Plains.

## **EDUCATION**

**University of Maine School of Law (1991)** *Doctor of Law*

**Portland (Oregon) State University, Lewis and Clark College (1983-1985)**

*Advanced studies in Public Administration and Economics of Regulated Industries*

**University of Maine (1969)** *B.A. in Political Science*

## **HONORS, MEMBERSHIPS & PRESENTATIONS**

**Honors:** BPA Middle Management Program, Massachusetts Energy Citizen of the Year

**Memberships and Civic Positions:** Secretary of the Board of Directors, New Buildings Institute; Board of Directors, Wiscasset Area Development Corporation; Vice President, Small Woodland Owners Association of Maine; Board of Directors, Environment Northeast; Board of Directors, Wiscasset Area Development Corporation; Clerk, Wiscasset & Quebec Railroad Company; Board of Directors, Maine School of Science and Mathematics Foundation; Board of Directors, Maine Association of building Energy Professionals; Chairman, Planning Board, and Fence Viewer, Town of Alna, Maine

**Presentations & Papers:** At conferences or seminars in Long Beach and Santa Clara, California; Halifax, Nova Scotia; Winnipeg, Manitoba; Indianapolis, Indiana; Houston, Texas; Chicago, Illinois; Orlando, Florida; Boston, Massachusetts; Los Vegas, Nevada; Atlanta, Georgia; Washington, DC

Recent Publications: “Just a Little Money – Financing Modest Investments in Energy Efficiency and Renewable Energy for Residential and Small Business Customers in a New Energy Marketplace” and “Prospects for a Green Financing Program For Massachusetts” (with Fred Gordon)

## PRAHL CONSULTING SERVICES

***Evaluation planning, review and oversight consultant to the Massachusetts Non-Utility Parties (NUPs) and Energy Efficiency Advisory Council (EEAC), 1998-present.*** Over the past twelve years I have assumed a steadily increasing range of evaluation oversight responsibilities on behalf of Massachusetts regulators and NUPs. In 1998, I began as evaluation advisor to the NSTAR Collaborative. In the mid-2000s, most residential evaluations in Massachusetts went statewide, and I was assigned the responsibility for critiquing and providing oversight to these studies. In 2009, following an agreement among major stakeholders and an accompanying resolution by the EEAC, a decision was reached to fundamentally restructure the evaluation framework in Massachusetts. Under the new framework, all evaluations are statewide although administered by individual utilities, and the EEAC's consultants have the ability to directly override evaluation planning and implementation decisions made by the utilities.<sup>1</sup> As leader of the EEAC Consultants' EM&V team, I therefore have substantial decision-making authority over all EM&V activities in Massachusetts, currently totaling some \$9 million annually. I believe this is the second or third largest EM&V operation in the U.S., following California and possibly New York. I also represent Massachusetts on the Northeast EM&V Forum, a regional body charged with performing collaborative studies and developing regional protocols.

***Independent reviewer and planner for the Wisconsin statewide public benefits programs, 1999-present.*** For eleven years I have been responsible for reviewing and critiquing all deliverables for the evaluation of the statewide Focus on Energy program. I also play a key role in evaluation planning for Focus on Energy, and serve on the management team with the team of contractors performing the evaluations.

***Assisting the California PUC in overseeing a series of market effects studies, 2007-Present.*** Since 2007, as a subcontractor to CIEE, I have helped the CPUC to oversee exploratory market effects studies of the CFL, High-Bay Lighting, and Residential New Construction markets. I have been the lead representative for the CFL study and technical advisor for the remaining studies.<sup>2</sup>

***Evaluation advisor to the New York Department of Public Service, 2008-present.*** I am currently serving on a team of five individual consultants advising the NYDPS on its evaluation policy-making, review and oversight efforts.

***Evaluation advisor to the Rhode Island Energy Efficiency and Resources Management Council (EERMC), 2008-present.*** In this ongoing assignment I advise the Council on evaluation policy issues and on the review and oversight of all EM&V studies in Rhode Island.

***Independent reviewer of the evaluation activities of the California utilities on behalf of the CPUC, 1995-2000.*** In this assignment I represented the CPUC Energy Division on CADMAC, and helped to adjudicate and litigate disputes regarding savings claims in the AEAP. While California's evaluation program was smaller in the mid-90s than it is today, it was nonetheless the largest in the country at the time.

***Primary overseer of energy efficiency evaluation efforts in California on behalf of the California Board for Energy Efficiency and the CPUC, 1997-2000.*** As evaluation lead for the team of

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<sup>1</sup> Subject to a system of appeals.

<sup>2</sup> This contract expires on June 30, 2010.

consultants working for the CBEE, I was responsible for recommending evaluation policies and overseeing the planning and implementation of all evaluations, as well as for directing the work of other team members on evaluation issues.

***Coauthor of the California Evaluation Framework, 2003-2004.*** I was one of the authors of this groundbreaking California document.

***Evaluation Advisor to Long Island Power Authority (1999-2009).*** For ten years, I advised LIPA on its evaluation and market assessment activities, including reviewing and commenting on RFPs, reports, and interim work products.

***Evaluation Advisor to Efficiency Vermont (2000-present).*** For ten years, I have advised EVT on a range of evaluation and market assessment issues.

***Independent Reviewer for the Illinois Stakeholder Advisory Group (2008-2009).*** The SAG is responsible for helping regulators to oversee the programming efforts of Com Ed and Ameren Illinois. For two years I advised the SAG on the development and implementation of the Illinois evaluation framework governing the evaluation efforts of the two program administrators.

***Evaluation Advisor for the New England State Program Working Group (2006-2007).*** I advised the SPWG and the New England Independent System Operator (ISO) in the development of protocols governing the country's first forward capacity market for energy efficiency.

***Independent Reviewer for the U.S. Environmental Protection Agency (2009-2010).*** I recently served as an invited member of a team of five experts charged with reviewing and critiquing the savings estimation methods of the Energy Star program.

***Evaluation Advisor to the New York Power Authority (2009-present).*** I am currently advising NYPA on the development and implementation of its evaluation framework.

Other clients over the years have included BC Hydro, NARUC, and the Connecticut Department of Public Utilities Control.

## **Ralph Prah, Independent Consultant**

7613 Whitebridge Glen  
University Park, FL 34201  
Phone: (608) 238-9942  
E-mail: PrahR@msn.com

### **EXPERIENCE**

1990-Present: Independent Consultant

Advised governmental and non-profit organizations on the planning, review and oversight of energy efficiency program evaluation and market assessment activities. Clients included the California, Connecticut, Massachusetts, New York, Wisconsin, and Vermont PUCs; the National Association of Regulatory Utility Commissions; the Wisconsin Department of Administration; the Massachusetts Department of Energy Resources; the Long Island Power Authority; the Massachusetts Non-Utility Parties; and the Northwest Energy Efficiency Alliance. Selected recent assignments include:

Lead evaluation planner and reviewer for the Wisconsin statewide public benefits evaluation team, 1999-present.

Evaluation planning, review and oversight consultant to the Massachusetts Non-Utility Parties and Energy Efficiency Advisory Council, 1998-present.

Evaluation advisor to the New York Department of Public Service, 2008-present

Evaluation advisor to the Rhode Island Energy Efficiency and Resources Management Council, 2008-present.

Evaluation advisor to the New York Power Authority, 2009-present

Assisting the California PUC in overseeing a series of market effects studies, 2007-Present (subcontractor to the California Institute for Energy Efficiency)

Evaluation planning and review consultant to Efficiency Vermont, 2000-present.

Evaluation planning and review advisor for the Long Island Power Authority, 1999-2009.

Evaluation advisor to the Illinois Stakeholder Advisory Group, 2008-2009

Assisting the New England states and ISO in developing regional Measurement and Verification protocols for use in the Forward Capacity Market, 2006-2007

Primary overseer of energy efficiency evaluation efforts in California on behalf of the California Board for Energy Efficiency and the California PUC, 1997-2000.

Independent reviewer of the evaluation activities of the California utilities on behalf of the California PUC, 1995-2000.

1985-1997: Coordinator of Energy Efficiency Evaluation and Research, Public Service Commission of Wisconsin

Provided regulatory oversight for the program evaluation, market assessment and R&D efforts of the Wisconsin utilities in support of their energy efficiency programs. Played a leading role in conceiving, developing, and overseeing the Energy Center of Wisconsin, a unique state-level research consortium. Served as an in-house consultant on a wide range of regulatory issues involving statistical analysis and applied social research.

### **EDUCATION**

1985. M.A., Sociology, University of Wisconsin-Madison.

1982. B.S., History, University of Wisconsin-Madison.

1982. B.A., Journalism, University of Wisconsin - Madison.

## **REFERRED PUBLICATIONS**

### *1. Conference Papers*

Vine, Edward, Nick Hall, Kenneth M. Keating, Martin Kushler, and Ralph Prah, 2010. "Emerging Evaluation Issues: The U.S. Experience." In Proceedings of the International Energy Program Evaluation Conference. Paris, France.

Vine, Edward, Ralph Prah, Steve Meyers and Isaac Turiel, 2009. "A Framework for Evaluating Market Effects of Energy Efficiency Programs: Guidance for Evaluators." In Proceedings of the 2009 International Energy Program Evaluation Conference.

Ledyard, Thomas, Dimple Gandhi and Ralph Prah, 2009. "In it for the Long Haul: The Challenges of a Seven-Year Effort to Assess the Market Effects of a Non-Residential New Construction Program." In Proceedings of the 2009 International Energy Program Evaluation Conference.

Tolkin, Betty M., William Blake, Elizabeth Titus, Ralph Prah, Dorothy Conant, and Lynn Hoefgen, 2009. "What Else Does an ENERGY STAR Home provide? Quantifying Non-Energy Impacts in Residential New Construction." In Proceedings of the 2009 International Energy Program Evaluation Conference.

Wilson-Wright, Lisa, Tom Ledyard, Ralph Prah, Kim Oswald and Angela Li, 2009. "They're Out There – Somewhere: Locating and Evaluating CFLs Distributed Through Markdown Programs." In Proceedings of the 2009 International Energy Program Evaluation Conference.

Barry, J. Ryan, Oscar Bloch, Miriam Goldberg, Ralph Prah and Mitch Rosenberg, 2009. "State-to-State Baseline Comparison to Establish Existence of Market Effects in the Non-Residential Sector." Forthcoming in Proceedings of the 2009 International Energy Program Evaluation Conference.

Lynn Hoefgen, Angela Li, Gail Azulay, Ralph Prah, and Susan Oman, 2008. "Market Effects: Claim Them Now or Forever Hold Your Peace." In Proceedings of the 2008 ACEEE Summer Study on Energy Efficiency in Buildings.

Glenn C. Haynes, Thomas Ledyard, Gail Azulay, and Ralph Prah, 2007. "Building a Better Mousetrap: A Unique Approach to Determining Reliable Savings Potential." In Proceedings of the 2007 International Energy Program Evaluation Conference.

Susan Oman, Lynn Hoefgen, Angela Li, and Ralph Prah, 2007. "Blinded by the Light: Why Are We in the Dark about How Many CFLs are Out There?" In Proceedings of the 2007 International Energy Program Evaluation Conference.

Robert M Wirtshafter, Greg Thomas, Gail Azulay, William Blake, and Ralph Prah, 2007. "Do Quality Installation Verification Programs for Residential Air Conditioners Make Sense in New England?" In Proceedings of the 2007 International Energy Program Evaluation Conference.

Ann Clarke, Robb Aldrich, Robert Allgor, David Hill and Ralph Prah, 2007. "A Performance Evaluation Study of Photovoltaic Systems Installed through the Long Island Power Authority's Clean Energy Initiative Solar Pioneer Program." In Proceedings of the 2007 International Energy Program Evaluation Conference.

Ann Clarke, Timothy Pettit, Robert Allgor, David Hill and Ralph Prah, 2005. "A Theory-Based Evaluation of LIPA's Solar Pioneer Program: Measuring Early Progress in the Transformation of the PV Market on Long Island." In Proceedings of the 2005 International Energy Program Evaluation Conference.

Thomas A. Ledyard, Ann Clarke, Ralph Prael, Todd Romano, and Eric Belliveau, 2005. "LIPA's Commercial Construction Program: Demonstrating Initiative Influence along the Road to Transformation." Forthcoming in Proceedings of the 2005 International Energy Program Evaluation Conference.

Timothy Pettit, Ann Clarke, David Hill, Ralph Prael, and Marjorie McCrae, 2004. "Using Theory-Based Evaluation To Help Plan Improvements for LIPA's Solar Pioneer Program." In Proceedings of the 2004 American Solar Energy Society Conference.

Michael W. Rufo, Ralph Prael and David Sumi, 2002. "Nonresidential Performance Contracting Programs: Assessing the Market Transformation Dimension." In Proceedings of the 2002 ACEEE Summer Study on Energy Efficiency in Buildings, pp. 6.267-6.282.

Sumi, David, and Ralph Prael, 2001. "A Comprehensive Examination of the Market Effects of a Public Benefits-Sponsored Pilot Program: Lessons Learned from Wisconsin's Focus on Energy." In Proceedings of the 2001 International Energy Program Evaluation Conference, pp. 237-248.

Sumi, David, and Ralph Prael, 2000. "Market Transformation Assessment: Early Results to Inform Program, Policy And Administrative Decisions in Wisconsin." Presented at the 11th National Energy Services Conference and Exposition, December 4-6, 2000.

Mosenthal, Philip, Ralph Prael, Chris Neme and Robert Cuomo, 2000. "A Modified Delphi Approach to Predict Market Transformation Program Effects." In Proceedings of the 2000 ACEEE Summer Study on Energy Efficiency in Buildings.

Hastie, Steve, Ralph Prael, Phil Mosenthal, Dimple Gandhi and Barbara Klein, 2000. "A Systematic Application of Theory-Based Implementation and Evaluation of Market Transformation Programs." In Proceedings of the 2000 ACEEE Summer Study on Energy Efficiency in Buildings.

Rufo, Michael, Ralph Prael and Pierre Landry, 1999. "A Comprehensive Baseline Assessment of the Non-Residential Energy-Efficiency Services Market." In Proceedings of the 1999 Energy Services Conference.

Rufo, Michael, Ralph Prael and Pierre Landry, 1999. "Evaluation of the 1998 California Non-Residential Standard Performance Contracting Program: A Theory-Driven Approach." In Proceedings of the 1999 International Energy Program Evaluation Conference, pp. 867-880.

Goldman, Charles, Joseph Eto, Ralph Prael and Jeff Schlegel, 1998. "California's Non-Residential Standard Performance Contract Program." In Proceedings of the 1998 ACEEE Summer Study on Energy Efficiency in Buildings.

Prael, Ralph, Jeff Schlegel and Charles Goldman, 1998. "Organizing for Market Transformation: Institutional Issues in the Creation of a New Energy Efficiency Policy Environment in California." In Proceedings of the 1998 ACEEE Summer Study on Energy Efficiency in Buildings.

Prael, Ralph, and Scott Pigg, 1997. "Do the Market Effects of Utility Energy Efficiency Programs Last? Evidence From Wisconsin." In Proceedings of the 1997 International Energy Program Evaluation Conference, August.

Pigg, Scott, Ralph Prael and Mark Wegener, 1997. "Motors Market Transformation in a Time of Utility Restructuring -- The Wisconsin Story." In Proceedings of the 1997 International Energy Program Evaluation Conference, August.

Kushler, Martin, Jeff Schlegel and Ralph Prael, 1996. "A Tale of Two States: A Case Study Analysis of the Effects of Market Transformation." In Proceedings of the 1996 ACEEE Summer Study on Energy

Efficiency in Buildings, Volume 3, pp. 59-68. American Conference for an Energy Efficient Economy, Washington, D.C., August.

Prahl, Ralph and Jeff Schlegel, 1994. "DSM Resource Acquisition and Market Transformation: Two Inconsistent Policy Objectives?" In Proceedings of the 1994 ACEEE Summer Study on Energy Efficiency in Buildings. American Council for an Energy Efficient Economy, Washington, D.C.

Prahl, Ralph, 1994. "When Worlds Collide: The Role of Verification in DSM Bidding." In Proceedings of NARUC's Fifth National Conference on Integrated Resource Planning. National Association of Regulatory Utility Commissioners, Washington D.C., May.

Schlegel, Jeff, and Ralph Prahl, 1994. "Market Transformation: Getting More Conservation and Energy Efficiency for Less Money." In Proceedings of the 1994 Affordable Comfort Conference.

Schlegel, Jeff, George Edgar, Martin Kushler, Ralph Prahl and Angie Minkin, 1993. "Do Shareholder Incentives Work? Results of an Evaluation of DSM Shareholder Incentives in California." In Proceedings of the 1993 International Energy Program Evaluation Conference. Argonne National Laboratory, Argonne, IL, August.

Prahl, Ralph, and Jeff Schlegel, 1993. "Evaluating Market Transformation." In Proceedings of the 1993 International Energy Program Evaluation Conference. Argonne National Laboratory, Argonne, IL, August.

Peach, Gil, Ralph Prahl, Jeff Schlegel and Rick Fleming, 1993. "Moving Towards Market Transformation." In Proceedings of The ECEEE 1993 Summer Study: The Energy Efficiency Challenge for Europe. European Council for An Energy Efficient Economy, Oslo, Norway, August.

Schlegel, Jeff, and Ralph Prahl, 1993. "Money Talks: The Changing Role of Measurement and Evaluation in the Age of DSM Regulatory Incentives." In Proceedings of the Sixth National Conference on Utility Demand-Side Management Programs. Electric Power Research Institute, Palo Alto, CA, March.

Schlegel, Jeff, Ralph Prahl, Wayne DeForest and Martin Kushler, 1992. "Are Markets Being Transformed by DSM Programs?" Presented at NARUC's Fourth National Conference on Integrated Resource Planning, September 16, 1992.

Prahl, Ralph, Jeff Schlegel and Scott Pigg, 1992. "Evaluation and Utility Performance Incentives: Not (Just) A Scorecard." In Proceedings of NARUC's Fourth National Conference on Integrated Resource Planning. National Association of Regulatory Utility Commissions, Washington D.C., September.

Vine, Edward, Odon de Buen, Charles Goldman, and Ralph Prahl, 1991. "Stimulating Utilities to Promote Energy Efficiency: Process Evaluation of the Madison Gas and Electric Competition." In Proceedings of the 1991 International Energy Program Evaluation Conference. Argonne National Laboratory, Argonne, IL, August. Pp. 234-248.

Schlegel, Jeff, Ralph Prahl and Martin J. Kushler, 1991. "Measurement in the Age of Incentives." In Proceedings of the 1991 International Energy Program Evaluation Conference. Argonne National Laboratory, Argonne, IL, August. Pp. 182-190.

Prahl, Ralph, 1991. "Evaluation of Utility Performance Incentives in Wisconsin." In Proceedings of the 1991 International Energy Program Evaluation Conference. Argonne National Laboratory, Argonne, IL, August. Pp. 244-250.

Vine, Edward, Odon de Buen, Charles Goldman and Ralph Prahl, 1991. "Stimulating Utilities to Promote Energy Efficiency: The Madison Gas and Electric Competition." In Proceedings of the Fifth National

Conference on Utility Demand-Side Management Programs. Electric Power Research Institute, Palo Alto, CA, July. Pp, 346-351.

Prahl, Ralph, 1990. "Development of a State-Level Collaborative DSM Research Center." In Proceedings of the 1990 ACEEE Summer Study on Energy Efficiency in Buildings, Volume 5. American Council for an Energy Efficient Economy, Washington, D.C., August. Pp. 149-156.

Prahl, Ralph, Virginia L. Kreitler and Julie Worel, 1989. "Market Research in a Regulatory Setting: the Wisconsin Commercial Market Segmentation Study." In Proceedings of the Fourth National Conference on Utility Demand-Side Management Programs. Electric Power Research Institute, Palo Alto, CA, May. Pp. 63.1-63.10.

Kreitler, Virginia L., and Ralph Prahl, 1989. "Variability in Commercial Markets and Implications for Program Transferability." In Proceedings of the Fourth International Conference on Energy Program Evaluation. Argonne National Laboratory, Argonne, IL, August. Pp. 349-354.

Prahl, Ralph, 1988. "Evaluation for PUCs." In Proceedings of the 1988 ACEEE Summer Study on Energy Efficiency in Buildings, Volume 9. American Council for an Energy Efficient Economy, Washington, D.C., August. Pp. 126-138.

Oliver, Pamela E., Gerald Marwell and Ralph Prahl, 1985. "Organizer and Network Characteristics as Predictors of Collective Action Through All-or-None Agreements." Presented at the annual meetings of the American Sociological Association, Washington, D.C.

## 2. Journal Articles

Vine, Edward, Odon De Buen, Charles Goldman and Ralph Prahl, 1992. "Mandating Utility Competition: One Option for Promoting Energy Efficiency." *Utilities Policy*, January, 1992:51-61.

Prahl, Ralph, Gerald Marwell and Pamela E. Oliver, 1991. "Reach and Selectivity as Strategies of Recruitment for Collective Action: A Theory of the Critical Mass, V." *Journal of Mathematical Sociology* 16(2):137-164.

Oliver, Pamela E., Gerald Marwell and Ralph Prahl, 1988. "Social Networks and Collective Action: A Theory of the Critical Mass, III." *American Journal of Sociology* 94:502-534.

## 3. Journal Issues

Prahl, Ralph, and Jeff Schlegel, 1995, Guest Editors. *Energy Services Journal: Special Issue on Market Transformation*, Volume 1, No. 2. Lawrence Erlbaum Associates, Mahwah, New Jersey.

## 4. Book Chapters

Prahl, Ralph, and Jeff Schlegel, 1994. "Evaluating Market Transformation." In *Energizing the Energy Policy Process: The Impact of Evaluation*, Roberta W. Walsh and John G. Heilman, editors, pp. 181-197. Quorum Books, Westport, Connecticut.

## **SELECTED NON-REFERREED PUBLICATIONS**

Eto, Joseph, Ralph Prahl and Jeff Schlegel, 1996. *A Scoping Study on Energy-Efficiency Market Transformation by California Utility DSM Programs*. Ernest Orlando Lawrence Berkeley National Laboratory, Berkeley, CA.

Schlegel, Jeff, Miriam Goldberg, Jonathan Raab, Ralph Prah, Marshall Kneipp, and Dan Violette, 1997. Evaluating Energy Efficiency Programs in a Re-Structured Industry Environment: A Handbook for PUC Staff. Washington, D.C.: National Association of Regulatory Utility Commissioners.

### **MISCELLANEOUS ACTIVITIES**

Member of the planning committee for the International Energy Program Evaluation Conference, 1999-present.