The Rhode Island Energy Efficiency and Resource Management Council (EERMC)

November 16, 2011

VIA DELIVERY AND ELECTRONIC MAIL

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

RE: Docket 4295- EERMC Review and Approval of the 2012 Energy Efficiency Plan 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 National Grid's 2012 Energy Efficiency Program Plan ("2012 EEPP") as supported by the Vermont Energy Investment Corporation/Optimal Energy's ("Consultant Team") Cost-Effectiveness Report completed for the EERMC, which is enclosed. The EERMC's Consultant Team's report and findings were presented to the EERMC and approved and adopted by a unanimous vote of the EERMC on November 10th, 2011.

As the PUC is aware, R.I.G.L. § 39-1-27.7(c)(5) provides that the EERMC review and approve the triennial energy efficiency procurement plans and any related annual efficiency plans for cost-effectiveness, such as the 2012 Energy Efficiency Program Plan filed on November 1 by National Grid. Section 39-1-27.7 (c)(5) provides further that the PUC shall issue an order approving a mechanism to fully fund cost-effective energy efficiency plans within 60 days after it is filed with the Commission.

Pursuant to its cost-effectiveness review and approval responsibilities under § 39-1-27.7(c)(5), the EERMC authorized the Consultant Team to conduct a cost-effectiveness analysis of the 2012 EEPP filed on November 1, 2011. The enclosed report is the product of that analysis.

In brief summary, the Consultant Team and the EERMC find that under the Total Resource Cost ("TRC") test, ordered by the Commission in Docket 4202's Revised Standards for Least Cost Procurement (July, 2011), and consistent with national best practices, both the individual programs and in combination, the portfolio of programs presented in the 2012 EEPP are cost-effective and compliant with state statutes and regulations. Accordingly, the EERMC's review and approval finds the 2012 Energy Efficiency Program Plan to be cost-effective and appropriate for a fully reconciling funding mechanism approved by the Commission within the specified 60 day period.

The EERMC respectfully recommends that the Commission approve the cost-effective 2012 EEPP as submitted by National Grid and the parties on November 1, and as provided for by § 39-1-27.7 (c)(5), approve a fully reconciling funding mechanism sufficient to fund the 2012 EEPP's proposed budget within 60 days from the date of the Plan's filing.

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

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The Cost-Effectiveness Of National Grid's Annual Energy Efficiency Procurement Plan For 2012:

An Assessment and Report by
The VEIC/Optimal Consultant Team
Working on Behalf of

The Rhode Island Energy Efficiency and Resource Management Council (EERMC)

EERMC Consultant Team Findings

This finding and this Cost Effectiveness Report were presented by the EERMC Consultant Team to the EERMC at its November 10 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 2012 Annual Energy Efficiency Program Plan (EEPP) Filing by National Grid are cost-effective according to the Total Resource Cost Test (TRC). We also find that the Programs and portfolio proposed represent a reasonable and credible ramp-up of National Grid's implementation efforts. We conclude that these programs meet the cost-effective 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 EEPP for 2012 includes improved cost-effectiveness relative to the projections contained for 2012 in the 2012-2014 Energy Efficiency and System Reliability Procurement Plan (2012-2014 Plan) filed with the Commission on by National Grid on September 7, 2011. The proposed EEPP for 2012 meets the Savings Targets for electric and gas efficiency savings for 2012 described in the 2012-2014 Plan.

I: Introduction

During the 2010 legislative session the Rhode Island legislature passed H8082 – An Act Relating to Public Utilities and Carriers, which includes the following language for R.I.G.L. § 39-1-27.7 (c)(5):

> *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 approval of whether the 2012 EEPP is cost-effective and submit that review and approval as evidence to the Rhode Island Public Utilities Commission ("Commission" or "PUC") necessary for Commission's approval of a fully reconciling funding mechanism to fund the 2012 EE Program Plan 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 Resources 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 2012 Energy Efficiency Program Plan (EEPP), filed November 1, 2011 with the Commission in Docket No. 4295. 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 13 meeting the EERMC: (1) approved in principle the Consultant Team's high level Cost Effectiveness determination – that National Grid's 2012 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 a specific Cost-Effectiveness Report be prepared in consultation with the EERMC Sub-Committee and be submitted to the EERMC at its November 10th meeting.

At its November 10th meeting the EERMC approved the Consultant Team's specific Cost Effectiveness Report and its conclusion – that National Grid's 2012 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.

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 2012 EEPP.

II. 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), 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), Betsy Harper (VEIC), and Energy Futures Group provide deep knowledge of residential program design. Juliette Juillerat (VEIC), Steve Bower (OEI), and Cliff McDonald (OEI) form the analytical team that reviews screening and modeling assumptions. Ralph Prahl, of Prahl 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 Rhode Island 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
- Provided oversight of the Opportunity Report process in both Phase I and in Phase II

- Contributed to the development of, and reviewed annual EEPP filings by National Grid for 2009, 2010, 2011, and 2012
- Analyzed the cost-effectiveness of the 2011 EEPP and documented those findings for the PUC on behalf of the EERMC.
- Contributed to the development, and reviewed the cost-effectiveness, of National Grid's 2012-2014 Energy Efficiency Procurement Plan
- Documented the finding of cost-effectiveness of the 2012-2014 Energy Efficiency Procurement Plan for the PUC on behalf of the EERMC.

This strong familiarity with the Rhode Island policy, planning, implementation, and evaluation experience provides a high level of assurance that practice in Rhode Island is consistent with regional and national best practices in Energy Efficiency Least Cost Procurement.

III. 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 maximizes ratepayers' economic savings through investments in all cost-effective energy efficiency. By placing a requirement on the distribution utility to procure all cost-effective energy efficiency, Rhode Island ratepayers of all classes 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 wisely 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 spelled out:

> *(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_2 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.*

Following existing Commission practice and since least cost procurement was added by the General Assembly for natural gas efficiency in 2010, the same TRC methodology (adjusted appropriately for gas measures and programs) has been applied to the evaluation of cost-effectiveness for gas programs.

IV. Consultant Findings

The Consultant Team finds that both the individual programs and in combination, the portfolio of programs presented in the 2012 EEPP filing by National Grid are cost-effective according to the TRC. We also find that the programs and portfolio proposed represent a reasonable and credible 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 Rhode Island General Laws § 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 established in the 2012 EEPP meet those established for 2012 in the 2012-2014 Procurement Plan. The 2012 EEPP meets the Commission-approved Energy Savings Targets for electric efficiency savings (128,570 Annual MWh, or 1.7% of 2009

electric load) and comes close to the Commission-approved natural gas Savings Targets for gas efficiency savings (231,548 Annual MMBTU, or 0.6% of 2009 natural gas load).[1] Improvements in Total Resource Cost and Benefit-to-Cost ratio for 2012 between the 2012-2014 Plan and the 2012 EEPP can be explained by the more detailed level of analysis, planning and program-level oversight required for an annual plan, as opposed to the higher level of planning occurring in a three-year plan. The review conducted by the Consultant Team to reach these conclusions is described in detail in the following sections:

- Section V: 2012 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 2012 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 and evolution of utility efficiency procurement and programs. The Council believes this input is critical to having the programs and new mechanisms evolve into resource acquisition tools that can effectively implement the Rhode Island law to procure all cost-effective energy efficiency.

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 EE policy generally, identifying best practices, reviewing EE programs, and providing written testimony as appropriate. The Consultant Team has engaged National Grid staff directly over its three 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 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

[1] Due to a combination of factors explained in detail in the 2012-2014 Procurement Plan (p.6), the proposed natural gas savings goals for 2012 in the 2012-2014 three-year Plan and in the 2012 EEPP are slightly lower than those approved by the Commission on June 7, 2011 (R.I.G.L. § 39-1-27.7.), at 0.8% of 2009 natural gas load.

National Grid's Energy Efficiency Procurement Plan (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. Although the Collaborative Subcommittee meets regularly throughout the year, beginning in July a more robust schedule of meetings, and between-meeting correspondence is typically initiated to begin formulation of the subsequent year's program planning, and ultimate filing. Due to the 2012-2014 three-year planning cycle overlapping the 2012 annual planning cycle, the 2011 process schedule varied from a typical year:

August:

- Collaborative meetings held at beginning (8/5) and end (8/24) of month to review and revise preliminary program design, savings and budgets reflected in 2012-2014 Plan that will translate into 2012 EEPP
- Members from the Consultant Team held strategy meetings covering the C&I and residential (including low-income) sectors on the 2012 EEPP development process.
- Technical Reference Manual (TRM).Draft received from National Grid, initial comments submitted by Consultant Team. The TRM provides formulas and assumptions used for estimating savings for efficiency measures promoted by National Grid's energy efficiency programs. The TRM is an important piece of documentation of the cost-effectiveness assumptions for prescriptive measures offered by National Grid.

September:

- Kick-off call on 9/6 with National Grid and Council members to review the 2012 EEPP development schedule and process
- First (9/8) and second (9/24) drafts of the 2012 EEPP developed by National Grid for review and comment by the Collaborative Subcommittee
- Program Design meetings on 9/16 with National Grid program managers and Consultant Team
- Cost-effectiveness screening model review meeting with National Grid analysts and Consultant Team

- Collaborative meeting on 9/23 to review draft and feedback from stakeholders
- TRM: Interactive submission of comments to National Grid, and responses to comments received, third draft received from National Grid

October:

- Multiple conference calls between National Grid staff and Consultant Team members to resolve program design, savings, cost and budget issues.
- Cost-effectiveness screening model provided by National Grid to the EERMC Consultant Team on 10/10
- Third draft from National Grid distributed to EERMC and Collaborative on 10/7.
- Post-EERMC meeting, Collaborative Subcommittee works with National Grid to assure all EERMC issues are factored into final version
- TRM: Additional interactive submission of comments to National Grid, and responses received

November 1st

- Submittal of 2012 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 promote 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 "best practice" for evaluating energy efficiency programs. The TRC test indicates that an efficiency measure or program is cost-effective if the benefits outweigh the costs for Rhode Island consumers.

The TRC test compares the value of avoided energy costs and other resource costs to the full incremental cost of efficiency measures and other non-measure 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 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 2012 EEPP methodology and found it to be consistent with standard practice and the Standards. The Rhode Island TRC test includes the following benefits and costs:

- The benefits 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-resource benefits (generally due to decreased operation and maintenance costs), and Demand Reduction Induced Price Effect (DRIPE, as included in the avoided costs of electricity). The benefits for reduced electric energy (MWh and MW) and other resources are monetized based on avoided costs.
- The costs include the costs of program planning and administration, marketing, rebates and other customer incentives, related implementation costs,[2] customer contribution, program evaluation, and shareholder incentive costs, as shown in Tables E-2 and E-5, and G-2 and G-5, of the Company's 2012 EE Program Plan.[3] 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.

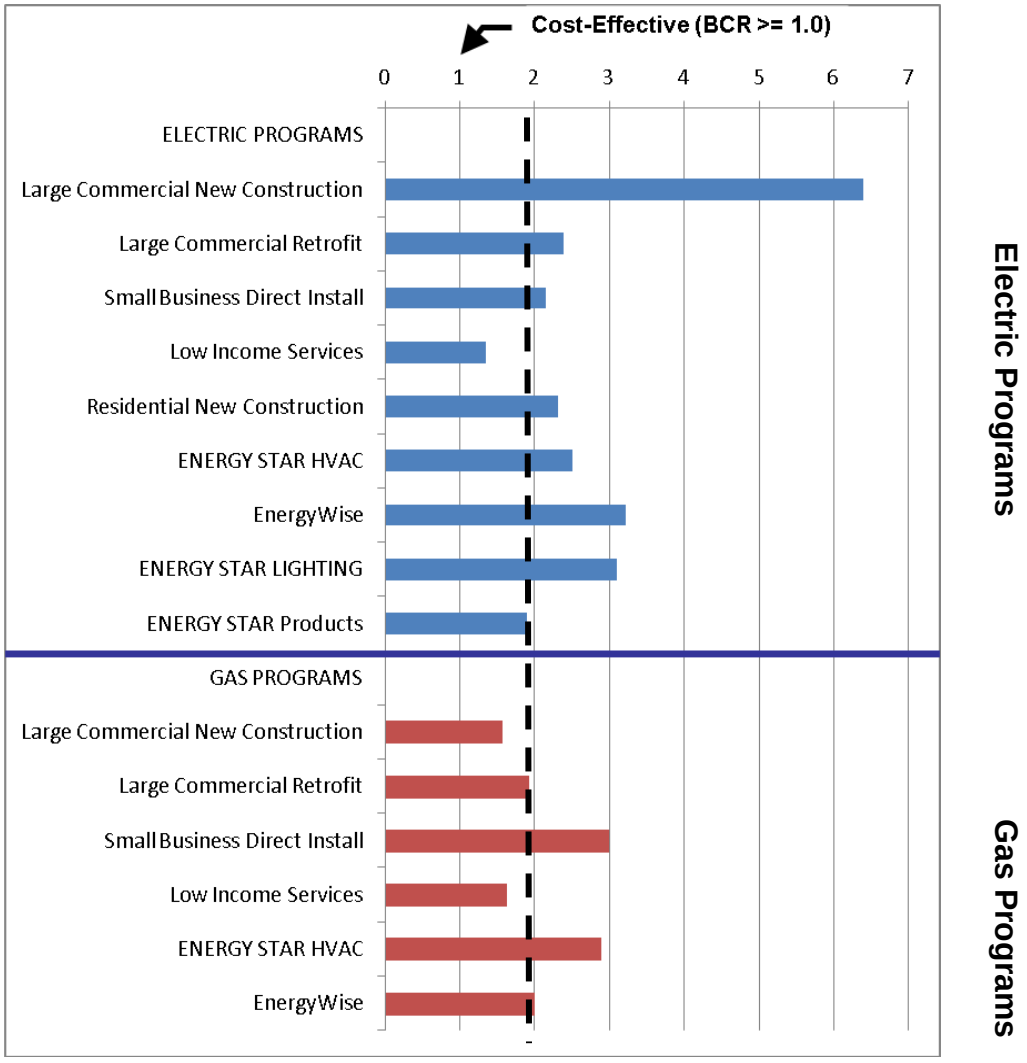
The costs and benefits of an efficiency program are discounted to present-value using a real discount rate, in order to discount the future value of money (i.e., money today is considered more valuable than the same amount of money in the future). A program is considered to be cost-effective if the present value of benefits exceeds the present value of costs, that is, when the TRC benefit-cost ratio (BCR) is greater than 1.0.

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

[3] 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

VII. Cost Effectiveness Review and Findings

This section summarizes the cost-effectiveness of programs presented in the 2012 EEPP, followed by a description of the Consultant Team's review of methodology and findings. The Standards for 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 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 Tables E-5 (electric) and G-5 (natural gas) of the National Grid EEPP. These tables provide supporting data on program budgets, avoided costs, and other related data. All of the electric programs are projected to be cost effective, with BCRs ranging from 1.35 (Low Income Residential) to 6.39 (Large Commercial New Construction). Likewise, the gas programs are all projected as cost-effective with BCRs ranging from 1.56 (Large Commercial New construction) to 2.98 (Small Business Direct Install). 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).



The cost-effectiveness of a few of the programs have changed significantly from the 2011 EEPP to the 2012 EEPP. The program-level BCRs are determined by 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 application of recent evaluation results, application of new avoided costs from the 2011 Avoided Energy Supply Component Study, field experience on recent implementation costs, and changes to state or federal standards.

The Consultant Team review of the cost-effectiveness of the program occurred at several levels, described in more detail below:

- Technical Reference Manual (TRM) review, which allowed for an initial assessment of the measures and assumptions used by National Grid's energy efficiency programs.
- In-depth review of programs and overall portfolio:
    - Review of program design and cost effectiveness projections
    - Review of the mix of offered measures.
    - Review of the cost-effectiveness screening model
    - Documentation and tracking of 2012 EEPP goals compared to prior annual plans, the 2012-2014 Plan, and historical quarterly and annual performance reports.

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. [4]

This review and the collaboration of National Grid in the review are consistent with the objective of increased transparency highlighted in the 2012-14 Plan. There the Company agreed (page 38)

> "To provide for increased transparency and accountability under the proposed [shareholder incentive] mechanism, the Company will undertake the following three activities as part of this proposal:
>
> - The Company will provide a Technical Reference Manual that documents the savings assumptions and calculation methodologies for the Rhode Island plan. This would be submitted to the EERMC and the Collaborative Subcommittee and other parties as desired with the annual 2012 EE Program Plan.

[4] 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 in 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.

- The Company would collaborate with the Division, TEC-RI, the EERMC, and their consultants to demonstrate how savings assumptions on a measure level are translated into program cost-effectiveness calculations.
- The Company will provide greater clarity on how program design changes are integrated into changes in savings assumptions."

As guided by these principles agreed to by the Company, the Consultant Team's review of the cost-effectiveness screening tool and the TRM has been a significant improvement from the prior year's review process. As discussed below, now that these tools are available to the Consultant Team, future review of annual plans will further incorporate these tools into the planning and review process.

Consistent and on-going oversight of National Grid energy efficiency planning and implementation activity occurs both through direct interaction with National Grid staff, and through participation in the Collaborative process (timeline documented in Section V). For program year 2012, the Consultant Team's oversight of the planning process occurred at a much deeper level than ever before, as illustrated below:

- The Consultant Team reached out to National Grid analysts and project managers to flag and address a detailed and prioritized list of issues. The scope of the issues investigated and reviewed was broad and included a number of issues related to both program design and cost effectiveness (examples provided below).

- The analysts on the Consultant Team reviewed National Grid's cost-effectiveness screening process. First, during a meeting with National Grid, the Team reviewed the screening tool's general structure, inputs, net-to-gross assumptions, realization rates, costs, etc. In addition, for the first time in the EEPP review process, National Grid's cost-effectiveness screening tool was made available to the Consultant Team. This allowed the Team to directly review assumptions at the program and the aggregated measure level. As part of this process, several minor issues were flagged by the Consultant Team and addressed by National Grid. The review of the screening process has made marked progress compared to prior years' plan review; the integration of the screening tool, tracking tool, and TRM will continue to be reviewed going forward.

- The Consulting Team found that the overwhelming majority of the modeling and cost-effectiveness assumptions reviewed were reasonable and well-supported. Any cost-effectiveness issues flagged in the screening tool and in the review of the EEPP were addressed at the portfolio and program level by reaching out to National Grid's analyst team. In addition, the Consultant Team's deeper involvement in program design review lead to a tighter scrutiny of cost-effectiveness metrics associated with the programs. Program design and cost-effectiveness recommendations are closely connected and many

program design recommendations are made to improve programs cost-effectiveness (e.g. a change in measure mix). Examples of these issues include:

  - Adjusting the number of lighting products forecast in each category to allow the program to promote more lighting products and reach more customers
  - Corrections to inconsistencies in HVAC electric savings for fossil fuel-heated homes.

- Review of the cost-effectiveness of the EEPP was facilitated by the development and review of Rhode Island's first *Technical Reference Manual for Estimating Savings from Energy Efficiency Measures* (TRM), which documents the savings algorithms and assumptions used for prescriptive efficiency measures. Starting in July 2011, members of the Consultant Team collaborated with National Grid to provide oversight of the TRM development by a detailed review of the savings assumptions for the measures in each program. Through this process, National Grid demonstrated its application of evaluation results from several recently completed important evaluation studies. In addition, consistent with National Grid's long-standing practice and national reputation in the field of energy efficiency evaluation, new results from the large number of evaluations that were completed in 2010-2011 were used by National Grid to update a number of measure baselines, net-to-gross ratios, measure lives and other measure assumptions, and documentation of measure data sources was refined and improved. In addition, a number of lower-priority issues have been flagged for future discussion and resolution with National Grid.

  The TRM greatly improves the review process and oversight of the cost-effectiveness of the efficiency programs. Now that the TRM and cost-effectiveness screening tool are available to the Consultant Team, an in-depth review of their integration and implementation will be possible going forward. The TRM is expected to be publicly available in November 2011.

- To facilitate the continued oversight of the EEPP and implementation over the years, the Consultant Team has developed tracking tools to monitor progress towards goals. These tracking tools include data related to cost-effectiveness, such as budgets and savings goals presented in prior EEPPs, as well as savings and spending reported in annual and quarterly reports. Metrics tracked at the program level include cost effectiveness (TRC and utility cost per annual and lifetime savings, BCR, cost per participant, saving per participants) and general program trends (budgets, savings, etc.). These tracking tools will make it much easier for the Consultant Team and National Grid to explain how and why the programs' cost-effectiveness is evolving over time, and will be used to help prioritize areas for further investigation. Going forward, a more detailed review of the TRM and screening tool will contribute to a more thorough understanding of the inputs into each program's BCR.

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 cost-effectiveness screening tool. The review focused on the general mechanics of the model, with a more detailed review of several specific measures. 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 screening 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 an even more informed review of the savings assumptions used in the screening tool 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 indeed securing 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 2012 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 efficiency to the cost of electric supply. The EERMC Consultant Team notes that in addition to the TRC being the test ordered by the PUC, it is also the best measure of whether efficiency is cheaper than the cost of supply. The TRC test accounts for both the costs and benefits of efficiency programs and includes the costs and benefits for both the utility and its customers. The benefits are calculated using the avoided costs of electric energy and demand, and fossil fuels, 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 of just "how much" benefit the programs provide.

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 2012 plan, the relevance of National Grid's EM&V process is that this process that 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 Public Utilities Commission ("PUC"), Division of Public Utilities and Carriers ("Division") and the Office of Energy Resources. Recently NEEP (Northeast Energy Efficiency Partnerships) has also begun to play an important and increased role in establishing regionally harmonized EM&V standards. National Grid owns utilities in several states, including Massachusetts, New Hampshire and New York along with Rhode Island. 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 and Rhode Island. Most EM&V studies that bear on Rhode Island's energy efficiency programs are planned, budgeted, implemented, reported, and filed in all three (or at least two) of these states.

In Rhode Island, the Consultant Team's work with National Grid's evaluation department to date has been focused primarily on providing input into evaluation priorities, approaches, and spending levels. We have in-depth familiarity with these methods through our work with the Company in Massachusetts, on a separate project for the Massachusetts Energy Efficiency Advisory Council. On the basis of this familiarity, we believe that the Company'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 and will continue to work with National Grid on behalf of the Council on approaches to producing more Rhode Island-specific results within current EM&V budget limitations. We have also recommended that the Company's and the EERMC's EM&V budget in Rhode Island, be increased to support more Rhode Island-specific work.

X. Conclusion

For the reasons stated herein, the EERMC and the EERMC's Consultant Team finds that National Grid's 2012 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).

Attachment A: EERMC Consulting Team Qualifications

Vermont Energy Investment Corp.

Scudder Parker, Consulting Division Director
Sean Bleything, Consultant
Betsy Harper, Consultant
George Lawrence, Consultant
Juliette Juillerat, Analyst

Optimal Energy, Inc.

Phil Mosenthal, President
Mike Guerard, Managing Consultant
Steve Bower, Managing Consultant
Gabe Arnold, Senior Consultant
Cliff McDonald, Senior Analyst

Energy Futures Group

Richard Faesy, Principal
Glenn Reed, Principal

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 2000/2009 - Present

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 successfully 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 PARKER

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PROFESSIONAL EXPERIENCE

Director, Consulting Division, **Vermont Energy Investment Corporation (VEIC),** Burlington, Vermont 2010 – Present
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, **Vermont Energy Investment Corporation,** Burlington, Vermont 2007 – 2010
Managed complex projects focusing on achieving aggressive efficiency and renewable energy targets, including 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 the U.S. and Canada.

- **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.
- **Rhode Island Energy Efficiency Resource Management Council**: Lead team in supporting implementation of an energy efficiency least-cost procurement design and aggressive distributed resource acquisition effort Led negotiations with local utilities on goals, budgets, and designs of efficiency and renewable energy programs and strategies.
- **Indiana Municipal Power Agency:** Led team to analyze energy efficiency potential and preliminary program design for Municipal utilities in Indiana, including coordination of program designs with anticipated statewide Core Programs.

Public Policy Coordinator, **Vermont Businesses for Social Responsibility**, Montpelier, Vermont 2004 - 2005
Worked with 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.

Director-Energy Efficiency Division, **Vermont Department of Public Service (DPS),** Montpelier, Vermont 1990 - 2003
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.

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

EDUCATION

Union Theological Seminary: MS Divinity, *cum laude*, 1968
Williams College: BA English Literature, *magna cum laude and Phi Beta Kappa*, 1965

GEORGE LAWRENCE

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PROFESSIONAL EXPERIENCE

Consultant, **Vermont Energy Investment Corporation,** Burlington, Vermont 2011 - Present
Designs, reviews, and/or critiques energy efficiency and renewable energy programs and policies, with a speciality in commercial and industrial (C&I) programs and policies. Conducts research and performs economic analysis of efficiency measures, programs and policies. Assists consulting business development including sometimes leading proposal preparation. Examples of recent client work includes:

- ***Oak Ridge National Laboratory (ORNL) Technical Assistance Program*** – Provide program design support to EECBG and SEP ARRA grant recipients through ORNL Technical Assistance Project, including incentive design, quality assurance programs, etc.
- ***DC Sustainable Energy Utility*** – Providing commercial and industrial business market initiative experience for VEIC's Washington, D.C. based efficiency utility.
- ***New Hampshire Public Utilities Commission*** – Evaluated New Hampshire's commercial and industrial energy efficiency programs for cost effectiveness and comprehensiveness in delivery of services, and made recommendations for improvements.

Planning and Development Manager, **Vermont Energy Investment Corporation** Burlington, Vermont 2006 - 2011
Managed multiple commercial, municipal, and industrial business market initiatives for Efficiency Vermont. Designed and instituted programs for the Farm, K-12 Schools, Water and Wastewater, and Ski Industry markets to reduce electrical and energy usage by these customers. Designed and instituted programs to target industrial users of compressed air to reduce waste and save energy.

Construction Sales, Green Building Products, **McKernon Group,** Brandon, Vermont 2004 - 2006
Contacted and advised architects, engineers, contractors, and homeowners on new building products and their benefits. Managed sales of multiple lines of environmentally friendly construction materials such as insulating concrete forms and structural insulated panels. Certified insulating concrete form installation trainer.

Sales Manager, Telecom Applications, **Northern Power Systems,** Waitsfield, Vermont 2000 – 2004
Managed domestic and international sales of renewable and fossil fuel powered energy systems that were used in extreme environments. Consulted and advised commercial, government, and military organizations. Traveled extensively throughout North America to meet with customers.

Sales Manager, **Windstream Power Systems,** Burlington, Vermont 1999 - 2000
Managed domestic and international sales of renewable energy power systems.

EDUCATION

Middlebury College: BA Physics, 1989

ADDITIONAL INFORMATION

- Association of Energy Engineers - Certified Energy Manager
- Association of Energy Engineers - Certified Energy Auditor
- Department of Energy - AirMaster Compressed Air Specialist
- Building Performance Institute - Building Analyst Certification
- Building Performance Institute - Envelope Certification
- Building Performance Institute - Heating Certification

SEAN BLEYTHING

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PROFESSIONAL EXPERIENCE

Consultant, **Vermont Energy Investment Corporation (VEIC),** Burlington, Vermont 2011 – Present

- Provide residential technical assistance Weatherization Innovation Pilot Program – Danville, VA
- Conduct research and perform economic analysis of efficiency measures for Efficiency Vermont
- Develop and deliver energy efficiency training to residential retrofit professionals – Chicago, IL

Weatherization Program Manager, **Southface Energy Institute,** Atlanta, Georgia 2009 – 2011

- Managed daily operations for Georgia Weatherization Assistance Program training effort
- Responsible for development and delivery of multiple training courses for 500+ weatherization professionals
- Oversaw annual budget of $1.7 million
- Designed and oversaw construction of 5,000 sq.ft. Southeast Weatherization and Energy Efficiency Training Center (Opened Oct. 2010)
- Consultant for design and creation of Charleston Energy Efficiency Partnership

EarthCraft House Program Manager, **Southface Energy Institute,** Atlanta, Georgia 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
- Primary Consultant for creation of EarthCraft Virginia

EarthCraft House Technical Advisor, **Southface Energy Institute,** Atlanta, Georgia 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, including EarthCraft House, ENERGY STAR, LEED for Homes, and Building America Builders Challenge
- Conducted energy analysis using REM/Rate energy modeling to determine cost-effectiveness of energy upgrades

EDUCATION & CERTIFICATIONS

University of Kansas: B.A. 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 EXPERIENCE

- 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

BETSY HARPER

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PROFESSIONAL EXPERIENCE

Managing Consultant, **Vermont Energy Investment Corporation (VEIC),** Newton, Massachusetts 2009 - Present
Project manager responsible for leading teams to launch or improve energy efficiency programs implemented by electric and gas utilities. Focused on three areas of expertise: residential loan programs; energy code compliance; and targeted community programs. Recent and current activities include:

- ***Connecticut Energy Efficiency Board:*** Long-term relationship as residential program consultant, focused on three areas: consumer loan program; home energy audit; targeted community programs. Played lead role in assisting client to design and launch a new residential loan program pilot with unprecedented high participation – $14M loans originated in first year.
- ***New York State Energy Research & Development Authority (NYSERDA):*** Project Manager for a year-long energy code compliance evaluation. Analyzed percentage of buildings – new construction and renovation – which are were built at or above energy code 2009-2010. Oversaw multiple subcontractors who performed intensive in-field residential and commercial building evaluation. Wrote roadmap for New York State to achieve DOE-mandated 90% compliance by 2017.
- ***Rhode Island EERMC:*** Analyzed best practice residential loan programs and made recommendations for a loan structure for Rhode Island. Assisted with targeted community program design. Perform on-going assessment of utility program design and effectiveness of implementation.

Principal Consultant, **Clean Energy Solutions,** Cambridge, Massachusetts 2008
Primary client: Cambridge Energy Alliance. Designed self-funding energy retrofit program for City of Cambridge for multi-sector market: residential, commercial, industrial, municipal & non-profit.

Assistant Project Manager, **RCG LLC,** Somerville, Massachusetts 2005 - 2007
Oversaw green building design and construction of multi-family development in Boston urban renewal neighborhood. Earned ENERGY STAR certification with projected 30% energy savings, with no increase in construction cost.

SVP, Product Management & New Business Development
Wellington Management Company, LLC: Boston, Massachusetts 1994 - 1998
Putnam Investments: Boston, Massachusetts 1991 - 1994
Developed new investment products and made new business development presentations to institutional clients.

Management Consultant, **McKinsey & Company:** New York, New York 1984 - 1988
Managed project teams to develop strategies for expanding product lines and entering new markets in financial services, telecom and consumer goods industries.

EDUCATION

Williams College: BA, *cum laude* Economics, 1979
Harvard Business School: MBA with distinction, 1984

ADDITIONAL INFORMATION

- Newton High Performance Building Coalition, Co-chair: Influenced design of new construction, including $200M new high school to achieve higher energy efficiency. Persuaded Board of Aldermen to adopt stretch building code to become first Green Community in MA.
- Newton Green Decade Coalition, Board of Directors 2007-2009
- Mayor of Newton Blue Ribbon Finance Commission appointment 2007

VERMONT ENERGY INVESTMENT CORPORATION

JULIETTE JUILLERAT

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PROFESSIONAL EXPERIENCE

Analyst, **Vermont Energy Investment Corporation,** Burlington, Vermont 2011 – Present
Conducts research and analysis on energy efficiency and renewable energy projects. Conducts economic screening of energy efficiency and renewable energy measures and programs. Supports the consulting business development, through development of project proposals and budgets.

Retail Market Coordinator, **Efficiency Vermont,** Burlington, Vermont 2007 – 2011
Developed and operated effective systems and processes to support Retail Efficient Products implementation goals and objectives. Collaborated with the Residential Energy Services (RES) Group, with other VEIC teams and with external partners and contractors to develop and operate effective systems and processes to support Retail Efficient Products. Coordinated program promotions with field managers, marketing specialists, retailers, manufacturers, subcontractors, and governmental agencies.

- Planned, developed, and implemented specific tactical approaches to retail market services
- Drafted Memorandums of Understanding;
- Queried a large database to create complex reports;
- Designed customer surveys;
- Created maps and digests for planning purposes;
- Researched and analyzed market activity and trends; Prepared market data and analysis reports.

Senior Residential Assistant, **Efficiency Vermont,** Burlington, Vermont 2007
Processed subcontractor invoices and prepared data for uploading to tracking systems. Provided on-going data quality control. Assured quality and completion of administrative and data tracking needs. Oversaw subcontractor and staff including, participant communications and monthly reporting.

Research Assistant, **University of Vermont,** Burlington, Vermont 2007 – 2010
Coordinated a research project on carbon storage in the Northern Forest.

- Collaborated with foresters and other researchers.
- Trained and supervised technicians.
- Measured forest and soil characteristics in the field and lab.
- Created and managed a large database.
- Created a website focused on a summary of the project methods and results.

Freelance Translator (French/English), Burlington, VT 2005 - 2006
Marketed translation services to potential clients and agencies; translated a variety of documents; Followed up with clients to ensure timely payment.

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

EDUCATION

University of Vermont: MS Plant and Soil Science, 2010
McGill University: BS Agricultural and Environmental Sciences, m*agna cum laude*, 2004

AWARDS

Outstanding Student Paper Award, American Geophysical Union, 2009
Eliza Jones Award, McGill University, 2002
Dean's List of Honor, McGill University, 2002

Optimal ENERGY Integrated Energy Resources

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 levilized 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.

Optimal ENERGY *Integrated Energy Resources*

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. — Bristol, 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.

Optimal ENERGY *Integrated Energy Resources*

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 experienced 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. — Slatersville, 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

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STEVEN T. BOWER, CEM
MANAGING CONSULTANT

Mr. Bower has served as project manager, lead analyst and support analyst on a wide variety of energy efficiency potential and program evaluation projects. He also has lead responsibilities for developing and maintaining Optimal's efficiency investment and economic modeling tools. He has 20 years of work experience in information systems design and development, data management and analysis, project management, and energy efficiency analysis. He has developed information systems ranging from small custom applications to data warehouses to large-scale, web-based transaction processing systems, spanning the entire lifecycle of information system development. Mr. Bower is a Certified Energy Manager (CEM).

PROFESSIONAL EXPERIENCE

Optimal Energy, Inc. — Bristol, VT

Managing Consultant, March 2006–present

- Perform cost-effectiveness and savings analyses of efficiency measures, programs and portfolios, for both past and planned programs.
- Develop efficiency evaluation protocols, including measure deemed savings algorithms and efficiency program Technical Reference Manuals.
- Project manager for various efficiency projects, including efficiency potential studies and development of Technical Reference Manuals for calculating efficiency measure savings.
- Provide strategic planning for and management of Optimal Energy's software tools for energy efficiency and economic modeling, and related consultant services.
- Design and implement software functionality for efficiency portfolio planning and management.
- Perform energy audits/walk-throughs and subsequent analyses to identify opportunities for energy and cost savings.

IDX Systems Corporation (now GE Healthcare) — Burlington, VT

Software Engineer and Project Manager, 2000-2006

- Developed mission-critical radiology and cardiology imaging software applications.
- As Software Engineer, performed requirements analysis, software design and programming at all application tiers of web-based, mission-critical applications.
- As Project Manager, responsible for project scope, schedule and resources, assessing and mitigating project risks, and the quality of all project deliverables.

GIS/Trans, Ltd. — Cambridge, MA

Senior Analyst, 1996-2000

- Senior Analyst with consulting firm specializing in Geographic Information Systems (GIS) solutions for transportation. Technical Lead and Project Manager for various consulting projects.

- Technical lead for design, development and implementation of an Oracle-based data warehouse for the Maine Department of Transportation. Responsible for technical staff and success of all technical aspects through implementation.
- Technical Lead, Florida GIS Planning, Analysis and Implementation Project.

Vermont Center for Geographic Information — Burlington, VT

Database Administrator, 1990-1996

- Administered statewide GIS database and data distribution system. Developed standards and guidelines for GIS data development, specifications, formats, metadata and data exchange. Designed and developed advanced GIS applications.

VT Agency of Natural Resources/VT Dept. of Health — Waterbury, VT

Information Systems Consultant, 1989

- Assessed potential geographic databases for inclusion in the Vermont GIS. Developed procedures for converting databases to GIS format.

U. S. Peace Corps — Zaire (now Democratic Republic of the Congo)

Peace Corps Volunteer, 1983-1986

- Asst. Professor of Physics (1985–1986), Institut Supérieur Pédagogique (teachers college), Bukavu, Zaire. High School Physics Teacher (1983–1985). Coordinator, Math-Physics Teacher Training (Summer 1985), Peace Corps Training Center.

EDUCATION

M.S., Natural Resources Planning (GPA 3.72), University of Vermont, Burlington VT, 1991

B.A., Physics and Computer Science (Magna Cum Laude, GPA 3.65), Brandeis University, Waltham MA, 1982

CERTIFICATIONS

Certified Energy Manager, Association of Energy Engineers, 2009

HIGHLIGHTS OF PROJECT EXPERIENCE

Efficiency Evaluation and Assessment

- Technical lead for development of a Statewide, multi-jurisdictional electric and natural gas Technical Reference Manual for Massachusetts. (2009-2010)
- Project manager for development of C&I measures for a Technical Reference Manual for use by multiple Ohio utilities (2010).
- Lead analyst for the building sector (residential, commercial, industrial) analysis for the New York State Climate Action Plan (2010-2011)
- Project manager and lead analyst for a Vermont 20-year electric efficiency potential study, including multiple budget scenarios. (2009-2010)
- Project manager and lead analyst for a New York statewide electric efficiency potential study, updating a 2003 statewide potential study also done by Optimal Energy. (2008-2009)

- Performed year-end cost-effectiveness screening of the Conservation and Load Management Programs for the Connecticut Municipal Electric Energy Cooperative. (2007)
- Performed cost-effectiveness and savings analysis screenings to support planning and design of Efficiency Long Island initiative of the Long Island Power Authority (LIPA), for multiple scenarios over 10- and 20-year time horizons. (2006-2008)
- Developed hourly "8760" efficiency savings profiles for multiple scenarios of efficiency program savings, for incorporation into LIPA's power planning process. (2008-2010)
- Performed retrospective screenings of LIPA's efficiency programs to support their annual reporting. (2006-2007)
- Developed energy consumption profiles for sixteen Connecticut schools in support of an energy management and planning services contract. (2006)

Efficiency Investment Tool Development

- Developed and enhanced Optimal Energy's Microsoft Excel-based cost-effectiveness analysis tool for custom commercial efficiency projects, customized for various clients. (2006-Present)
- Developed scope and incorporated enhancements to Optimal Energy's Portfolio Screening Tool for the New York State Energy Research and Development Authority (NYSERDA). The tool performs cost-effectiveness analysis of energy efficiency measures, programs and entire portfolios. (2006-2007)

SELECTED PUBLICATIONS AND REPORTS

Steven T. Bower. 1994. "Techniques for Developing a Calibrated Road Route System." Proceedings of the Fourteenth Annual ESRI User Conference, published on CD-ROM.

Steven T. Bower and Carlton M. Newton. 1993. "Boundary Problem for Triangulated Irregular Networks." Cartography and Geographic Information Systems, Vol. 20, No. 4.

Optimal ENERGY *Integrated Energy Resources*

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 expert in the field of energy-efficient lighting and brings a wealth of experience in lighting technologies, markets, and strategies to reduce lighting 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 serves on the Board of the National Council for Qualifications of Lighting Professionals 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. — Bristol, 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, Class of 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

"Vermont's *Core Performance* Guide," Various locations in Vermont 2008-2009
"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

OTHER

Chair, Steering Committee, DesignLights Consortium LED Qualified Products Initiative
Member of the Board, National Council on Qualifications of Lighting Professionals
Member, Steering Committee, US DOE CALIPER LED Product Testing Program.

Optimal ENERGY *Integrated Energy Resources*

CLIFFORD S. MCDONALD
SENIOR ANALYST

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. — Bristol, VT

Analyst, 2006-2007 & Senior Analyst August 2009-present

- Conduct research and analysis of energy efficiency measures and programs
- 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

Viridian Energy and Environmental — New York, NY

Energy Analyst, 2008- 2009

- Used DOE2 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

University of Pennsylvania Medical Center — Philadelphia, PA

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

- Provided implementation support for Orange & Rockland Utilities, including screening custom projects for cost-effectiveness and reviewing the incentives offered
- 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
- Created in analysis of electric-sector emission reductions for the New York State Climate Action Plan
- 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

ENERGY FUTURES GROUP QUALIFICATIONS

Energy Futures Group (EFG) is a consulting firm that provides clients specialized expertise on energy efficiency markets, programs and policies. It was founded 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 bring to our work a unique combination of technical, economic, program and policy expertise. Our participation on the Board of Directors of Residential Energy Services Network (RESNET), the Northeast HERS Alliance 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; and various other national efficiency forums is testament to our extensive knowledge of building science and important technical aspects efficiency measures. We have taught short courses for the Association of Energy Service Professionals (AESP) and made invited conference presentations on cost-effectiveness screening of efficiency programs. We have critically reviewed literally hundreds of gas, electric, fuel oil and multi-fuel efficiency programs; played key roles in developing a number that have won national awards for excellence; and taught short courses on efficiency program design and implementation for Affordable Comfort and AESP. We have also helped shape a variety of policies for the promotion of energy efficiency including Ontario's first shareholder incentive mechanism for meeting efficiency program goals, federal efficiency standards for central air conditioners, rules for participation of demand resources in the New England ISO's Forward Capacity Market, and adoption of Energy Star standards as building codes in several Long Island Communities.

We use our expertise to assist clients with a variety of needs:

Program design – designs or critical reviews of others' designs of electric, natural gas, fuel oil or multi-fuel energy efficiency programs, with an emphasis on cutting edge strategies that are necessary to achieve deep levels of participation and savings.
Program implementation support – development of annual program goals and budgets, selection and oversight of implementation contractors, presentation of programs to key trade allies, technical trouble-shooting, and various other needs.
Policy development – support for the development of regulatory or legislative policies addressing goals and budgets for efficiency initiatives, administrative structures for program implementation, utility shareholder incentives, cost-effectiveness tests, equipment efficiency standards and building codes.
Building energy codes – support for the development of programs, policies and strategies that promote code adoption and maximize compliance.
Collaborative engagements between utilities and other stakeholders – serve as technical, program and policy advisors to non-utility parties, but work closely with utilities to develop innovative approaches to efficiency initiatives.
Savings estimation – development or critical review of assumptions or algorithms for the savings, cost, and lives of efficiency measures, often structured in the form of what are increasingly known as Technical Reference Manuals.
Baseline studies – assessments of new construction practices, existing home conditions, HVAC sales or other markets to inform program design, development of building codes or savings potential.

Program evaluation – planning for program evaluation needs, support in overseeing evaluators work and/or conducting process or impact evaluations themselves.
Cost-effectiveness screening – assessments of the cost-effectiveness of all types of efficiency programs, as well as the relative merits of different cost-effectiveness tests.
Efficiency potential studies – high level or detailed assessments of technical, economic and achievable efficiency potential, carefully calibrating analysis to local conditions.
Expert witness testimony – develop and stand cross-examination on testimony on efficiency program proposals and/or related policy issues.
EFG is currently working with a range of clients – consumer advocates, government agencies, environmental groups, other consultants and utilities – in more than 10 states and provinces. During the course of their careers, EFG principals have worked in more than 30 states and provinces, as well as several countries in Europe and Asia.

GLENN REED, PRINCIPAL

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: Dir. of Regional Initiatives, Northeast Energy Efficiency Partnerships, Lexington, MA
1987-2000: Deputy Dir. 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. Mr. Reed currently is a lead residential advisor to the Massachusetts Energy Efficiency Advisory Council (EEAC) assisting and overseeing program design and implementation of residential lighting, appliance, HVAC, and consumer electronics programs. As the lead residential consultant to the Connecticut Energy Efficiency Board (EEB), he plays a similar technical assistance and oversight role in that state. For the Rhode Island Energy Efficiency Resource Management Council (EERMC) he provides oversight support on National Grid's lighting, appliances and gas and electric HVAC programs. In addition to his on-going work in Massachusetts, Connecticut, and Rhode Island, Mr. Reed has performed or directly overseen cost-effectiveness screening and program design for clients in New York, Prince Edward Island, and Vermont. Mr. Reed also developed or co-developed the Cost-effectiveness and Program Planning and Design modules for The Association of Energy Service Professional's *DSM 101* training and presented this material to utility staff in several locations in the US. Prior to co-founding EFG, Mr. Reed was a Managing Consultant at the Vermont Energy Investment Corporation, Director of Regional Infinitives at the Northeast Energy Efficiency Partnerships (NEEP), and Deputy Director of East Coast Consulting at XENERGY (now KEMA).

Selected Projects

- ***Rhode Island Energy Efficiency and Resource Management Council.*** Senior Advisor providing on-going technical and programmatic advice to, and oversight of, Rhode Island's residential efficient products (lighting, appliances and consumer electronics) and HVAC programs.
- ***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.
- ***Connecticut Energy Efficiency Board.*** Leads residential team to provide oversight of the state's electric and gas residential efficiency program.

- ***Efficiency Vermont.*** Senior Advisor for Retail Market efforts (efficient lighting, appliances and consumer electronics) for Vermont's statewide, award-winning energy efficiency utility.
- ***New York State Energy Research and Development Authority (NYSERDA).*** Senior Advisor in statewide residential code compliance assessment study.
- ***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.
- ***Orange and Rockland (O&R).*** Led residential team to assess the cost-effective savings potential and to develop five-year program designs and budgets to attain this potential within prescribed budget caps.
- ***Vermont Electric Power Company.*** Managed the residential efficiency cost-effectiveness assessment and program design tasks for the VELCO Southern Loop project.
- ***Prince Edward Island Office of Energy Efficiency.*** Managed a potential analysis, measure screening, and program design and cost-effectiveness assessment for the provincial government. This analysis included the residential, C&I, and transportation sectors.
- ***Association of Energy Services Professionals (AESP).*** Lead trainer for AESP's DSM 101 workshops in NY, KS, IL, WA, and NC. Developed or co-developed Residential and C&I Technology, Cost-effectiveness, and Program Planning and Design training modules. These workshops, lasting as long as five days, provided efficiency program staff with details on all aspects of energy efficiency program planning, design, implementation, and evaluation.
- ***Management of Regional Market Transformation Initiatives.*** Responsible for NEEP's six residential and C&I regional market transformation Initiatives - ENERGY STAR® Products, Residential HVAC, ENERGY STAR Windows, Premium Efficiency Motors, Unitary HVAC and C&I Information Exchange - and for Initiative-related research and evaluation activities.
- ***ENERGY STAR Products and Residential HVAC Initiatives.*** As manager of these NEEP Initiatives, activities include facilitation of multi-state stakeholder Working Group meetings (Sponsors, Sponsors' contractors, collaborative consultants, DOE, EPA, CEE and others), management of multiple RFP processes (coordinated contractor procurement for Sponsors and solicitations to industry to develop and implement joint promotions), development of regional market transformation plans, and coordination with national and other regional market transformation programs. Under Mr. Reed's direction the ENERGY STAR Products Initiative and its Sponsors were recognized for five consecutive years at the National ENERGY STAR Awards.

Selected Publications

- *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.

RICHARD FAESY, PRINCIPAL

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, Burlington, VT
1986-2000: Director, Energy Rated Homes of Vermont (ERH-VT), Burlington, VT
1989-2000: Development Director, Single Family Services, Vermont Energy Investment Corporation, Burlington, VT

Professional Summary

As a Certified Energy Rater and LEED Accredited Professional, Richard Faesy specializes in residential buildings, technologies, and markets, with a focus on home energy rating systems (HERS), ENERGY STAR Homes, building codes, residential retrofit, energy efficiency financing, green building, and effective program design 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. Richard is known for his experience and insights in residential energy efficiency. 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. Strong communication skills ensure no surprises. Richard is a strong manager and planner, having overseen the Vermont Energy Investment Corporation's (VEIC) Planning and Evaluation Group's Energy Efficiency Division's 12 staff. His projects consistently deliver beyond the client's expectations.

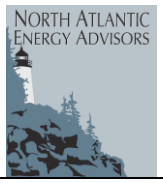
Projects

- ***Rhode Island Energy Efficiency and Resource Management Council.*** *Consultant overseeing the residential new construction and existing homes programs in Rhode Island. 2008-present.*
- ***Massachusetts Energy Efficiency Advisory Council.*** *Consultant overseeing the residential new construction and existing homes programs in Massachusetts. 2007-present.*
- ***Connecticut Energy Conservation Management Board.*** *ENERGY STAR Homes Program advisor assisting the Board with goal setting, utility oversight and planning and technical assistance. 2007-present.*
- ***Joint Management Committee (Massachusetts, Connecticut, Rhode Island and New Hampshire utilities).*** Oversight of the regional ENERGY STAR Homes Programs as a representative for the non-utility parties. 2003-2007.

- ***Efficiency Vermont.*** *Senior Advisor for residential program design and policy guidance for Vermont's statewide, award-winning energy efficiency utility. 2000-present.*
- ***Iowa Office of Consumer Advocate.*** *Team lead for utility program portfolio review, testimony development, and on-going program modifications and enhancements. 2008-present.*
- ***Long Island Power Authority.*** *Team lead on program design, planning, policy guidance and technical assistance on residential and multifamily sectors and new homes baseline study. 2003-2010.*
- ***New Jersey Office of Clean Energy, Board of Public Utilities.*** *Senior Advisor for program design and oversight of New Jersey ENERGY STAR Homes Program. 2004-2010.*
- ***New York State Energy Research and Development Authority (NYSERDA).*** Senior Advisor in statewide residential code compliance assessment 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.
- ***LEED for Homes Provider.*** *Led the Northeast team (of six firms) implementing the U.S. Green Building Council's LEED for Homes rating system in the Northeast United States and Canada. 2006-2009.*
- ***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-present.*
- ***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.*

Selected Presentations

- "Residential Retrofit Program Design Guide Overview", **U.S. DOE Technical Assistance Program National Webcast**, May 2011.
- "Supporting Energy-Efficiency Codes and Standards through DSM/EE Programs", **Regulatory Assistance Project Advocates Webinar**, April, 2011.
- "Designing Effective Incentives to Drive Residential Retrofit Program Participation", **U.S. DOE Technical Assistance Program National Webcast**, October 2010.
- "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.
- "Designing Effective Retrofit Programs", **U.S. DOE Technical Assistance Program National Webcast**, August 2010.



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 grogram 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 781.441.8151	**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 Committee. **SUMMARY OF RESULTS –**

Period of Contract: 2008 - Present	• This “collaborative process” has proven over time to be a successful and cost-effective program development and oversight model. • Massachusetts programs are recognized as being in the first tier nationally and internationally by almost all independent best practices assessments or surveys. • Budgets for both retrofit and “lost opportunity”- based commercial and industrial efficiency programs of over $250 million annually.

NORTH ATLANTIC ENERGY ADVISORS

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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 increasingly 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.[1] 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.[2]

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 consultants working for the CBEE, I was responsible for recommending evaluation policies and

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[1] Subject to a system of appeals.

[2] This contract expires on June 30, 2010.

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.

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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 Prahl, 2010. "Emerging Evaluation Issues: The U.S. Experience." In Proceedings of the International Energy Program Evaluation Conference. Paris, France.

Vine, Edward, Ralph Prahl, 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 Prahl, 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 Prahl, 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 Prahl, 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 Prahl 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 Prahl, 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 Prahl, 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 Prahl, 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 Prahl, 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 Prahl, 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 Prahl, 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 Prahl, 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 Prahl, 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 Prahl 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 Prahl, 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 Prahl, 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 Prahl, 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 Prahl, 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 Prahl 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 Prahl 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 Prahl 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.

Prahl, 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.

Prahl, 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 Prahl 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 Prahl, 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 Prahl, 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.