

Technical Proposal

Policy & Program Planning Consultant Services

Rhode Island

Energy Efficiency and Resource Management Council

Response to RFP Number EERMC-2020-03

**Prepared for
Rhode Island Energy Efficiency
and Resource Management Council**

By Optimal Energy Inc.

October 28, 2020

**Optimal Energy, Inc.
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RFP Cover Sheet

Offeror's Name:	Optimal Energy, Inc.
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RFP Information	
Title of RFP:	Policy & Program Planning Consultant Services
RFP Number:	EERMC-2020-03

Offeror Information	
Legal Name of Offeror:	Optimal Energy, Inc.
Type of Entity (i.e. corporation, partnership, sole proprietorship):	Corporation
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Signature of Authorized Person

10/28/2020

Date

Eric Belliveau, Vice President

Printed Name, Title

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A. OVERVIEW: LEADERSHIP FOR RHODE ISLAND'S CLEAN ENERGY FUTURE






Optimal Energy Inc. and our partners (Optimal team) are pleased to present this proposal to the Rhode Island Energy Efficiency and Resource Management Council (EERMC or Council). The Optimal team's deep bench of clean energy professionals has a highly successful record of service to the EERMC and Rhode Island ratepayers. We understand the Council's need for a consultant with the ability to balance workloads to provide all services required. This contract has historically been, and will continue to be, a top priority contract for the Optimal team. We are fully committed to meeting the associated workload. We have consistently and effectively supported the objectives of [Rhode Island's Least Cost Procurement Law](#)¹ (LCP Law), the EERMC's associated responsibilities, and State energy policies and objectives. Our performance in Rhode Island and experience elsewhere positions us to support the EERMC on all core objectives, and to address clean energy challenges and opportunities in the future. We adapt to meet requirements, identify strategies for anticipated needs, and offer flexibility and responsiveness.

The EERMC, Office of Energy Resources (OER), Division of Public Utilities and Carriers (the Division) and Rhode Island Public Utilities Commission (PUC) all have statutorily directed roles, while National Grid serves a central function as program administrator. Many other stakeholders, representing a wide range of interests and needs in Rhode Island, are vital to informing policy direction. The role of the EERMC's consultant in the statewide system is to support these stakeholders, on EERMC's behalf, to align objectives and facilitate accomplishing common goals. The role has evolved since the passage of LCP Law in 2006, and our deep and long-standing connections with all stakeholders have supported enhancements through these ongoing systemic changes. Our proposed Work Plan continues to refine these connections and ensure the integration of new stakeholders. As consultants to the EERMC, we will continue to integrate local conditions with national best practices and emerging research to enhance Rhode Island's clean energy future.

Experience Serving the EERMC

- Optimal team members have advised the EERMC since 2008, advancing Rhode Island's position.
- Team includes 5 full-time year-round Rhode Island residents based in Providence.
- Team members named in this proposal have served the EERMC for a combined total of over 80 years.

Work Plan Objectives

-  Maximize Energy Efficiency Savings
-  Enhance Equity
-  Support Council & Public Education
-  Drive Process Improvements
-  Prepare for the Future

The Optimal team will continue to meet every element of the scope of work, while fully complying with LCP Law and [Standards](#) that cover both energy efficiency (EE) and system reliability procurement (SRP). We are fully versed in LCP Law and Standards and have applied these standards to ensure compliance for plans and results of Rhode Island's EE and SRP programs.

There are five Work Plan Objectives that set our proposal apart as uniquely able to meet the Council's needs.

¹ We have included active links for relevant materials throughout this proposal.

Least Cost Procurement: The Foundation of Efficiency in Rhode Island

Rhode Island leads in the adoption and effective implementation of Least Cost Procurement, the framework to diversify energy supply, which allows energy efficiency to be compared directly to other supply options, as well as for other non-wires and non-pipes alternatives to be compared to traditional energy infrastructure investments.

LCP Law established the *What* and *Why* to maximize energy efficiency and system reliability to benefit all Rhode Islanders in 2006. *LCP Standards* offer guidance on the *How* and *When* to support the process and outcomes to meet the law's intent. By codifying and clarifying purposes and definitions, the PUC supports the myriad of stakeholders involved in the cyclical process by providing common, objective, and standardized reference points to facilitate alignment and minimize confusion.

How is covered with specification of detailed requirements for annual, three-year, and system reliability plans, with sufficient information to affirm the core intents of cost-effectiveness, relationship to cost of supply, and application of the appropriately identified and quantified stream of benefits that stem from the plans.

Additional aspects of the law that are documented and defined include expectations relating to prudence and reliability and considerations such as equity, workforce, environmental impacts, and rate and bill impacts. While most of the content of LCP Standards is aimed at directing what the utility must include in its plan, clear and discrete assignments to the EERMC and OER provide the task list the Council must follow in its role of setting triannual savings targets and review and approval of EE and SRP plans. *When* to support the required content and tasks is clearly detailed in dates established for each plan, milestones for stakeholders to build their review, and comment timelines to support the prescribed regulatory process.

Fundamentally, LCP Standards direct that any plan coming before the PUC is, from an economic perspective, the best choice for ratepayers. The LCP Standards are designed to evolve in alignment with all other PUC dockets that inform ratepayer investments and National Grid filings (e.g., Docket 4600 work to establish a consistent set of benefits and their conditions for application and quantification).

Maximize Energy Efficiency Savings

As part of its obligation under LCP Law, the EERMC recently oversaw completion of a Market Potential Study (MPS) with findings that clearly indicate that significant savings are achievable in HVAC, hot water, and thermal loads, even as lighting savings diminish. The Optimal team has supported Rhode Island's efforts to maximize EE savings and position it as one of the first states to plan its EE programs to tackle the challenge of the decline of claimable lighting savings and other industry shifts, while also addressing COVID. For example, our team closely scrutinized the EE plans recently submitted by National Grid, approved by the EERMC, and pending before the PUC, which ultimately complied with law and standards.



Enhance Equity

In the 2021-2023 planning process, the EERMC and OER worked together to increase the focus on equity and environmental justice. To this end, the EERMC established equity as one of its priorities presented to the Technical Working Group and recommended greater emphasis on equity in the LCP Standards triennial update. The resulting 2021 Annual Plan and 2021-2023 Three-Year Plan proposed significant progress on equity in multiple areas:



- commitment to establish an Equity Stakeholder Working Group
- expansion of incentives for moderate-income customers
- establishment of a Performance Incentive path to encourage National Grid to achieve measurable equity performance improvements by collecting information on renters as a proxy for underserved populations

This is just the start, and significant work will be required to realize the critical enhancements envisioned. Our team members have long histories of work in neighboring jurisdictions and further afield to expand efficiency equity metrics beyond the industry's historical focus on income eligible programs to include areas such as equity in the small business sector and the clean energy workforce. Two team members are members of the first Equity Working Group established by the Massachusetts Energy Efficiency Advisory Council, which has developed an equity agenda and is now devising recommendations and metrics for the State's next three-year planning cycle. We also advise the Connecticut Energy Efficiency Board with its focus on equity metrics, and helped set income eligible savings requirements in Pennsylvania for 2021-2025. We will combine this extensive experience, and our associated network of experts, with our nuanced understanding of Rhode Island's diverse communities and stakeholders to drive progress on this critical priority.

Support Council Member and Public Education

The EERMC's success is rooted in knowledgeable Council members. Optimal team members Mike Guerard and Rachel Sholly have worked directly with every Council member on the EERMC since its inception to provide effective onboarding of new members and ongoing education on new and emerging issues. This work is critically important now, as the Council's three pending seats are expected to be filled in 2021.



In addition to working with Council members to provide information on the complex and changing energy landscape, the Optimal team has helped the Council develop a well-informed stakeholder network. Interested members of the public are provided with information to understand the significant benefits of energy efficiency, such as through the annual Public Forum and the EERMC's sponsorship of the University of Rhode Island's energy-focused [PIER lecture series](#).

Drive Continuous Process Improvements

We understand and have a plan in place to address the Council's concerns about having sufficient review time for Plans and other meetings materials, which sometimes have not had a full opportunity for appropriate input, review, feedback, and response. This limits the ability of the Council to fully vet materials in advance of critical votes. When processes do not allow sufficient stakeholder engagement, outcomes can be adversely affected.



COVID disrupted plans to implement the [proposed process improvement plan](#) presented to the EERMC in December 2019. The Optimal team will work to fully address ideas and

expectations of Council members to implement a plan to improve the Council’s process in 2021 and beyond. Once established, we will support conformance to timelines to allow Council and other stakeholders time to fully review materials and consider key issues. The revised process will also allow the consultant team to meet its deadlines to analyze and assemble data and provide summaries and other decision-making inputs. Our process improvements will streamline and make these services much more efficient, benefiting both the EERMC and Rhode Island ratepayers.

Prepare for the Future

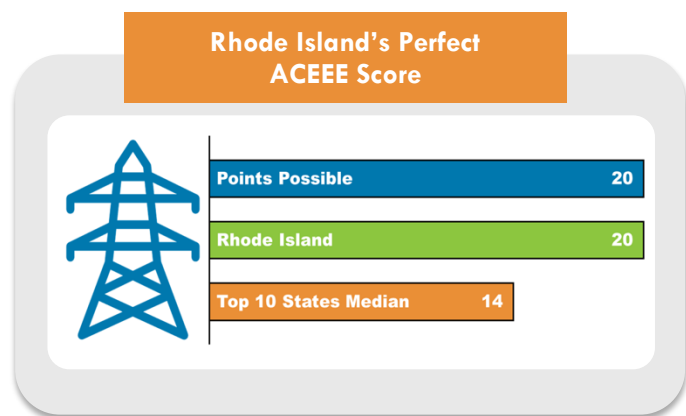
Rhode Island’s long-standing leadership in clean energy includes state-level policy initiatives, such as the ambitious [100 Percent by 2030 Renewable Electricity Goal](#). It also includes tackling complex challenges such as the portfolio changes necessary to address declining claimable lighting savings in energy efficiency. The Optimal team will continue to support Rhode Island’s national leadership. We are working in Rhode Island and other states to tap more deeply into the energy end uses that will supplement lighting efficiency in today’s programs, and fully replace it in tomorrow’s portfolios.



Of course, not all emerging trends can be anticipated today. Our Work Plan emphasizes an agile, responsive, and collaborative approach to ensure that the Council and stakeholders are fully prepared for the challenges of the future. Our team is deeply engaged with current trends in the clean energy industry. We have supported significant heating electrification and decarbonization for the Massachusetts Energy Efficiency Advisory Council (EEAC); non-wires and non-pipes alternatives and associated locational valuation in Rhode Island, where we have helped chart a nation-leading plan to create a non-pipes alternative program in SRP planning; and made the case for the critical role workforce development plays in supporting deeper energy efficiency savings in Delaware,

as we have also emphasized in Rhode Island. We provide advice to our clients on other emerging topics, including the policy and analytic frameworks necessitated by increasing interconnectedness of batteries, electric vehicles, and connected devices such as Wi-Fi thermostats; and the need for equity to be central in clean energy policy and practice, as detailed above for Rhode Island, Connecticut and Massachusetts. Our team leads in these emerging research areas and cutting-edge applications.

In closing, we point to the long-term success of our partnership. Rhode Island first achieved a perfect 20 points in ACEEE’s Scorecard ranking of utility programs and policy in 2014. It is the only state that has scored perfectly in that category every year since then. The Optimal team is best positioned to support the EERMC and OER to sustain this national leadership in energy efficiency.



B. WORK PLAN

The Optimal team's Work Plan addresses all activities in the 31 items listed in the RFP scope of work. Our local team members, which include four Optimal Energy staff and one independent subcontractor, understand Rhode Island's communities, cultures, business, and economy. They are a part of it. Our experience shows that local presence matters, with the Council, with OER, with National Grid, and with other stakeholders. Our history of availability, any day, for in-person meetings improves our understanding of real-world, local conditions. In a typical year, our consultants attend over 140 in-person meetings to advance the EERMC's agenda and develop strong stakeholder engagement. Informal conversations between meetings further solidifies our grasp of stakeholder concerns and issues. The benefits that accrue from these relationships are borne out in our proven performance. Our flexibility to attend meetings on very short notice helps, as schedules of the many key players are constantly in flux.

A strong emphasis on enhancing the overall development process for EE and SRP Plans will be critical in 2021, and the required review, feedback, and approval cycle is optimized by our ability to meet with short notice. While COVID now affects everyone's ability to hold face-to-face meetings, when the threat of infection is past and the State lifts restrictions, we can seamlessly resume in-person meetings.

Our Work Plan provides necessary attention to the LCP Standards for EE and SRP. Our internal systems include continuous feedback loops to confirm conformance with PUC-prescribed activities. The approach is informed by our experience supporting enhancements to the standards with changes issued by the PUC since the initial version, and we are well-practiced in their application.

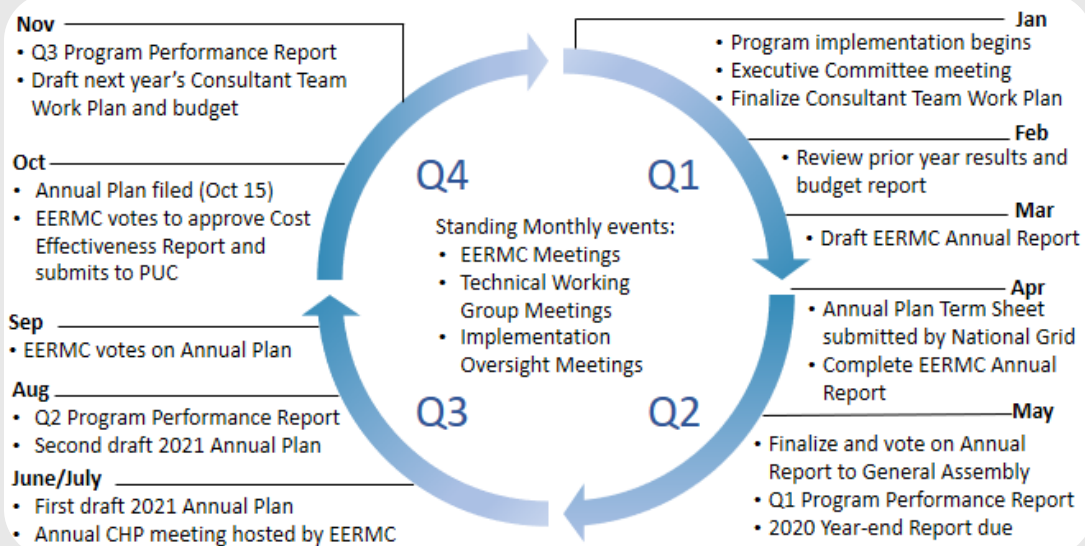
Our team has always put a high priority on effective education and communication; we believe this is one of the main reasons that Rhode Island is a national leader in energy efficiency and associated policy support. We coordinate the work of the many parties critical in energy efficiency planning and implementation, including OER, the Division, National Grid, and members of the technical working groups. We expect this level of coordination will be even more important in the future to align efforts, build consistent approaches to planning, streamline delivery, and foster effective collaboration and partnership as the clean energy industry enters a new phase of rapid evolution.

As required in the RFP, we provide a high-level overview of the annual timeline of Council activities below. These activities are supplemented with continuous stakeholder engagement to foster consensus, and as-needed analyses as areas of focus emerge in each year's planning cycle.

Local Availability & Knowledge

- Available to attend in-person meetings any day of the year, without exception
- Can host in-person meetings at our Providence office
- Can host virtual meetings of 100+ people
- Understand and follow Rhode Island's public meeting laws
- Familiar with and follow PUC regulatory procedures – experience testifying in multiple PUC proceedings

Rhode Island Annual Energy Efficiency Planning Cycle



In the remainder of this section, we describe our approach to the four primary tasks in the RFP, which include responsibilities related to EERMC Oversight, Development of Work Products and Representation of the EERMC, Energy Efficiency and System Reliability Program Design and Delivery, and Advancing Integrated Approaches and Addressing Emerging Issues. For each, we outline the broad objectives that will be met through our services, and provide charts that detail associated activities, with information on the estimated number of in-person meetings to support the tasks based on historical precedent.

Task 1 - Responsibilities Related to EERMC Oversight

The primary objective of Task 1 is to support Council members as they perform their assigned roles and responsibilities. This includes providing substantive, clear, and timely information for Council members. This will be more important than ever in the upcoming program cycle, as Rhode Island begins the transition toward reliance on more comprehensive efficiency measures like HVAC and hot water. With rapid change in the energy landscape, up-to-date data and information on industry, technology, policy, and regulatory advances is vital for the Council to guide and drive the evolution of Rhode Island's energy efficiency efforts. In 2021 and beyond, we anticipate that Council members will seek support from their consultants to build knowledge of emerging program strategies to ensure that the State can continue to maximize efficiency savings and benefits. Our essential role is to ensure that individual EERMC members are supported and empowered to provide strong leadership on both energy efficiency and system reliability, and as a collective body, to serve as stewards of Rhode Island's law.

TASK 1: EERMC Oversight

12 Subtasks
103+ In-person Meetings

<p>1.1 EERMC Meetings</p> <ul style="list-style-type: none"> • Develop agendas to ensure Council meets all legislated and regulatory objectives • Present on critical topics and key points for deliberation <p><i>In-person Meetings: 12</i></p>	<p>1.2 EERMC Executive Committee Meetings</p> <ul style="list-style-type: none"> • Support at least one Executive Committee meeting per year, per Council By-laws <p><i>In-person Meetings: 1</i></p>	<p>1.3 Councilor Briefings</p> <ul style="list-style-type: none"> • Individually brief each voting Councilor and the non-voting representative for delivered fuels • Target at least two per Councilor <p><i>In-person Meetings: 24</i></p>
<p>1.4 Councilor Retreat & Orientation</p> <ul style="list-style-type: none"> • Educate all Councilors • Orient new Councilors • Cover roles, responsibilities, evolving efficiency issues and innovations and clean energy developments <p><i>In-person Meetings: 4</i></p>	<p>1.5 EE & SRP Technical Working Groups</p> <ul style="list-style-type: none"> • Participate in separate monthly EE & SRP meetings of core stakeholders • Inform development, implementation and evaluation of EE & SRP Plans <p><i>In-person Meetings: 24</i></p>	<p>1.6 Equity Working Group</p> <ul style="list-style-type: none"> • Represent EERMC in newly formed Equity Working Group • Ensure EERMC's equity priorities are reflected in National Grid's EE Plans <p><i>In-person Meetings: 4-12</i></p>
<p>1.7 EERMC Education Working Group</p> <ul style="list-style-type: none"> • Implement the Council's public education objectives • Organize Annual EERMC Public Forum • Coordinate members of EERMC, OER & National Grid <p><i>In-person Meetings: 4</i></p>	<p>1.8 OER / Division / Consultant Team Meetings</p> <ul style="list-style-type: none"> • Discuss and coordinate EERMC-related activities • Prepare for upcoming Council meetings <p><i>In-person Meetings: 24</i></p>	<p>1.9 OER / National Grid / Consultant Team Meetings</p> <ul style="list-style-type: none"> • Coordinate timing and deliverables required to meet all deadlines • Provide feedback based on review of National Grid deliverables <p><i>In-person Meetings: 6</i></p>
<p>1.10 Refresh & Maintain Website</p> <ul style="list-style-type: none"> • Refresh EERMC website to improve useability & value • Post monthly meeting notices and materials • Promote educational events 	<p>1.11 Educational Tools</p> <ul style="list-style-type: none"> • Further develop EERMC educational tools, including the EERMC educational handbook and white papers 	<p>1.12 Manage Consultants as Needed</p> <ul style="list-style-type: none"> • Assist with RFP development, issuance, and selection • Onboard and oversee activities of vendors • Ensure deliverables are met on time

■ Core Scope Activities

■ Additional Activities Identified

Task 2 - Development of Work Products and Representation of the EERMC

The Optimal team’s focus will be on effective communication and representation of the results of the EERMC’s successful work with key stakeholders, institutions, and agencies impacting or being impacted by LCP. Part of this responsibility is to inform and advise decisionmakers and participants in the broader energy efficiency market to build support for continued efforts that will maintain Rhode Island’s national leadership in energy efficiency.

TASK 2: Development of Work Products and Representation of the EERMC			5 Subtasks 32+ In-person Meetings
<p>2.1 EERMC Annual Report</p> <ul style="list-style-type: none"> Develop the statutorily required Annual Report Coordinate with National Grid and OER to source and assemble content <p><i>In-person Meetings: 2</i></p>	<p>2.2 State & Regional Policy</p> <ul style="list-style-type: none"> Represent EERMC in meetings with: <ul style="list-style-type: none"> - General Assembly - Executive branch agencies - ISO-New England - Avoided Cost Study Group <p><i>In-person Meetings: 6-12</i></p>	<p>2.3 Stakeholder Forums</p> <ul style="list-style-type: none"> Meet individually with: <ul style="list-style-type: none"> - Active EE stakeholders - Local groups on program designs and strategies Engage in regional initiatives coordinated by NEEP <p><i>In-person Meetings: 24-36</i></p>	
<p>2.4 Annual Timeline</p> <ul style="list-style-type: none"> Create an annual timeline for all major events and activities for each month Adjust as needed based on new developments 	<p>2.5 Quarterly Written Progress Reports</p> <ul style="list-style-type: none"> Provide quarterly written progress reports on all deliverables, activities, and events and any scope additions or revisions 		
<p>■ Core Scope Activities</p>		<p>■ Additional Activities Identified</p>	

Task 3 - Energy Efficiency and System Reliability Program Design and Delivery

This task includes the activities necessary to meet the EERMC’s fundamental objectives, which are to design and successfully deliver system reliability and energy efficiency programs and services that maximize the resulting benefits for all Rhode Islanders. The next years will be very different: the loss of most lighting savings, the current and pending impacts of COVID, and expiration of the standing LCP statute are among the EERMC’s future challenges.

The Optimal team proposes an approach that builds on our record and prepares for the new challenges that will come in the “post-lighting world.” Our approach will ensure that the EERMC continues to achieve the clearly documented objectives for Plan development and delivery codified by the PUC in the LCP Standards, including detailed review of plans to ensure that proposed costs are reasonable and justified and to assure cost-efficiency as well as cost-effectiveness.

TASK 3: Energy Efficiency and System Reliability Program Design and Delivery

9 Subtasks
30+ In-person Meetings

<p>3.1 Residential & Income Eligible Sector Monthly Meetings</p> <ul style="list-style-type: none"> • Oversee program implementation to achieve EE Plan objectives • Review program data and optimize program performance <p><i>In-person Meetings: 4</i></p>	<p>3.2 Commercial & Industrial Sector Monthly Meetings</p> <ul style="list-style-type: none"> • Oversee program implementation to achieve EE Plan objectives • Review program data and optimize program performance <p><i>In-person Meetings: 4</i></p>	<p>3.3 EM&V: C&I and Residential Studies</p> <ul style="list-style-type: none"> • Meet monthly with National Grid, OER and Division • Review current studies • Ensure consistency of study development, review, and approval <p><i>In-person Meetings: 2</i></p>
<p>3.4 2022 Annual Plan Development</p> <ul style="list-style-type: none"> • Meet monthly with sector strategy groups on 2022 Annual Plan development between May and October • Additional meetings with National Grid, OER, Division <p><i>In-person Meetings: 12-24</i></p>	<p>3.5 CHP Annual Public Meeting</p> <ul style="list-style-type: none"> • Per legislation, gather stakeholders to discuss opportunities and strategies around CHP in Rhode Island <p><i>In-person Meetings: 2</i></p>	<p>3.6 PUC Technical Sessions & Open Meeting on 2022 EE and SRP Plans</p> <ul style="list-style-type: none"> • Represent EERMC in at least two pre-filing and two post-filing technical sessions • Participate in open meetings for PUC ruling on Plans <p><i>In-person Meetings: 6-8</i></p>
<p>3.7 Cost-Effectiveness Analysis & Report</p> <ul style="list-style-type: none"> • Conduct detailed analysis on proposed EE & SRP Plans to determine cost-effectiveness and adherence to TRM standards • Submit report to PUC 	<p>3.8 Quarterly Memos</p> <ul style="list-style-type: none"> • Provide quarterly memos and/or presentations on EE & SRP progress 	<p>3.9 Oversight of Third-Party Studies</p> <ul style="list-style-type: none"> • Provide oversight of any analyses or studies commissioned by EERMC • Ensure they are effectively used to support related processes and objectives

■ Core Scope Activities

■ Additional Activities Identified

Task 4 – Advancing Integrated Approaches and Addressing Emerging Issues

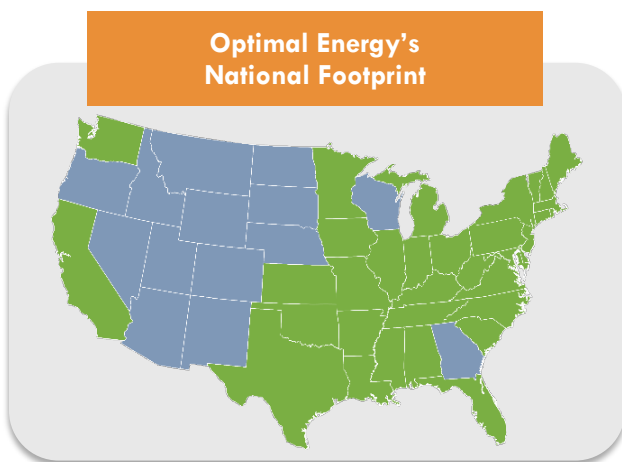
The Optimal team has been an early voice in many jurisdictions highlighting the imperative to work across areas of energy policy and programs that have historically existed in silos. The process of developing and managing plans that address the integration of cross-cutting solutions and approaches requires a team able to draw on experts across the spectrum of clean energy resources and policies; our team has repeatedly shown it can do this. We are uniquely situated to support Rhode Island’s continuing leadership in the evolving energy landscape due to our early and concerted engagement in a range of jurisdictions on issues including workforce development, heating decarbonization, equity in efficiency programs, locational valuation, distributed energy resources, and many others, as described further in our company qualifications and resumes.

Our proposed approach to this key work area directs support and assistance to OER as it delivers its key function as the agency charged with leading critical activities addressing climate change and resiliency. The Optimal team is prepared to provide the necessary expertise to assist OER in leading Rhode Island to a secure, cost-effective, and sustainable energy future.

TASK 4: Advancing Integrated Approaches and Addressing Emerging Issues		2 Subtasks 6+ In-person Meetings
<p>4.1 Scoping Meetings with OER and/or EERMC</p> <ul style="list-style-type: none"> Meet with Councilors and OER to define objectives and deliverables associated with necessary analyses, research, and documents to support all areas of integration and innovation listed in Task <p>In-person Meetings: 6-12</p>	<p>4.2 Analysis, Research Papers, White Papers</p> <ul style="list-style-type: none"> Develop timely analyses, research papers, white papers, etc. as requested 	
■ Core Scope Activities	■ Additional Activities Identified	

C. COMPANY PROFILE

Founded in 1996, **Optimal Energy** provides a full range of energy efficiency consulting services. We specialize in assessing, developing, designing, planning, launching, and overseeing efficiency programs and policies that effectively address the needs of all stakeholders in a cost-effective, balanced fashion. These efforts are supported by broad experience gathering both quantitative and qualitative data from many sources and synthesizing it into meaningful, defensible, and actionable conclusions and recommendations. Our primary objective is to help our clients recognize opportunities and support their efforts to lead the industry. We have advised 8 of the top 10 states ranked for efficiency policy and programs by the ACEEE. We are unapologetic advocates for the fact that achieving all cost-effective energy efficiency is the easiest, least expensive, and first step in reducing GHG emissions and combatting climate change.



Optimal Energy maintains offices in Providence, Rhode Island, and Vermont, as well as employees in Massachusetts, New York, and Delaware. Optimal Energy supplements its core staff of policy and analytic experts with other leaders in emerging areas of policy and programming. Optimal has subcontracted with two firms and four independent contractors, including both a minority-owned firm and a woman-owned independent contractor. Independent contractors are listed in the Staff Experience section. The two firms, profiled below, contribute to a range of key work areas, as shown under Staff Experience.

Energy Futures Group (EFG) is a clean-energy consulting firm established in 2010 and headquartered in Vermont with offices in Boston and New York. EFG designs, implements, and evaluates programs and policies to promote investments in efficiency, renewable energy, other distributed resources, and strategic electrification. EFG staff have delivered projects on behalf of energy regulators, government agencies, utilities, and advocacy organizations in 40 states, 8 Canadian provinces, and several countries in Europe. Two members of the EFG team have been involved with the EERMC since 2010, and are well-versed in past efforts, current plans and Rhode Island’s future direction.

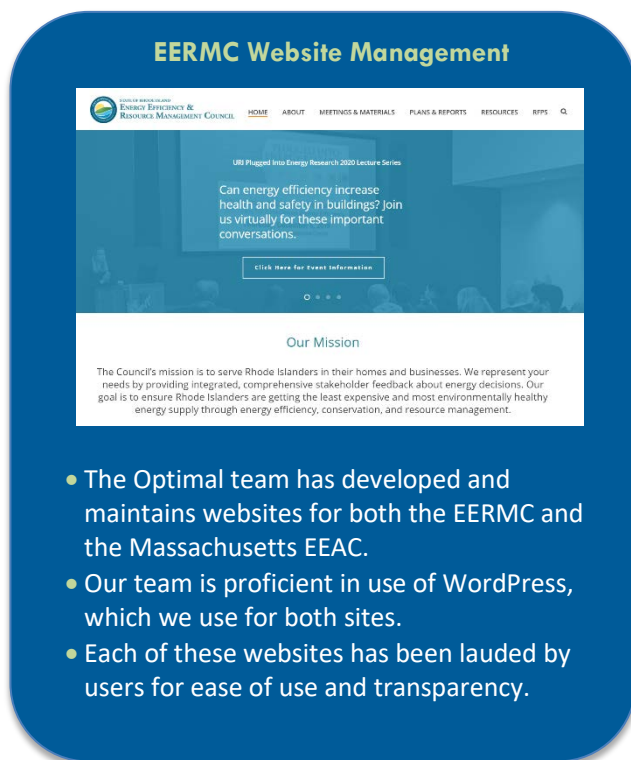
EcoMetric Consulting, LLC (EcoMetric) was founded in 2015 with a mission of providing inspired, forward-thinking advisory services to inform demand-side management decision making. EcoMetric's principal consultants are industry leaders in utility energy efficiency program M&V practices, having authored or assisted in the development of many of the industry's leading reference materials. EcoMetric staff recently analyzed pay-for-performance, retro-commissioning and multifamily programs in five US jurisdictions and Ontario, Canada. The engineering staff has performed on-site equipment verification and power metering, and delivering investment-grade audits in support of energy performance contracts.

D. RELEVANT EXPERIENCE

Optimal Energy has a long and successful history of work providing technical consulting services to energy efficiency councils and related clients, as do all of our team members. We have served this function in Rhode Island, first as a subcontractor from 2008 to 2017, and then as the prime contractor since 2018. Our industry experience in managing councils is unmatched: Optimal is the lead technical consultant to the Massachusetts and Delaware Energy Efficiency Advisory Councils, and EFG is the lead consultant to the Connecticut Board. Optimal is also a team member working with key stakeholder groups in Illinois and Missouri. This work gives our team significant historical insight into the needs and challenges of councils. Further, our ongoing work in this role in several jurisdictions that are similarly facing the clean energy industry’s rapid changes affords us the ability to facilitate and accelerate transferring best practices that creatively and effectively accelerate advancement in climate change mitigation and resilience efforts.

In addition to the broad skills required to provide overarching support for council needs, we specialize in related concentrations within the clean energy industry, detailed below.

- **Market Potential Studies:** Optimal Energy has completed at least one market potential study per year since 2015, covering more than five jurisdictions. We have overseen or reviewed many other studies in our council and advisory work. Our team also developed the industry’s [guide to completing potential studies](#) for the US Environmental Protection Agency.



EERMC Website Management

HOME ABOUT MEETINGS & MATERIALS PLANS & REPORTS RESOURCES RFPs

URI Plugged Into Energy Research 2020 Lecture Series

Can energy efficiency increase health and safety in buildings? Join us virtually for these important conversations.

[Click Here for Event Information](#)

Our Mission

The Council's mission is to serve Rhode Islanders in their homes and businesses. We represent your needs by providing integrated, comprehensive stakeholder feedback about energy decisions. Our goal is to ensure Rhode Islanders are getting the least expensive and most environmentally healthy energy supply through energy efficiency, conservation, and resource management.

- The Optimal team has developed and maintains websites for both the EERMC and the Massachusetts EEAC.
- Our team is proficient in use of WordPress, which we use for both sites.
- Each of these websites has been lauded by users for ease of use and transparency.

- **Evaluation, Measurement and Verification:** Ralph Prah is a nationally recognized leader in EM&V with 25 years of experience. He has been a member of the planning committee for the International Energy Program Evaluation Conference since 1999, and won the 2015 International Energy Program Evaluation Lifetime Achievement Award.
- **Policy and Legislation:** Arah Schuur brings expertise in energy efficiency and energy optimization policy at a state and national level. Prior to joining Optimal, Arah served as the Director of Energy Efficiency at the Massachusetts Department of Energy Resources. She led the Commonwealth’s energy efficiency policy and oversaw the Energy Efficiency Advisory Council in its development and oversight of its nation-leading programs. Arah contributed to key areas of the 2018 Act to Advance Clean Energy, incorporating fuel switching into energy efficiency plans for the first time and expanding focus on peak energy reduction. She also worked on home energy scorecards, commercial PACE, and energy efficiency regulations for the cannabis industry. Prior to her DOER experience, Arah was at the US Department of Energy, where she provided input on energy efficiency finance, labeling, and utility data-sharing policies.
- **Expert Testimony:** Optimal Energy has provided expert testimony and ongoing efficiency policy advisory support to a wide range of clients, including the Illinois Attorney General’s Office and the Sierra Club. Our team regularly provides testimony on topics including review of PUC dockets, utility efficiency plans, and proposed policy and program enhancements.
- **Distributed and Renewable Energy:** David Hill at EFG brings more than twenty years of experience in renewable energy and distributed energy policy, and is nationally known for advancing sustainable energy program design and evaluation. Prior to joining EFG in 2020, he served as the Director of Distributed Resources and as a Policy Fellow at VEIC.

E. EXAMPLES OF PRIOR WORK

Optimal has worked diligently to serve the EERMC, producing a body of work already familiar to you. As described in Section D, the Optimal team plays a substantially similar role for states in New England, the mid-Atlantic and Midwest, for councils and stakeholder groups, and related work for other clients nationally and internationally. The three examples highlighted below cover a range of deliverables² for different state-level council and commission clients that the Optimal team has supported in recent years.

Optimal Energy leads the technical consulting team for the Massachusetts EEAC, supporting similar advisory and oversight requirements. We have developed a wide range of deliverables, including a [white paper on the future of C&I lighting](#), recent presentations on [residential program opportunities](#) and [moving programs beyond lighting](#), and comprehensive analyses on emerging efficiency [savings opportunities like HVAC](#). In our work for the EEAC, we also collaborate extensively with efficiency program administrators to tackle complex challenges, such as [establishing energy management system baselines for efficiency programs](#).

Optimal Energy is part of the Pennsylvania Statewide Evaluator team, serving as technical lead for its [Energy Efficiency and Peak Demand Reduction Market Potential Study](#), which was also supported by EcoMetric. The study’s results were translated directly into binding energy efficiency and demand reduction targets for Pennsylvania’s regulated electric distribution companies (EDCs). Our study was a key input for the [Pennsylvania PUC’s Final Implementation Order](#), which

² Individual examples of prior work products are available for review using the embedded hyperlinks throughout this section.

we helped to author, and which underwent extensive review by the PUC, its Technical Utility Staff, the EDCs, and many other stakeholders.

Optimal Energy was selected in a competitive bidding process to support the New Jersey Board of Public Utilities (BPU) in its compliance with New Jersey's 2018 Clean Energy Act. The Act mandated completion of an [energy efficiency potential study](#) to inform the Board as it established targets. The project included estimation of ten-year potential in energy efficiency, demand response, and combined heat and power. The potential was then allocated to the electric and gas public utilities. Optimal provided recommendations on five-year targets for each utility. Following assessment of the efficiency potential and development of utility savings goals and performance incentives, Optimal continued to assist the BPU through a stakeholder process in the development of a new policy framework for utility-administered efficiency programs.

As required by the RFP, we include in Appendix B two previously written memos that describe a technical energy issue and provide a recommendation to a client. We have selected these from outside of New England to showcase our work from other parts of the country:

- Assessment of energy efficiency programs of CPS Energy in San Antonio, Texas, with recommendations, commissioned by the Sierra Club and completed to inform the City Council of San Antonio
- Review of legal and economic considerations for establishing appropriate discount rate to apply to energy efficiency costs and savings for the Pennsylvania PUC

F. REFERENCE INFORMATION

We provide as references the principal contacts for two of our contracts of similar scale and scope, which are described in the above section on Relevant Experience.³

- **Maggie McCarey**, Manager of Energy Resources, Massachusetts Department of Energy Resources; maggie.mccarey@state.ma.us; 617-626-1036.
- **Robert Underwood**, Energy Administrator, Division of Climate, Coastal, & Energy, Delaware Department of Natural Resources and Environmental Control; robert.underwood@delaware.gov; 302-735-3489.

G. IDENTIFICATION OF STAFF AND SUBCONTRACTORS

See Section I.

H. STAFF RESPONSIBILITIES

See Section I.

I. STAFF EXPERIENCE

This section covers all three required sections on staffing called for in the RFP.

The Optimal team is organized to facilitate effective coordination of work while allowing for flexibility for both variability in the anticipated needs defined in the RFP and unanticipated requirements that may arise. This structure supports the EERMC by providing clear lines of communication and responsibility; active coordination and integration with key stakeholders,

³ No subcontractor is engaged to complete more than 20 percent of the Work Plan, so subcontractor references are not required.

including OER, the Division, and National Grid; and two-way channels to facilitate education and communication with the public.

Our staffing plan balances a core of members with proven track records, institutional knowledge, and well-established relationships while also enhancing and expanding the team to assure that evolving challenges and needs are addressed. We organize our team into five groups covering the core roles and areas of focus, as shown in our organizational chart below. While each member is listed only once in their primary area of concentration, many team members actively participate in multiple groups.



In addition to the detail provided in the Company Profile section above for Optimal, EFG, and EcoMetric, we also feature four independent contractors listed in the chart above who supplement the team with critical and specific skill sets to add to the robustness of the team’s capabilities.

- Rachel Sholly, Education & Communication Lead.** Rachel brings long-standing connections to local stakeholders. After establishing the URI Energy Fellows Program, she transitioned to the Rhode Island Office of Energy Resources in 2013. In addition to supporting the EERMC, she worked with an array of public and private stakeholders to achieve deep energy savings. Since contracting with Optimal in 2018, Rachel has led efforts to engage stakeholders and educate Council members and the public on energy efficiency.
- Ralph Prah, EM&V Group Technical Lead.** Ralph has advised governmental and non-profit organizations on the planning, review, and oversight of energy efficiency program evaluation and market assessment activities. Clients included the PUCs in California, Connecticut, Massachusetts, New York, Wisconsin, New Hampshire, and Vermont; 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.

- **Margaret Lynch, Residential & Income Eligible Strategy.** Margie has over a decade of efficiency experience, starting with the Consortium for Energy Efficiency, where she facilitated industry, program administrator, and government stakeholders to create frameworks for identifying program opportunities. In 2013, she established her own woman-owned business, which is part of the consultant team for the Massachusetts EEAC. She joined the Optimal team serving the Rhode Island EERMC in 2020.
- **Jennifer Chiodo, C&I Strategy.** Jen has over 30 years of experience focused on garnering energy efficiency in the business sector while overseeing the implementation of thousands of energy efficiency, commissioning, and measurement and verification projects. A Brown University graduate and former partner at Cx Associates, she fostered the firm's development into a widely recognized leader in energy efficiency.

The Optimal team also plans to continue engaging with student interns from local universities, such as through the [URI Energy Fellows Program](#), providing opportunities to work for a semester or summer on energy efficiency issues. Historically, it has led to bringing some of Rhode Island's best and brightest into careers in this important work.

J. CONFLICTS OF INTEREST

The Optimal team has no conflicts of interest with any distribution companies or affiliates of the distribution companies. The Optimal team has no conflicts of interest with any member of the EERMC.⁴ Should any conflict of interest or appearance thereof arise, Optimal will bring it to the attention of OER and the EERMC.

K. LITIGATION

Optimal Energy has no litigation, disputes, claims or complaints, or events of default or other failure to satisfy contract obligations, or failure to deliver products, involving offeror or an affiliate of offer, and relating to providing services to report.

L. INVESTIGATION

Optimal Energy confirms that it, and its directors, employees, and agents, are not currently under investigation by any governmental agency and have not in the last four years been convicted or found liable for any act prohibited by state or federal law in any jurisdiction involving conspiracy, collusion, or other impropriety with respect to bidding on any contract.

⁴ Optimal Energy currently rents Providence office space from Peter Case, who is a member of the EERMC. Mr. Case disclosed this when he was approached for Council membership, and it was not communicated to us that this was a conflict.

APPENDIX A: FIRM QUALIFICATIONS AND RESUMES – ANNEX TO PROPOSAL SECTION I

Firm Qualifications

- Optimal Energy
- EcoMetrics
- Energy Futures Group

Resumes

Optimal Energy

- Eric Belliveau, Partner in Charge, Policy & Regulatory
- Mike Guerard, Project Manager
- Adrian Caesar, Website, Retreat, Analyst
- Elizabeth Chant, Income Eligible, Equity
- Adam Jacobs, C&I
- Craig Johnson, Residential, Income Eligible, EM&V
- Phil Mosenthal, Codes & Standards, Policy
- Sam Ross, EM&V, Financing
- Arah Schuur, Policy, Optimization
- Matt Socks, ADR, AESC, ISO, Analytics

EcoMetric

- Salil Gogte, EM&V Policy & Regulatory
- Mike Honeychuck, C&I
- Corey Read, Residential
- Bitul Sinha, C&I EM&V

Energy Futures Group

- Richard Faesy, Residential
- David Hill, Renewables, Distributed Energy Resources
- Dan Mellinger, C&I
- Glenn Reed, EM&V

Independent Consultants

- Jennifer Chiodo, C&I
- Margaret Lynch, Residential, Income Eligible
- Ralph Prah, EM&V
- Rachel Sholly, Education & Communication

OPTIMAL ENERGY CORPORATE QUALIFICATIONS

Founded in 1996, Optimal Energy provides a full range of energy efficiency consulting services to investor and municipally owned utilities, program administrators, state and federal energy offices, regulatory commissions, advisory councils, and advocacy groups. We specialize in assessing, developing, designing, planning, and launching efficiency programs and policies that effectively address the needs of all stakeholders in a cost-effective, balanced fashion. These efforts are supported by broad experience gathering both quantitative and qualitative data from a variety of sources and synthesizing it into meaningful, defensible, and actionable conclusions and recommendations. Our primary objective is to help our clients recognize opportunities and support their efforts to be a leading organization in their industry.

EXPERTISE

Optimal Energy offers unparalleled expertise and technical support in all aspects of energy efficiency. We help our clients develop the organizational capacity and expertise needed to acquire all cost effective energy efficiency. Using our proprietary tools, our consultants provide in-depth technical analysis that is well regarded by the industry for its comprehensiveness and accuracy. We are nationally-recognized for our assistance to policy-makers at all levels.

Our subject matter experts work on a range of energy related challenges.

- Conducting in-depth market assessments to characterize various technologies or market segments and identify opportunities for market transformation, intervention, or promotion.
- Performing comprehensive studies to determine the technical, economic, and achievable potential for energy efficiency, demand response, fuel switching and renewable energy measures or programs
- Analyzing the costs and benefits of demand-side management energy resources, including the treatment of many ancillary and non-energy costs and benefits that are often overlooked by others in the industry
- Integrated technical and economic analysis and optimization of diverse energy resources to assess the ability of demand-side strategies to defer or replace more costly supply-side investments
- Developing Technical Reference Manuals and other support for monitoring and verification with algorithms for estimating the energy savings and non-energy benefits of electric and gas efficiency measures, and documenting associated costs, impact factors, and data sources
- Measure and program impact evaluation, measurement, and verification and process evaluation focused on actionable recommendations on improved program design and delivery.

RECENT REPRESENTATIVE PROJECTS

Massachusetts Energy Efficiency Advisory Council, Consulting Services, 2009-present

Optimal Energy is the lead consultant to the Council, and has just been selected to continue in this role for the 2020-2022 period. Optimal, along with key partners, helps the Council with strategic planning and goal-setting; program review; and EM&V oversight to support the energy efficiency plans. Specific tasks have included: researching and characterizing new efficiency technologies; developing and analyzing energy efficiency programs and budgets; assessment and monetization of non-energy impacts and cost-benefit analysis; developing utility performance metrics and tracking progress towards utilities' spending and savings targets and performance metrics; modeling of emissions impacts; training, education and staff oversight of program implementation; evaluation planning and verification; and the development of marketing and training materials.

Delaware Department of Natural Resources and Environmental Control, Energy Efficiency Advisory Council, Program Development and Support, 2013-present

Optimal Energy provides broad program planning, analysis, and strategic guidance to the DNREC and the Delaware EEAC, with the objective of dramatically increasing energy savings and demand reduction. Optimal leads a team of experts and provides program design review and economic analysis; EM&V regulation promulgation; TRM development; and stakeholder engagement. Additionally, we provide DNREC and the Council with support services, including agenda development, annual report development and production, and meeting management tasks.

Connecticut Energy Efficiency Board, Technical Consulting Services, 2016-present

Optimal Energy is part of the consulting team that provides technical expertise to the CT EEB on C&I efficiency programs and markets, residential programs and markets, EM&V, financing, and demand issues. The team works with Eversource and United Illuminating, the Program Administrators, and the Connecticut Department Energy and Environmental Protection to advise and inform the Council. Services include program planning, program savings analysis and reporting, review of three year plans, and developing incentive and delivery strategies.

New Jersey Board of Public Utilities, Potential Study and Technical Advising, 2019-present

New Jersey's 2018 Clean Energy Act mandated completion of an energy efficiency potential study to inform the Board as it established targets. Optimal Energy was competitively selected to complete the work, which had to meet a very tight legislative deadline. The project included estimation of ten-year energy efficiency potential, demand response potential, and potential for savings from combined heat and power. Optimal provided recommendations on five-year efficiency targets and a structure for performance incentives and penalties that complied with legislative mandates. Subsequent to completing an energy efficiency potential study for New Jersey, Optimal Energy has been advising the NJ BPU as it devises a new program administrative structure, performance targets, incentives and penalties, stakeholder engagement, and M&V.



EcoMetric Consulting, LLC (EcoMetric) was founded in 2015 with a mission of providing inspired, forward-thinking advisory services to inform demand-side management (DSM) decision making. We deliver a comprehensive range of demand-side management advisory services to utilities and governing agencies for the residential, commercial, industrial, institutional, and government market segments. EcoMetric's principal consultants are industry leaders in utility energy efficiency program M&V practices, having authored or assisted in the development of many of the industry's leading reference materials. EcoMetric staff are proficient with data analytics using R or Python open-source libraries and statistical techniques to measure and evaluate SEM, Pay-for-Performance, and retro commissioning programs. Our consultants have also recently evaluated multifamily programs in California, New Mexico, Illinois, Pennsylvania, Washington, D.C., and Ontario, Canada. Our firm is comprised of forward-thinking technology professionals focused on the development of analytical products to reliably measure the time and location impacts of demand management resources.

EcoMetric is headquartered in Exton, Pennsylvania, and drives our projects with a dedicated, experienced staff of 15 energy professionals located across the globe. EcoMetric possesses extensive real-world experience in implementing M&V practices to quantify program savings impacts. Our team is conducting complex portfolio evaluation studies, determining accurate program savings, evaluating lost revenue, and performing cost-effectiveness analyses for investor-owned and publicly owned utilities throughout the United States and Canada. We leverage industry-leading data visualization tools to build interactive dashboard tools and web applications to communicate complex data and ideas. EcoMetric is a Disadvantaged Business Enterprise (DBE) certified by the U.S. Department of Transportation. We are also certified as a Minority Business Enterprise (MBE) by the Office of Diversity, Equity and Opportunity (ODEO).

Please see a sampling of relevant projects on the next page.

Pennsylvania Public Utility Commission – PA Act 129 Statewide Evaluator (2016 – Present)

EcoMetric Consulting is a leading contractor working on the Statewide Evaluation (SWE) Team for the Pennsylvania Public Utility Commission (PUC) 2016 – 2022. Salil Gogte was a part of the SWE team from 2009 – 2015, during his tenure at Nexant Inc. This contract focuses on evaluating the performance of the Energy Efficiency and Conservation program portfolios of the seven Electric Distribution Companies (EDCs). Under the PUC direction, the SWE monitors the sampling, data collection, savings estimation, reporting, and cost-effectiveness calculations of the planning and evaluation contractors hired by each EDC, assuring that ratepayers receive value from the programs they fund. The SWE team has created an Evaluation Framework to guide the utility EM&V contractors in developing data collection and sampling protocols and the proper use of the TRM and provides regular TRM development and maintenance.

ComEd, Nicor Gas, Peoples Gas, North Shore Gas Illinois – Impact Evaluation of Residential, Commercial, and Industrial Programs (2009 – Present)

EcoMetric staff have played a critical technical role in the impact evaluations for ComEd, Nicor Gas, Peoples Gas, and North Shore Gas energy efficiency programs throughout Illinois. EcoMetric has completed detailed engineering, building simulation, and whole-building energy usage analyses for energy efficiency programs including strategic energy management, retrocommissioning, multi-family, custom, prescriptive, data centers, small business, school kits, compressed air, new construction, weatherization, income-eligible, and pilots for emerging technologies. For retrocommissioning projects, our staff have completed detailed site visits, including installing logging and metering equipment and analyzed EMS data from a wide variety of commercial and industrial facilities. EcoMetric staff were also critical in launching the methods and whole building calculation protocols to determine savings for the SEM program. Currently, EcoMetric leads the impact for the joint-offered multi-family program, which includes custom and prescriptive measures, installed in all three utility service territories.

Ontario (Canada) Independent Electricity System Operator – SEM Program M&V (2017 – Present)

EcoMetric is conducting M&V for a Portfolio of Industrial Programs and the Commercial Energy Performance Program (EPP) for the Independent Electricity System Operator (IESO), who oversees all energy efficiency programs delivered throughout the province of Ontario. The Industrial Portfolio consists of the Process and Systems Upgrades and Energy Managers Program, while EPP is a whole building pay-for-performance program for commercial customers. Our staff led the on-going advanced M&V analysis for the Energy Managers program, a Strategic Energy Management (SEM) program where IESO pays the salary of a full-time energy manager at participating organizations to identify and implement capital and O&M energy improvements within the facility. We combine data analytics and engineering analysis to calculate energy and demand savings for these diverse projects and provide a cost-effective evaluation of the program.



CORPORATE DESCRIPTION

Energy Futures Group (EFG) is a clean-energy consulting firm headquartered in Hinesburg, Vermont, with offices in Boston and New York. EFG designs, implements, and evaluates programs and policies to promote investments in efficiency, renewable energy, other distributed resources, and strategic electrification. EFG staff have delivered projects on behalf of energy regulators, government agencies, utilities, and advocacy organizations in 40 states, 8 Canadian provinces, and several countries in Europe.

EFG brings to its work a unique combination of technical, economic, program, and policy expertise. EFG staff have critically evaluated hundreds of efficiency and renewable energy programs, playing key roles in developing many that have subsequently won awards for excellence. Recent work involves efficiency program portfolios and policies in each of the fifteen highest-ranking states on the ACEEE State Energy Efficiency Scorecard, as well as in Ontario, Manitoba and British Columbia. We have also provided expert witness testimony on efficiency programs, integrated resource planning, and related policy issues in regulatory proceedings in twenty states and five Canadian provinces. Our staff has served on the Board of Directors of Residential Energy Services Network (RESNET), Building Performance Professionals Association (BPPA), the Energy Coop of Vermont, Building for Social Responsibility and the Program for the Evaluation and Analysis of Residential Lighting (PEARL); the Air Conditioning Contractors of America's (ACCA's) national quality installation committee; the Northeast Energy Efficiency Partnerships' Evaluation, Measurement and Verification forum's various committees, and various other regional and national efficiency forums. They have also taught courses on efficiency program design and implementation for both Affordable Comfort and AESP.

Brief Descriptions of Relevant Projects

- **Connecticut Energy Efficiency Board.** Lead consultant to the EEB in addition to leading the residential team to provide oversight of the state's energy efficiency programs. Work closely with the state's utilities to develop cost-effective program designs and goals for the annual Conservation and Load Management Plan.
- **DC Department of the Environment (Washington DC).** Provided technical support to the Vermont Energy Investment Corporation on the administration of the DC Sustainable Energy Utility (SEU). Responsibilities included leading the characterization of efficiency markets and opportunities, supporting program prioritization and design, and providing input on policy issues.
- **Efficiency Vermont.** Serve as Senior Advisors for residential program design and policy guidance for Vermont's statewide, award-winning energy efficiency utility. Also provided input to NEEP's regional EM&V forum and technical support on Efficiency

Vermont's bidding of efficiency resources into New England's Forward Capacity Market. Focus on residential retrofit programs, fuel dealer partnerships, cold climate heat pump program development, home energy labeling, and energy savings guarantees.

- **Maine Public Utilities Commission (PUC).** Lead the consulting team (including Cx Associates and Wirtshafter Associates) to provide expert assistance to the PUC in the review of the energy efficiency and renewable energy programs of the Efficiency Maine Trust (EMT). The EFG team focused on program design, program performance and evaluation issues through an initial comparative review with other efficiency programs and followed that by supporting the PUC in EMT's triennial plan adjudicatory case. (2015-2017)
- **Massachusetts Energy Efficiency Advisory Council.** Provide on-going technical and programmatic advice to, and oversight of, the Massachusetts gas and electric program administrators' residential efficient products (lighting, appliances and consumer electronics), multifamily, and HVAC programs. This includes review of key screening tool inputs and development of three-year program savings goals. Also assist Council evaluation consultants and lead Council engagement on the development of the residential measure characterizations for Massachusetts' new Technical Resource Manual.
- **Ontario Power Authority.** Multiple projects:
 - **T&D.** Assisted in the development and running of a staff workshop on integrated resource planning for addressing transmission and distribution (T&D) system reliability needs and the role efficiency resources can play in deferring T&D investments.
 - **Policy and Program Trends.** Developed and presented assessment of future efficiency policy and program trends for OPA's Advisory Council on Energy Efficiency.
- **Rhode Island Energy Efficiency and Resource Management Council.** Residential sector advisors providing on-going technical and programmatic advice to, and oversight of, Rhode Island's residential efficient products (lighting, appliances and consumer electronics), HVAC, existing homes and residential new construction programs. Work closely with National Grid staff to develop cost-effective program designs and goals for their energy efficiency plans. Also critically reviewing and providing feedback on National Grid's system reliability plans. Supported development of building asset rating program, delivered fuels programs and strategic electrification planning.



ERIC J. BELLIVEAU, PARTNER

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PROFESSIONAL EXPERIENCE

Optimal Energy, Hinesburg, VT. *Partner*, 1999-present

Eric Belliveau's partner responsibilities include managing the senior consultants on Optimal's staff, providing strategic direction and marketing, and overseeing financial management of the firm. He manages many of Optimal's largest projects and provides expert advice on many others. Mr. Belliveau leads Optimal's design and development of residential, commercial and industrial efficiency services delivery practice: developing program sales and marketing staff; researching market segmentation approaches and performance incentive mechanisms; and working with business-focused groups to improve marketing. He specializes in leading teams of energy experts to design, analyze, evaluate, and support program implementation for large stakeholder groups. He provides business planning and product development consulting for retail energy service providers in Delaware, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and Washington, DC. His work in evaluating energy system investment opportunities in a wide range of commercial and industrial businesses is ongoing.

Vermont Energy Future, Burlington, VT. *Managing Director*, 1998–2001

Mr. Belliveau was responsible for developing the business plan, securing funding, hiring staff, and establishing all business systems to establish the Energy Co-op of Vermont (ECVT). He researched options for a 10,000-member buyer cooperative that provides fossil fuel, energy efficiency, and renewable energy. He developed partnerships with a local electric coop and a local credit union for joint service delivery. He was responsible for increasing energy affordability for low to moderate-income members by lowering consumption through efficiency. After Mr. Belliveau left ECVT, he served as Board Chairman for 7 additional years.

Waterbury Fresh Foods, Burlington, VT. *General Manager/Vice President of Operations*, 1994-1998

Vermont Department of Agriculture, Montpelier, VT. *Marketing/Small Business Specialist*, 1991-1994

New England Housewrights, Charlotte, VT. *Construction Planner/Manager*, 1989-1991.

Vermont Pasta Company, Burlington, VT. *Founder/Owner*, 1980-1989

EDUCATION AND LICENSING

University of Maine, Orono, ME

Bachelor of Arts, International Affairs with an Economics and German emphasis, 1981

PROFESSIONAL ACTIVITIES AND MEMBERSHIPS

LEED Accredited 2010

Instructor, Post and Beam House Construction

REPRESENTATIVE PROJECT EXPERIENCE

Massachusetts Energy Efficiency Advisory Council, Technical Consulting Services (2010-present)

Optimal Energy serves as the lead technical consultant to the Massachusetts Energy Efficiency Advisory Council (EEAC) and has since 2010. Optimal's role includes supporting the EEAC on all aspects of negotiating efficiency programs, plans, goals, performance incentives, and budgets with the program administrators, and oversight of all program implementation and evaluation, monitoring and verification activities. Belliveau manages all aspects of the 21-member consultant team's interactions with the EEAC, program administrators, and myriad stakeholders in advising, designing, and supporting implementation of the Mass Save programs. The team is tasked with overseeing the planning and implementation of Massachusetts \$2.4 billion Three-Year Plan as the technical consultants to the Council. The Optimal team oversees and advises on the 25 commercial and industrial (C&I), residential, multifamily, low-income programs and initiatives, leads the \$70 million EM&V effort (approximately 45 studies ongoing at any one time), and advises and analyzes demand response efforts. The 2019-2021 Plan is the most aggressive set of energy efficiency and demand reduction programs in North America. Belliveau is currently the lead consultant on COVID mitigation strategies and the development of the 2022-2024 Three-Year Plan.

New Jersey Board of Public Utilities, Potential Study and Consulting Services (2019-present)

New Jersey's 2018 Clean Energy Act mandated completion of an energy efficiency potential study to inform the Board as it establishes targets. Optimal Energy was selected in a competitive bid to complete the work, which had to meet a very tight legislative deadline. Mr. Belliveau led the project, which included estimation of ten-year energy efficiency potential, demand response potential, and potential for savings from combined heat and power. Optimal was then retained to provide expert services as the BPU structures program implementation. Mr. Belliveau heads the Optimal team as it advises on program administrative structure, performance targets, incentives and penalties, stakeholder engagement, and measurement and verification. The New Jersey BPU recently released the *Proposal for New Jersey's Energy Efficiency and Peak Demand Reduction Program* and subsequent Board Order outlining the energy efficiency implementation plan for commencement in 2021. Mr. Belliveau supported the BPU staff in crafting the order including all calculations of savings, budgets, and performance mechanisms. He also led the process of creating a proposal for the New Jersey Cost Test, which is currently out for comment.

Delaware Department of Natural Resources and Environmental Control, Energy Efficiency Advisory Council Program Development and Support (2013-present)

Optimal Energy provides broad program planning, analysis, and strategic guidance to the Delaware Energy Efficiency Advisory Council as it develops a new model for joint utility and public-sector delivery of energy efficiency services, with the objective of dramatically increasing energy savings and demand reduction. Mr. Belliveau manages all aspects of 10-member team of experts. Belliveau provides program design review and economic analysis; evaluation, measurement, and verification regulation promulgation; technical reference manual development, database development, and stakeholder engagement. Optimal Energy was recently selected to continue as the technical lead for the DCCE adding to its responsibilities the implementation oversight the Energy Efficiency Investment Fund, a commercial and industrial efficiency program offering technical assistance, and prescriptive and custom incentive offers.

District of Columbia Sustainable Energy Utility (DCSEU), C&I Programs Manager (2011-2013)

Mr. Belliveau led the jump team that designed and implemented the start-up programs for the DCSEU. He was responsible for all aspects of implementing the District's first C&I programs, which met all first-year targets on time and on budget.



MICHAEL GUERARD, CONSULTANT

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PROFESSIONAL EXPERIENCE

Optimal Energy, Providence, RI. *Managing Consultant*, 2008 – Present.

At Optimal Energy, Mr. Guerard provides project management, research, stakeholder coordination and technical analysis to support clients' development of strategies for achieving energy efficiency goals and integrated resource solutions. His project work includes designing and developing statewide and utility-specific efficiency programs and supporting program implementation for both public and private-sector clients.

Conservation Services Group, Westborough, MA. 1991 - 2008

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.

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

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

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.

Program Management Roles, 1991-2000

EDUCATION

University of Kansas, Lawrence, KS

Graduate studies in Journalism & Mass Communications, 1988

University of Rhode Island, Kingston, RI

Bachelor's degrees in Philosophy and Psychology, 1986

REPRESENTATIVE PROJECT EXPERIENCE

Rhode Island Energy Efficiency and Resource Management Council, Policy and Program Planning Consulting

Optimal Energy manages a team of consultants providing support to the Rhode Island Energy Efficiency and Resource Management Council on topics ranging from high-level policy and legislative issues down to the oversight of program design and implementation oversight and infrastructure development. The team provides research, budget analysis, cost-effectiveness modeling, data tracking, and general oversight to the Council as well as strategy and general support to the Rhode Island Office of Energy Resources. Mr. Guerard has been part of management team guiding this work since 2009.

New Jersey Board of Public Utilities, Potential Study and Consulting Services (2019-present)

New Jersey's 2018 Clean Energy Act mandated completion of an energy efficiency potential study to inform the Board as it establishes targets. Optimal Energy was selected in a competitive bidding process to complete the work, which had to meet a very tight legislative deadline. Optimal was then retained to provide expert services as the BPU structures program implementation. Mr. Guerard coordinated the team's activities for its role in advising on program administrative structure, performance targets, incentives and penalties, stakeholder engagement, and measurement and verification.

Pascoag Utility District (2019-Present)

Optimal Energy provides energy efficiency consulting services for the Pascoag Utility District (PUD) in support of its energy efficiency investments filed annually with the Rhode Island Public Utilities Commission. Mr. Guerard has managed the project since it was initially awarded and works closely with PUD management and in coordination with the Rhode Island Office of Energy Resources to align their contributions to PUD efforts to serve Pascoag businesses and residents.

Connecticut Municipal Electric Energy Cooperative, Conservation and Load Management Consulting, 2006-present

Optimal has provided energy efficiency consulting services to the Connecticut Municipal Electric Energy Cooperative (CMEEC) since the inception of their conservation and load management programs. Services include program planning, program savings analysis and reporting, developing incentive and delivery strategies, and managing CMEEC's participation in the ISO-NE Forward Capacity Market. The latter has included drafting M&V plans specifying procedures for meeting all ISO-specified M&V rules and developing a web-based data tracking and reporting system. Optimal also helps CMEEC develop strategy for and manage participation in new FCM auctions and arranges for required annual certification reviews. Mr. Guerard has been managing this project since 2017.

Delaware Department of Natural Resources and Environmental Control, Energy Efficiency Advisory Council Program Development and Support, 2013-present

Optimal Energy provides broad program planning, analysis, and strategic guidance to the Delaware Energy Efficiency Advisory Council as it begins developing a new model for joint utility and public-sector delivery of energy efficiency services, with the objective of dramatically increasing energy savings and demand reductions in that state. Mr. Guerard supported the initial development and filing of energy efficiency program portfolios.



ADRIAN CAESAR, ANALYST

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PROFESSIONAL EXPERIENCE

Optimal Energy, Hinesburg, VT. *Analyst*, 2019-present

At Optimal, Mr. Caesar provides research, analysis, and writing and presentation support on a range of projects including advisory council technical services, potential studies, white papers, and policy reports for state and local governments. His expertise lies in economic analysis, statistical programming, and energy efficiency program evaluation.

Fortitude Systems, Denver, CO. Junior Account Executive/Hiring Consultant, 2018-2019

While working at Fortitude, Mr. Caesar collaborated with Senior Consultants to produce technical labor market insights for dozens of Fortune 500 clients in industries including oil and gas, telecommunications, healthcare, and e-Commerce. He provided consultation based on both primary and secondary research which aided in the fulfillment of over 12 projects and onboarding of over 25 functional/technical staff members.

Brown University, CareerLAB, Providence, RI. *Strategy Consultant*, 2017-2018

During his time at Brown's CareerLAB, Mr. Caesar worked in concert with four student team members to devise metrics of user engagement and satisfaction with BrownConnect, a networking, internship search, and career development web application for Brown University undergraduate students, graduate students, and alumni. His work entailed mediating three focus groups, administering website evaluation surveys to 14 participants, and modeling data on over 2,000 users using Excel and MySQL databases to aid in optimizing the survey designs and providing suggestions for improving BrownConnect to the CareerLAB Directors.

Northwestern Mutual, Providence, RI. Financial Representative Intern, 2017

At Northwestern Mutual, Mr. Caesar worked alongside life, disability income, long-term care, investment, accident, and health insurance specialists to prepare comprehensive financial planning analyses for clients. His primary focus was the development of Personal Planning Analyses based on financial risk management, wealth accumulation, and wealth distribution strategies using financial modeling and forecasting tools.

EDUCATION

Brown University, Providence, RI

Bachelor of Arts, Business, Entrepreneurship & Organizations, Economics Track (2018)

REPRESENTATIVE PROJECT EXPERIENCE

Rhode Island Energy Efficiency and Resources Management Council, Policy and Program Planning Consulting (2019-Present)

Optimal Energy manages a team of consultants providing support to the Rhode Island Energy Efficiency and Resource Management Council (EERMC) on topics ranging from high-level policy and legislative issues down to the oversight of program implementation and infrastructure development. Mr. Caesar leads monthly and quarterly utility data reporting for the consultant team. In addition, Mr. Caesar supports Optimal Energy's work for the EERMC in a range of areas related to ongoing program design, annual planning, measurement and verification, and research of emerging trends in the energy efficiency and clean energy space.

Pennsylvania Statewide Evaluator Team Member, Market Potential Study Support (2019-Present)

Optimal Energy has been actively involved with the Pennsylvania Statewide Evaluator team for Phase IV of Act 129 as the Energy Efficiency Market Potential Study Lead. In addition, Optimal provides methodological guidance and written memos covering a range of topics including cost-benefit analysis, discount rates, avoided cost calculations, the application of baseline data to developing actionable policy insights, and regular meetings with Public Utility Commission Technical Utility Staff. Mr. Caesar has been responsible for an array of activities which includes Potential Study Scenario Analysis, Potential Study Report drafting, and Combined Heat and Power Potential Study support.

Massachusetts Energy Efficiency Advisory Council, Technical Consulting Services (2019-present)

Optimal Energy serves as the lead technical consultant to the Massachusetts Energy Efficiency Advisory Council (MA EEAC) since its inception in 2006. Optimal's role includes representing the EEAC on all aspects of negotiating efficiency programs, plans, goals and budgets with the program administrators, and oversight of all program implementation and evaluation, monitoring and verification activities. As a technical services core member, Mr. Caesar provides technical services including recording and production of meeting minutes for full Council and executive committee meetings, as well as subcommittee or other meetings on an ad hoc basis. Mr. Caesar also provides analytical support for a variety of Council activities, including development, review, and implementation oversight of energy efficiency programs.

Delaware Department of Natural Resources and Environmental Control, Energy Efficiency Advisory Council Program Development and Support (2019-Present)

Optimal Energy provides broad program planning, analysis, and strategic guidance to the Delaware Energy Efficiency Advisory Council as it begins developing a new model for joint utility and public-sector delivery of energy efficiency services, with the objective of dramatically increasing energy savings and demand reductions in that state. In support of the Council, Mr. Caesar conducts research and analysis in a range of areas related to ongoing program design, measurement and verification, and emerging trends in the energy efficiency and clean energy space. Mr. Caesar also supports data analysis and reporting requirements for the Regional Greenhouse Gas Initiative.



ELIZABETH CHANT, MANAGING CONSULTANT

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PROFESSIONAL EXPERIENCE

Optimal Energy, Hinesburg, VT; *Managing Consultant*, 2018-present

Ms. Chant leads Optimal's business development processes and supports client work on equity issues in the sustainable energy industry, including low-income programs and programs to reach more deeply into communities that have been underserved by the clean energy economy.

Vermont Energy Investment Corporation, Burlington, VT; *Principal Consultant*, 2010-2018

Ms. Chant led VEIC's sustainable energy policy and programming related to low-income people and multifamily buildings. She co-led the team that explored the use of commercial PACE for affordable multifamily housing (2018). She was responsible for the development of VEIC's original winning proposal and its rebid to provide services as the Washington, DC, Sustainable Energy Utility (DCSEU) in 2010 and 2016. She was part of the launch team for the DCSEU as the first Multifamily Program Manager. She was part of the R&D team on the nation's first public-purpose energy services company, Commons Energy (2014), a financing and program delivery model that is a variation of a traditional ESCO. Ms. Chant provided expert testimony in front of the Nova Scotia Utility and Review Board (2015), and was subsequently invited back to keynote a conference held by the Nova Scotia Department of Energy.

CVOEO Weatherization, Burlington, VT; *Weatherization Director*, 2002-2010

At CVOEO Weatherization, Ms. Chant directed a staff of 30 auditors and crew members to weatherize low-income homes in Vermont. In her first years there, she improved productivity of the organization by more than 40%, ensuring that program dollars went as far as possible to serve Vermont's low-income people. This readied the organization for a doubling of production in the final two years of her tenure, as a result of American Recovery and Reinvestment Act.

Vermont Energy Investment Corporation, Burlington, VT; *Multifamily Program Manager*, 1997-2002

Ms. Chant designed, developed, and directed the Residential Energy Efficiency Program, an award-winning and innovative statewide offering to implement energy efficiency as a strategy for the preservation of affordable multifamily housing. Subsequently, she was involved in VEIC's original bid to become Efficiency Vermont, the nation's first energy efficiency utility. She launched Efficiency Vermont's multifamily programs, which were rated exemplary by ACEEE.

CVOEO Weatherization, Burlington, VT, *Administrative Coordinator*, 1995-1997.

This was Ms. Chant's entrée into energy efficiency for low-income people. She was responsible for income verification of clients, data management, and fiscal reporting for multiple funding sources.

EDUCATION

Georgetown University, Washington, DC

Bachelor of Science in Business Administration with honors, Finance Concentration, 1982

REPRESENTATIVE PROJECT EXPERIENCE

Massachusetts Energy Efficiency Advisory Council, 2018-present

Ms. Chant is a member of the Equity Working Group that has been established by the EEAC, providing her expertise on energy equity and justice issues. She works with the EEAC in its attempts to broaden the depth of services to historically underserved groups, including people of color, renters, and moderate income residents.

Delaware Department of Natural Resources and Environmental Control, 2018-present

Ms. Chant is a member of a task force that is redefining the scope of the Delaware Energy Efficiency Advisory Council's Low-Income Working Group. She provides advice on the effectiveness of low-income programs, and oversees production of annual reports from DNREC's programs.

Energy Efficiency for All (a project of Elevate Energy, Energy Foundation, National Housing Trust, and Natural Resources Defense Council), 2017-18.

Co-Principal Investigator, exploring the use of commercial Property-Assessed Clean Energy financing (C-PACE) for affordable multifamily housing in the U.S. Explored the policy and financial factors helped or hindered implementation and use of C-PACE for efficiency financing.

Maine Office of Public Advocate (ME OPA), Technical Advisor, 2016-18.

Reviewed Efficiency Maine plans and programs for ME OPA; participated in hearings and workshops before the Maine Public Service Commission with ME OPA.

Energy Action Centre, Testimony before the Nova Scotia Utility and Review Board (NS UARB) on Efficiency One Three-Year Plan, 2015.

Developed and provided testimony before the NS UARB on the proposed budget and plan for Efficiency Nova Scotia's Triennial Plan.

REPRESENTATIVE PUBLICATIONS

Chant, E., "Driving toward the Greater Good: A Framework and Indicator Tool for Incorporating Resident Benefits in Efficiency Decisions," *Stewards of Affordable Housing for the Future*, 2019.

Chant, E., and Huessy, F. 2018. "Justice for All: Measures of Equity for Low-Income Programs." *Proceedings of the 2018 ACEEE Summer Study on Energy Efficiency in Buildings*. Washington, DC: American Council for an Energy-Efficient Economy (ACEEE).

Adamczyk, P., Chant, E., Morse, S., and Calahane, K. 2018. *Commercial PACE for Affordable Multifamily Housing*. Washington, DC: Energy Efficiency for All.

Chant, E., Schaaf, R., and Ast, T. 2016. "Swiftly and Massively: Moving 115,000 Units of Multifamily Affordable Housing to Higher Efficiency." *Proceedings of the 2016 ACEEE Summer Study on Energy Efficiency in Buildings*. Washington, DC. 2:1-12.

Chant, E. 2015. "In the Matter of EfficiencyOne Application for Approval of a Supply Agreement for Electricity Efficiency and Conservation Activities between EfficiencyOne and Nova Scotia Power, Inc.," Direct Evidence on Behalf of Ecology Action Centre, Nova Scotia Utility and Review Board, M06733.

Chant, E., Adamczyk, P., Barash, D., and Sachs, B. 2014. "Looks Like Finance, but It's All about Solutions: The Public-Purpose ESCO Enterprise Model." *ACEEE Summer Study on Energy Efficiency in Buildings*. Washington, DC. 2014: 6-26 – 6-35.

Chant, E. 2014. "Public Purpose ESCO for Multifamily Affordable Housing," *ACEEE Energy Efficiency Finance Forum*.



ADAM JACOBS, CONSULTANT

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PROFESSIONAL EXPERIENCE

Optimal Energy, Hinesburg, VT. *Consultant*, 2019-present

Mr. Jacobs leads the C&I teams for Optimal's state-level advising to multiple advisory councils, drawing on his expertise in C&I programs, energy data management, measurement and verification, strategic planning, consensus building for groups of diverse stakeholders, and developing workforce training initiatives. Additionally, he leads and supports projects reviewing energy efficiency programs from both a technical and policy perspective.

City of Boston, Boston, MA. *Energy Manager*, 2015-2019

Mr. Jacobs was responsible for tracking the City's \$45M annual municipal energy budget and completing all relevant annual reporting obligations including the Municipal GHG inventory, U.S. Department of Energy Better Buildings Challenge, and Green Communities Annual Report. Mr. Jacobs overhauled the utility bill auditing and payment process for the City, leading to the recovery of over \$1.4M credits. He developed in-house capabilities to monitor performance of 5.7 megawatts of combined heat and power generators across Boston Public Schools in real-time, proving over \$1.2M in annual utility savings. Mr. Jacobs also organized and delivered a 74-hour utility-funded Building Operator Certification training for 28 facilities managers from the City of Boston and neighboring municipalities. His leading efforts helped Boston maintain the #1 ranking in ACEEE's City Energy Efficiency Scorecard in 2017 and 2019.

Johnson Controls, Falls Church, VA. *Energy Analyst*, 2012-2015

Mr. Jacobs performed annual M&V to prove \$1.5 million in savings under performance contract. He completed ASHRAE Level 2 energy audits and modeled energy performance using Power Usage Effectiveness (PUE) across 21 data centers globally. He presented quarterly sustainability updates to the client's executive staff. Mr. Jacobs also managed compliance with the UK Environment Agency and served as energy manager for ISO14001 and ISO50001 certification project team.

EnerNOC, Boston, MA. *Energy Markets Intern*, 2012

Mr. Jacobs performed legal review of demand response contracts before counter-signing for C&I customers. During DR dispatches, Mr. Jacobs review customer energy reduction plans, coached facilities personnel, and monitored electric load curtailment using real-time interval trend data.

Ceres, Boston, MA. *Electric Power Sector Intern*, 2011-2012

Mr. Jacobs profiled electric utilities and summarized arguments for a shareholder resolution on emissions disclosure, and renewable and energy efficiency compliance strategies. Mr. Jacobs also analyzed EIA 861 data to calculate utility energy efficiency program savings.

EDUCATION

Northeastern University, Boston, MA

Master of Science, Energy Systems, 2016; Certificate in Engineering Leadership, 2016

Boston University, Boston, MA

Bachelor of Arts, Environmental Analysis and Policy, Minor in Economics, 2012

REPRESENTATIVE PROJECT EXPERIENCE

Massachusetts Energy Efficiency Advisory Council, Technical Consulting Services (2019-present)

Optimal Energy serves as the lead technical consultant to the Massachusetts Energy Efficiency Advisory Council (EEAC) and has since its inception in 2006. Optimal's role includes representing the EEAC on all aspects of negotiating efficiency programs, plans, goals, and budgets with the program administrators, and oversight of all program implementation and evaluation, monitoring and verification activities. To support the EEAC, Mr. Jacobs serves as the lead on commercial and industrial efficiency program planning and analysis by tracking and analyzing quantitative and qualitative data as well as developing memos, presentations, and other work products.

Rhode Island Energy Efficiency and Resource Management Council, Policy and Program Planning Consulting, (2019 – present)

Optimal Energy manages a team of consultants providing support to the Rhode Island Energy Efficiency and Resource Management Council on topics ranging from high-level policy and legislative issues down to the oversight of program design and implementation oversight and infrastructure development. The team provides research, budget analysis, cost-effectiveness modeling, data tracking, and general oversight to the Council as well as strategy and general support to the Rhode Island Office of Energy Resources. To support the EERMC, Mr. Jacobs serves as the lead on commercial and industrial efficiency program planning and analysis by tracking and analyzing quantitative and qualitative data as well as developing memos, presentations, and other work products.

Delaware Department of Natural Resources and Environmental Control, Energy Efficiency Advisory Council Program Development and Support (2019-present)

Optimal Energy provides broad program planning, analysis, and strategic guidance to the Delaware Energy Efficiency Advisory Council (EEAC) and Delaware Department of Natural Resources and Environmental Control (DNREC) as it develops a new model for joint utility and public-sector delivery of energy efficiency services, with the objective of dramatically increasing energy savings and demand reductions. Mr. Jacobs provides technical support and review of commercial and industrial energy efficiency projects through DNREC's Energy Efficiency Investment Fund (EEIF) and Energy Efficiency Industrial (E2) programs. Mr. Jacobs also provides analytical support for the Cool Switch program, which works to reduce greenhouse gas emissions from commercial refrigeration systems.

PUBLICATION

"Energy Data Optimization: Dashboards, Utility Bill Verification and Open Data," with A. Guzzo, *U.S. Department of Energy Better Buildings Challenge – Solutions at a Glance*, Washington, D.C., May 2017.



CRAIG JOHNSON, CONSULTANT

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PROFESSIONAL EXPERIENCE

Optimal Energy, Providence, RI. *Consultant*, 2020-present; *Senior Analyst*, 2019-2020; *Analyst*, 2014-2018.

Mr. Johnson provides technical services for Optimal Energy's efforts to promote energy efficiency and renewable energy by researching and analyzing energy efficient and renewable energy technologies, programs, and evaluations to support planning and implementation. His project work includes analytical support in the development, review, and implementation oversight of energy efficiency programs for several clients, including the Rhode Island Energy Efficiency and Resource Management Council, Massachusetts Energy Efficiency Advisory Council, and Connecticut Municipal Electric Energy Cooperative. Mr. Johnson also provides technical and analytical support in the form of screening projects for cost-effectiveness, drafting communications pieces for a variety of public and private sector clients, and characterizing measures for energy efficiency potential studies.

Acadia Center (formerly Environment Northeast), Providence, RI. *Climate Change and Policy Intern*, 2013.

Mr. Johnson performed quantitative and qualitative analysis, with a primary focus on sustainable transportation. His research areas included conversion of freight shipping fuel from diesel to natural gas, electric vehicle incentives and policies, and alternative options for funding transportation projects. Mr. Johnson also participated in collaborative processes with stakeholders during the development and implementation of Rhode Island's Energy Efficiency Program Plans.

Bard Center for Environmental Policy, Annandale-on-Hudson, NY. *Teaching Assistant, Dr. Jennifer Philips*, 2012-2013.

Mr. Johnson researched and led discussions on sustainable farming practices and GHG emissions associated with agricultural systems.

Lyndon State College Atmospheric Department, Lyndonville, VT. *Research Assistant, Dr. Nolan Atkins* 2010-2012.

Mr. Johnson collected and photogrammetrically analyzed data of severe thunderstorms during the Verification on the Origins of Rotation in Tornadoes Experiment (VORTEX2). He also produced graphics for peer-reviewed research publications and presented results at national and regional conferences.

EDUCATION

Bard Center for Environmental Policy, Annandale-on-Hudson, NY

Master of Science, Climate Science & Policy, 2014

Master's Thesis: *Driving Sustainability: Estimating Lifecycle Private Costs of Electric Vehicles*

Lyndon State College, Lyndonville, VT

Bachelor of Science, Atmospheric Sciences, 2012

REPRESENTATIVE PROJECT EXPERIENCE

Rhode Island Energy Efficiency and Resource Management Council, Technical Consulting Services (2014-present)

Optimal Energy leads the Technical Consultant team for the Rhode Island Energy Efficiency and Resource Management Council (EERMC). Mr. Johnson contributes to this project by reviewing implementation plans and results of energy efficiency programs, participating in proceedings of the Public Utilities Commission, and providing ongoing analytical support for Council activities. These efforts have included setting targets of energy efficiency program potential, reviewing energy efficiency potential assessments, tracking and analyzing current and historical program performance, and assessing cost-effectiveness and total cost to achieve energy savings. Mr. Johnson has also coordinated residential sector and evaluation, measurement, and verification (EM&V) teams.

Massachusetts Energy Efficiency Advisory Council, Technical Consulting Services (2014-present)

Optimal Energy serves as the lead technical consultant to the Massachusetts Energy Efficiency Advisory Council (EEAC). From 2014-2019, Mr. Johnson provided technical services including recording and production of meeting minutes for full Council and Executive Committee meetings, as well as subcommittee and other meetings on an as-needed basis. Mr. Johnson has also provided analytical support for a variety of Council activities, including development, review, and implementation oversight of energy efficiency programs as well as communication pieces.

Connecticut Municipal Electric Energy Cooperative, Conservation and Load Management Consulting (2015-present)

Optimal Energy has provided energy efficiency consulting services to the Connecticut Municipal Electric Energy Cooperative (CMEEC). Mr. Johnson contributes to the full range of these services, including program planning, program savings analysis and reporting, reviewing projects for cost-effectiveness on an as needed basis, and managing the collection and processing of CMEEC's program data. The latter has included the development of an online technical reference library and savings calculation engine database. As part of its annual reporting requirements to the Connecticut Energy Efficiency Board, Mr. Johnson also quantifies the GHG impacts of CMEEC's programs. Since 2019, Mr. Johnson has also managed CMEEC's participation in the ISO-NE Forward Capacity Market.

Wallingford Electric Division, Conservation and Load Management Consulting (2015-present)

Optimal Energy has provided energy efficiency consulting services to the Wallingford Electric Division (WED) since the inception of their conservation and load management programs. Mr. Johnson contributes to program planning, program savings analysis and reporting, and developing incentive and delivery strategies. Mr. Johnson also has conducted on-site, pre- and post-retrofit audits of various lighting and HVAC projects for WED's commercial and industrial customers.

Pascoag Utility District (2019-Present)

Optimal Energy provides energy efficiency consulting services for the Pascoag Utility District (PUD). Mr. Johnson has provided guidance and recommendations on the planning, development, and implementation of PUD's Demand Side Management programs and assistance with data review and analysis for PUD's regulatory reporting requirements.

New Jersey Board of Public Utilities, Potential Study and Consulting Services (2019-Present)

New Jersey's 2018 Clean Energy Act mandates completion of an energy efficiency potential study to inform the Board as it establishes targets. Mr. Johnson developed measure characterizations used in the analysis for both the residential and commercial and industrial sectors. He then provided key analytical support in developing program budgets and savings targets.



PHILIP H. MOSENTHAL, PARTNER

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PROFESSIONAL EXPERIENCE

Optimal Energy, Hinesburg, Vermont. *Founding Partner*, 1996-present

As the Founding Partner Mr. Mosenthal is responsible consulting and analysis for numerous electric and gas utilities, government entities and other non-utility parties on energy efficiency, resource planning, regulatory issues, program design, and evaluation and market assessments. Mr. Mosenthal has over 30 years' experience in energy efficiency consulting, including facility energy management, utility and state planning, regulatory policy, program design, implementation, evaluation, and research. He has particular expertise in efficiency regulatory policy, assessment and integrated analysis of demand-side energy resources, valuation of energy resources and cost-benefit analysis, and program planning, design, and evaluation.

Mr. Mosenthal has developed numerous utility, state, and regional integrated resource and DSM plans, and has designed and evaluated energy efficiency programs throughout North America, Europe, and China. He has also led numerous efficiency and renewables potential studies and is a nationally recognized expert on efficiency resource assessment and valuation. Mr. Mosenthal has played key roles in many utility-stakeholder processes and successfully worked to build consensus. This work has included leading policy and planning initiatives related to goal setting, EM&V frameworks, cost recovery, and performance incentives. Mr. Mosenthal has testified before numerous regulatory commissions and state legislatures.

Resource Insight, Middlebury, Vermont. *Senior Research Associate*, 1995-1996

Xenergy, Incorporated (now DNV-GL), Allendale, New Jersey. *Chief Consultant*, 1990-1995

EDUCATION

University of Pennsylvania, Philadelphia, Pennsylvania
Master of Science, Energy Management and Policy, 1990

University of Pennsylvania, Philadelphia, Pennsylvania
Bachelor of Arts, Design of the Environment, 1982

REPRESENTATIVE PROJECT EXPERIENCE

New Hampshire Office of Consumer Advocate, Technical Consulting Services Related to Policy, Program Planning, and Stakeholder Engagement (2015-present)

Optimal Energy supports the NH OCA's engagement in the Energy Efficiency Sustainable Energy Board. Mr. Mosenthal leads the development of all gas and electric DSM efforts, and has participated in numerous working groups including ones related to cost recovery and lost revenue policy and estimation, performance incentive design, DSM plan development and program design, and EM&V. Key areas of focus have included: designing NH's first Energy Efficiency Resource Standard (EERS) and negotiated its initial targets; analyzing and critiquing the methods for calculating lost revenue and its

subsequent reform; negotiating policy issues around cost recovery practices related to lost revenue and amortization of program costs; design and implementation of performance incentive mechanisms; critical review, negotiations, and testimony on the utility gas and electric plans; development and updates of the TRM and other EM&V issues; review and negotiations on efficiency potential and baseline studies; and analyzed and made recommendations on electric grid modernization.

Illinois Office of the Attorney General, Advisor on Energy Efficiency Policy, Planning, Design, Implementation and Evaluation (2007 – present)

Mr. Mosenthal has served as project manager and lead advisor on the statewide utility collaborative. He led the development of a statewide collaborative stakeholder process with utilities and other parties, on behalf of the IL AG, and continues to be a lead technical consultant in this collaborative. Mr. Mosenthal has also assisted in developing laws and policies (including the recent statute establishing a cost recovery and shareholder performance incentive model), provided expert testimony in numerous dockets before the Illinois Commerce Commission, assisted in development of grid modernization rules and policies, and advised on electric procurement.

Massachusetts Energy Efficiency Advisory Council, Technical Consulting Services (2006 – present)

Optimal Energy has led the Technical Consultant team for the Massachusetts EEAC since its inception. Mr. Mosenthal has served in various roles on this team, including overall Team Manager, Team lead for the C&I sector, and senior advisor on efficiency policy, planning, programs, and EM&V. Optimal represents the EEAC negotiating efficiency policies, programs, plans, goals and budgets with program administrators, and oversees program implementation and EM&V.

New Jersey Board of Public Utilities, Potential Study and Consulting Services (2019-present)

New Jersey's 2018 Clean Energy Act mandates delivery of aggressive efficiency efforts, the development of all policies and administrative and EM&V frameworks to guide efficiency, and the completion of an energy efficiency potential study to inform the Board as it establishes savings goals and other metrics. Mr. Mosenthal is an integral part of the team, working on the assessment of potential, and leading work on the establishment of targets and performance incentives / penalties, EM&V framework, and cost-effectiveness policies.

Rhode Island Energy Efficiency and Resource Management Council, Technical Consulting (2006-present)

Optimal Energy has led the Technical Consultant team for the Rhode Island Energy Resource Management Council (ERMC) since its inception. Mr. Mosenthal has served in various roles, including as the team lead for the C&I sector, and senior advisor on policy, planning, programs, and EM&V. Optimal's role includes representing the EERMC on all aspects of negotiating efficiency policies, plans, programs, goals, and budgets with National Grid, the program administrator. We also provide oversight of all program implementation and evaluation, monitoring and verification activities.

Natural Resources Defense Council, Efficiency Assessment and Development of a New Policy Framework and Targets for a New Gas and Electric Efficiency Resource Standard for New York (2018)

Mr. Mosenthal was the project manager and lead investigator in development of a proposal in support of Governor Cuomo's plans for new efficiency resource policy and goals. This project included proposing an aggressive new EERS to achieve efficiency savings of 3% per year for electric and 1.5% per year for gas. We developed a new all-fuel EERS framework and shareholder incentive recommendations that would encourage both efficiency and beneficial electrification. Announced by the governor on Earth Day, it has led to New York having the most aggressive electric efficiency goals in the U.S., as well as an innovative new beneficial electrification policy and goals for heat pump deployment.



SAMUEL C. ROSS, CONSULTANT

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PROFESSIONAL EXPERIENCE

Optimal Energy, Hinesburg, VT. *Consultant*, 2018-present; *Senior Analyst*, 2017-2018.

Mr. Ross provides analytical services on a range of projects and subject matter expertise on data analysis tools, benefit-cost analysis, energy efficiency finance, and environmental economics. His project work includes conducting energy efficiency market potential studies, policy analysis and design for statewide energy efficiency programs, and developing energy efficiency finance solutions, which are tailored to clients' specific needs and context. Though he concentrates on electric and gas energy efficiency, Mr. Ross continues to expand his expertise to include integrating energy efficiency with clean energy and storage, quantifying non-energy impacts, and other emerging trends in the energy sector.

Data Consultant, London, UK. 2016-2017.

Mr. Ross transitioned to an independent consulting role with his prior employer, the National Investment Center for Seniors Housing and Care (NIC), where he supported mission-critical data quality and analytical work for NIC's data and analytics team.

National Investment Center for Seniors Housing and Care (NIC), Annapolis, MD. *Data and Analytics Team Manager*, 2015 – 2016; *Quality Assurance Analyst*, 2014-2015.

Mr. Ross managed a four-person team in charge of the firm's core research and analysis work, and he led hiring and managed personnel for the data and analytics team. Mr. Ross developed, implemented, and automated systems in R, MySQL, and Excel to ensure data quality both on import and analysis. Further, he led the firm's data quality, analysis, and quarterly reporting for their subscription website and data service, which was responsible for nearly 50% of firm revenue. He also initiated and led efforts to document key roles, processes and responsibilities across NIC to build institutional knowledge and reduce operational risk.

DC Energy, LLC, Vienna, VA. *Analyst*, 2012-2014.

Mr. Ross developed software to facilitate robust automated process infrastructure and data acquisition, parsing, normalization and storage in MySQL databases. He developed metadata acquisition systems to ensure efficient debugging and error reporting, and supported OTC and auction-based electricity futures trading through software development and automated tracking systems.

EDUCATION

London School of Economics, London, UK

Master of Science with Distinction in Environmental Economics and Climate Change, 2017

Dartmouth College, Hanover, NH

Bachelor of Arts in Economics, Environmental Studies, 2012

REPRESENTATIVE PROJECT EXPERIENCE

Rhode Island Energy Efficiency and Resources Management Council, Policy and Program Planning Consulting (2017-present)

Optimal Energy manages a team of consultants providing support to the Rhode Island Energy Efficiency and Resource Management Council (EERMC) on topics ranging from high-level policy and legislative issues down to the oversight of program implementation and infrastructure development. Mr. Ross supports Optimal Energy's work for the EERMC in a range of areas related to ongoing program design, measurement and verification, in addition to key contributions to energy efficiency and clean energy finance tools developed in collaboration with EERMC and other Rhode Island energy sector stakeholders. Mr. Ross oversaw the contractor that completed a market potential study for the state of Rhode Island in 2020. He is also leading the process of translating the information that resulted into actionable policy options.

Pennsylvania Statewide Evaluator Team Member, Market Potential Study Lead (2019-present)

Optimal Energy is a member of the Pennsylvania Statewide Evaluator team for Phase IV of Act 129. Optimal leads the Energy Efficiency Market Potential Study, and has supported a wide range of other activities, including updating Pennsylvania's Technical Reference Manual, supporting the Demand Response and Combined Heat and Power Potential Studies, and significant contributions to a detailed efficiency measure cost analysis widely utilized by Pennsylvania utilities in program planning. In addition, Optimal provides methodological guidance and written memos covering a range of topics including cost-benefit analysis, discount rates, avoided cost calculations, and application of baseline data to actionable policy insights.

New Jersey Board of Public Utilities, Market Potential Study with Recommended Targets (2019)

Optimal Energy completed an Energy Efficiency Market Potential Study for the State of New Jersey, with estimates of 20-year achievable potential for electricity and natural gas. The Clean Energy Act of 2018 specified minimum levels of efficiency targets for New Jersey's public utilities, and the potential study determined whether targets should be at the minimum level specified by legislation or higher. Mr. Ross contributed to the analysis underlying Optimal Energy's recommended targets, quantitative performance indicators, and performance incentives to meet or exceed the goals established by the Legislature.

Delaware Department of Natural Resources and Environmental Control, Energy Efficiency Advisory Council Program Development and Support (2017-present)

Optimal Energy provides broad program planning, analysis, and strategic guidance to the Delaware Energy Efficiency Advisory Council as it begins developing a new model for joint utility and public-sector delivery of energy efficiency services, with the objective of dramatically increasing energy savings and demand reductions in that state. In support of the Council, Mr. Ross led the next generation of energy efficiency market potential study for the state of Delaware, which supported the determination of electric and gas energy savings targets. In addition, Mr. Ross contributes to a range of research tasks related to the energy and environmental nexus, including driving the development of the 'Cool Switch' program, which includes incentives for businesses to reduce emissions of climate-damaging refrigerants.

Minnesota Statewide Energy Efficiency Potential Study (2018)

Optimal Energy and partner Center for Energy and Environment (CEE) collaborated to prepare a statewide natural gas and electric energy efficiency and carbon saving potential study on behalf of the State of Minnesota. This study informed decision-makers with Minnesota's Conservation Improvement Program (CIP) about market sectors, geographic areas, utility service territories, end uses, measures and programs that should be targeted to help realize demand-side management potential in Minnesota. Mr. Ross provided technical expertise in the collection, aggregation, and integration of industrial-sector data and avoided costs data across all sectors, in addition to developing a suite of customized tools to meet client needs to iterate over a large number of input data sets and to report resulting data.



ARAH SCHUUR, MANAGING CONSULTANT

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PROFESSIONAL EXPERIENCE

Optimal Energy, Providence, RI. *Managing Consultant*, 2020-present

Ms. Schuur provides project management and client support for the development and implementation of comprehensive energy plans, energy efficiency programs, and state and local energy policies and regulations. She provides expertise in energy optimization, energy efficiency finance and contracting, and greenhouse gas mitigation and climate resilience planning.

Acadia Center, Boston MA. *Vice President, Climate and Energy*, 2019-2020

Ms. Schuur led program staff across New England on research and policy advocacy work in clean energy, low-carbon transportation, grid modernization, and energy systems planning. She led an organization-wide effort to complete Acadia Center's first strategic plan and develop a framework for growth and development for the organization.

Massachusetts Dept. of Energy Resources (DOER), Boston, MA. *Director, Energy Efficiency*, 2015-2018

Ms. Schuur led energy efficiency policy and program portfolio, overseeing work with the stakeholder body responsible for planning and implementation of the state's nation-leading energy efficiency investment plans. During her tenure, Massachusetts incorporated fuel switching into its energy efficiency plans for the first time and expanded its focus on demand response and peak reduction. Ms. Schuur planned and oversaw a portfolio of clean energy projects, including the DOER's first grant program for active demand response. She directed the team responsible for the implementation of key energy efficiency policies and regulations such as a new commercial PACE program, home energy scorecard, and energy efficiency regulations for new industries. She led the development of partnerships with other agencies and contributed her expertise to DOER's responses to utility rate cases, state policy formation, low-income clean energy initiative, and comprehensive energy planning.

U.S. Dept. of Housing and Urban Development, Washington, DC. *Senior Advisor for Energy*, 2014–2015

Ms. Schuur implemented clean energy initiatives and executed President Obama's Climate Action Plan goals at HUD, including energy efficiency projects, building energy codes, and solar energy targets. She advised Secretary Julián Castro on energy issues and completed the expedited development of a new HUD clean energy finance policy.

U.S. Department of Energy, Office of Energy Efficiency, Washington, DC.

Director, Commercial Buildings Integration, 2012-2014

Senior Advisor to the Deputy Assistant Secretary of Energy Efficiency, 2011-2012

Ms. Schuur helped establish the Better Buildings Challenge, forging partnerships with real estate organizations to advance best practices in energy efficiency planning, finance, contracting, and implementation. She also led DOE's work to deploy energy efficient technologies in commercial and multifamily buildings. Ms. Schuur developed successful partnerships across the federal government to increase DOE's impact. As an authority on buildings and energy efficiency, she provided input on energy efficiency finance, labeling, and utility data-sharing policies.

C40 Program, Clinton Climate Initiative, New York, NY. Director, Energy Efficiency Building Retrofit Program, 2007-2011

Ms. Schuur joined the Clinton Foundation to build a new program to accelerate the planning, development, and implementation of large-scale energy efficiency retrofit projects. In this role, she oversaw a global team that built partnerships with governments, global real estate organizations, and financial and technical companies to execute energy efficiency projects. The team developed and disseminated new contracting and financing mechanisms for energy efficiency retrofits. Ms. Schuur provided subject matter expertise to President Clinton, Foundation leadership, the Clinton Global Initiative, and Bloomberg Philanthropies.

EDUCATION

Massachusetts Institute of Technology, Cambridge, MA

Master of City Planning, Department of Urban Studies and Planning, 2005

Master of Science in Real Estate Development, Center for Real Estate, 2005

Yale University, New Haven, CT

Bachelor of Sciences in Biology, 1993

PROFESSIONAL ACTIVITIES AND MEMBERSHIPS

New England Women in Energy and the Environment (NEWIEE)

Northeast Sustainable Energy Association (NESEA)

REPRESENTATIVE PRESENTATIONS AND PUBLICATIONS

Schuur, A., Farnsworth, D., Markowitz, P., Miziolek, C., and Musher, D., 2017. "Next Generation Energy Efficiency," *Proceedings of the New England Sustainable Energy Association (NESEA) Annual Conference*.

Schuur, A., Rodrigues, G., Hepp, R., Kiddie, and R., Nouel, C., 2016. "Infrastructure Modernization Affects Us All," *Proceedings of the Association of Energy Services Professionals (AESP) and the Northeast Energy Efficiency Council (NEEC) Annual Join Conference*.

Schuur, A. and Phillips, G., 2016. "Massachusetts' New Three-Year Energy Efficiency Plan, an Overview," *Proceedings of the Association of Energy Engineers, New England Chapter*.

Schuur, A. and Counihan, R. 2016. "Massachusetts Energy Efficiency: Demand Reduction, Technology & Innovation," *Proceedings of the National Association of State Energy Offices (NASEO) Energy Policy Outlook Conference*.

Walraven, B., Wilson, S., Schuur, A., Greener, C. and Fedrizzi, R. 2008, "The Business Case for Going Green," *BOMA International Conference General Session*.



MATTHEW T. SOCKS, PE, CEM, SENIOR CONSULTANT

Optimal Energy | 10600 Route 116, Suite 3 | Hinesburg, VT 05401 | 802-482-5614 | socks@optenergy.com

Matthew Socks, PE, CEM, Senior Consultant, joined Optimal Energy in 2007 and serves a leading role in efficiency program engineering, economic analysis, and implementation support for clients across North America. With expertise in the field of efficiency measure research and characterization, he has developed standardized methodologies for determining savings from efficiency measures and programs in more than a dozen states. Mr. Socks has served as a primary contributor to numerous energy efficiency potential analyses, many of which have formed the foundation for jurisdictional efficiency savings targets. Having provided clients with efficiency program design and implementation support, he has both developed novel program approaches from the ground up, and provided strategic assessment of existing program portfolios. An experienced analyst, Mr. Socks has led targeted market research efforts on both building sectors and efficient technologies. Finally, in addition to managing Optimal Energy's suite of analytical tools, Mr. Socks has developed customer-facing tools for project-level cost-benefit analysis and data collection management.

PROFESSIONAL EXPERIENCE

Optimal Energy, Hinesburg VT. *Senior Consultant*, 2007–present

NSK Corporation, Ann Arbor, MI. *Engineering Intern*, 2000–2003

EDUCATION, LICENSING, AND CERTIFICATIONS

Massachusetts Institute of Technology, Cambridge, MA

Bachelor of Science, Mechanical Engineering, 2006

Professional Engineer (PE), State of Vermont, 2013-present

Certified Energy Manager (CEM), Association of Energy Engineers, 2010-present

Certified Building Energy Simulation Analyst (BESA), Association of Energy Engineers, 2012-2015

Lighting Certified (LC), National Council on Qualifications for the Lighting Professions, 2011-2015

REPRESENTATIVE PROJECT EXPERIENCE

New Jersey Board of Public Utilities, Energy Efficiency Potential Study, 2019

New Jersey's 2018 Clean Energy Act mandated completion of an energy efficiency potential study to inform the Board as it establishes targets. The project included estimation of ten-year (2020 – 2029) energy efficiency potential, demand response potential, and potential for savings from combined heat and power. The potential then needed to be allocated to the electric and gas public utilities. Mr. Socks led the potential study team.

Northeast Energy Efficiency Partnerships, Mid-Atlantic Technical Reference Manual (2010-2017)

Optimal Energy developed efficiency measure costs and savings estimation protocols for a novel, multi-state Technical Reference Manual for use by utilities in the Mid-Atlantic region. The project required comparative analyses between regional energy efficiency savings estimation methodologies and working with stakeholders to reach consensus on the characterizations. From 2016 on, Optimal led the development of both residential and commercial & industrial measure entries. On this project, Mr. Socks led the development of the commercial and industrial measures and facilitated stakeholder engagement.

Natural Resources Defense Council, Energy Efficiency for All, Potential Study for Energy Savings In Affordable Multifamily Housing (2014-present)

In support of Energy Efficiency for All, a joint initiative of the Natural Resources Defense Council, the National Housing Trust, and others, Optimal Energy developed a study of energy efficiency potential in affordable multifamily housing covering electricity, natural gas, and fuel oil potential in nine states. Mr. Socks served as project manager and technical lead and developed a novel method of parameterizing the potential analysis to provide justifiable results for across disparate regions. He has continued to support these efforts through educational outreach and additional focused analyses.

Enbridge Gas Distribution, Evaluation Audit (2013-2015)

Optimal served as the EM&V auditor for all Enbridge Gas Systems evaluations, on behalf of Enbridge and the Ontario Energy Board. This involved reviewing the processes and analyses used for the impact evaluation and making recommendations on ways to improve the programs, as well as developing realization rates for each program. Mr. Socks led the review and validation of findings presented in a series of industrial custom project savings verification (CPSV) reports developed by third-party Technical Evaluators (TEs). Mr. Socks provided detailed feedback on the quality, reasonableness, and accuracy of project savings estimates, and developed revised project savings estimates, as appropriate. Mr. Socks also led the review of deemed savings values for EGD's high-impact prescriptive measures that accounted for a significant portion of claimed prescriptive savings.

New York Power Authority, BuildSmart NY Support Services (2013-2015)

Optimal Energy supported the New York Power Authority (NYPA) with the development and implementation of BuildSmart NY, the initiative established to implement Executive Order 88 (EO88). The Order, signed by Governor Cuomo in December 2012, directs New York State Agencies to reduce average source energy use intensity by 20% by 2020. Optimal researched other regional energy efficiency goals to instruct NYPA how best to measure EO88 compliance and developed standardized normalization methodologies to account for weather and changes in facility use. Further, Optimal developed a comprehensive tracking database for energy usage at the account level for all state agencies subject to EO88 and assisted with tracking and interpreting initial consumption trends. Mr. Socks served as project manager and led all project deliverable development.

New York Power Authority and New York Governor's Office, New York State Government Facilities Energy Efficiency Study (2011-2012)

Optimal Energy conducted a study of the energy efficiency and renewable energy potential for New York State government facilities. Building upon previous analyses conducted by Optimal Energy for the State of New York, Optimal developed energy efficiency potential estimates for the ten largest state agencies. A parallel analysis of renewable energy potential was also completed. The study led directly to Executive Order 88 and BuildSmart NY, an initiative by Governor Cuomo to release \$450 million in state financing with the goal of reducing energy consumption in State buildings by 20%. Mr. Socks served as overall project manager and technical lead of the energy efficiency potential development.



SALIL GOGTE, CMVP

PRESIDENT & CEO

Professional Experience

- ▶ EcoMetric Consulting
Founder & CEO
(2016-present)
- ▶ Nexant Utility Services
Principal Consultant
(2006–2015)

Email

salil@ecometricconsulting.com

Education

- ▶ MS, Mechanical Engineering, University of New Mexico, Albuquerque, NM, May 2005
- ▶ BE, Mechanical Engineering, University of Pune, Maharashtra, India, August 2003
- ▶ Certified Measurement & Verification Professional (CMVP)

Salil Gogte is the Founder and CEO of EcoMetric Consulting (EcoMetric). Salil is an active proponent of economical energy production, transmission, distribution, and consumption. He has spent more than 15 years advising the energy industry on structuring policies and regulations that govern the economic management of demand side resources. Salil's expertise includes a variety of energy efficiency and distributed generation consulting services including policy planning, goal setting, program design & delivery, assessing market potential, market research and characterization, and evaluation, measurement and verification. Formerly a Director of Nexant's Planning & Evaluation practice, he has directed DSM planning and evaluation studies for over 25 multi-sector utilities and regulators in North America and provided leadership to a team of over 30 engineers, statisticians, and economists.

Relevant Projects

PA Act 129 Statewide Evaluator

Salil is the Principal-in-Charge of EcoMetric's role on the PA PUC Statewide Evaluation team to develop policy and technical guidelines, and verify the energy savings and peak demand reduction claims made by seven large electric distribution companies for the Act 129 DSM portfolio. Since 2009, he co-chairs the Act 129 Program Evaluation Group tasked with updating the PA Technical Reference Manual, and conducting market potential assessments and market characterization studies. Salil also manages stakeholder discussions on numerous topics including policy planning, demand response, hours of use studies, statistical methods for savings verification, PJM resource offerings, and annual reporting.

Evaluation of Industrial & P4P Portfolio of Programs

Salil is the Principal-in-Charge of EcoMetric's impact and process evaluation of IESO Canada's Industrial Portfolio, including the Process & Systems Upgrades program, Industrial Accelerator program, Energy Manager (i.e. SEM) non-incented measures, and all Industrial pilot programs. He also leads all of IESO's whole building P4P program evaluations including the pilots. The EcoMetric team is performing full impact and process evaluations over the 5-year Conservation First Framework (CFF), including engineering reviews, on-site data gathering, and interviews with project participants and other program stakeholders.

Independent Electricity System Operator (IESO)

Portfolio Evaluation DC Sustainable Energy Utility

Salil is the Principal-in-Charge of EcoMetric's work leading the impact evaluation for all commercial sector programs. He is responsible for directing both EcoMetric and sub-contractor engineering teams through the detailed reviews of a wide variety of prescriptive, custom, and new construction programs. These program reviews include whole building simulations, customer spreadsheet calculations, and prescriptive measures.

Portfolio Evaluation Delaware Department of Natural Resources and Environmental Control (DNREC)

Salil is the Principal-in-Charge for the ongoing evaluation of DNREC's portfolio of commercial, industrial, and residential programs. The evaluation includes the verification of energy impacts, process evaluation of program delivery, and the quantification of non-energy benefits associated with the residential income-qualified Weatherization Assistance Program offered by DNREC. Through the evaluation, the EcoMetric team completed over 200 engineering desk reviews, analyzed billing data of more than 600 residential customers, and conducted interviews with 250 participants.



MIKE HONEYCHUCK, P.E.

MANAGING CONSULTANT

Professional Experience

- ▶ EcoMetric Consulting
Managing Consultant
(2020-present)
- ▶ Pennoni Associates
Operations Manager
(2018-2020)
- ▶ Warren Energy
Engineering
Energy Consultant,
Operations Manager
(2011-2018)

Email

mikeh@ecometricconsulting.com

Phone

717-578-6169

Education

- ▶ BE, Mechanical Engineering, University of Delaware, Newark, DE, May 2011
 - ▶ MS, Data Science, Indiana University, Bloomington, IN, Dec 2021 (expected)
-

Mike Honeychuck is a licensed Professional Engineer. He has 9 years of experience in utility rebate program evaluation and energy efficiency consulting. He has performed evaluation, measurement and verification (EM&V) activities for hundreds of energy upgrades through utility rebate programs in five states. Project types included both retrofits and new construction projects at commercial, government, industrial, multi-family, and educational facilities. Mike has developed site-specific M&V plans, conducted customer interviews, performed on-site equipment verification and power metering, completed savings calculations and analyses, and generated written reports. He has also performed energy audits at more than 100 facilities, several of which were investment-grade audits in support of energy performance contracts.

Relevant Projects

Prescriptive, Custom C&I and Multifamily EMV

Mike oversaw EM&V activities as part of an impact evaluation of a prescriptive lighting energy rebate program, a midstream lighting energy rebate program, a custom energy rebate program, and a multi-family housing energy rebate program for PPL Electric Utilities in Pennsylvania. Measures involved lighting and lighting controls upgrades, building automation and controls, HVAC systems, water systems, and building envelope improvements. Mike's responsibilities included: reviewing program implementer files and analysis, scheduling site visits, performing site visits, installing data loggers and metering equipment, supervising site visit efforts, performing verified savings calculations, analyzing logger/metered data, completing verification reports, and compiling program-level results. Mike regularly installed light loggers, current transducers, and power meters on various electrical equipment.

Demand Management Program and Multifamily Program M&V ConEd of New York

Mike oversaw technical review services and M&V activities for a demand management program and a multifamily housing program for Consolidated Edison in New York City, involving more than 30 project sites annually. Measures involved LED lighting upgrades, generator installations, thermal storage, variable speed motor drives, chiller replacements, battery storage, building controls, and various 2- and 4-pipe steam system improvements. Mike's responsibilities included: providing guidance to program staff, reviewing submitted files and analysis, creation of measurement and verification (M&V) plans, scheduling site visits, performing site visits, installing data loggers and metering equipment, performing savings calculations, analyzing logger/metered data performing savings calculations, and completing verification reports.

Portfolio Evaluation Delaware Natural Resources & Environmental Control (DNREC)

Mike is a member of the impact evaluation team responsible for verifying energy savings and demand reductions claimed by DNREC in the state of Delaware. He supports the Energy Efficiency Investment Fund, and the Green Energy Program EMV efforts by performing engineering reviews of prescriptive and custom energy efficiency projects installed at commercial and industrial facilities. As part of the desk reviews, Mike reviews all project documentation and performs energy savings calculations. Energy efficiency measures include LED lighting (retrofits & gut renovations), chiller replacements, boiler replacements, HVAC equipment replacements, building envelope improvements, and water flow reduction. Mike also supports the evaluation efforts of Green Energy Program which includes residential and commercial projects such as solar photovoltaic, solar water heater and geothermal water-source heat pumps.



CORY READ

MANAGING CONSULTANT

Professional Experience

- ▶ EcoMetric Consulting
Energy Engineer (2019-present)
- ▶ Idaho Power
Energy Efficiency Analyst (2008-2019)
- ▶ Colliers International
Market Research Director
(2006-2008)

Email

cory@ecometricconsulting.com

Phone

208-602-8632

Education

- ▶ MS, Data Science, Indiana University, Bloomington, IN
 - ▶ BS, Statistical Science, Brigham Young University, Provo, UT
-

Cory is a Managing Consultant (Data Scientist) for EcoMetric Consulting based in Boise, Idaho. Analytics professional with over thirteen years' experience in the energy efficiency space, Cory engages data problems using tools spanning traditional business intelligence, econometrics, statistics, and modern data science. He leads EcoMetric's normalized metered energy consumption (NMEC) and pay per performance model-based program M&V. His work includes developing new IPMVP Option C compliant machine learning based whole building models. Cory is fluent in open source analysis programming languages including R and Python and has 20 years of SAS programming experience. Prior to working at EcoMetric, Cory led energy efficiency program targeted marketing and customer segmentation efforts at Idaho Power. Cory holds a BS in Statistical Science and an MS in Data Science.

Relevant Projects

Commercial Pay for Performance Impact Evaluation

Leads the impact analysis modeling verifying participant baseline models and performance period savings. Pre modeling tasks include cleaning and preparing customer hourly meter data, coding additional variables, merging appropriate weather data. The project modeling phase includes verifying customer submitted models while also tracking ways that models could be improved. Project also includes testing various alternative modeling approaches including machine learning and advanced regression models with hourly data to compare alternative model performance with customer submitted regression models.

Ontario Independent System Operator (IESO)

Weatherization Whole Building Impact Analysis

Cory conducted income qualified program whole house weatherization NMEC billing analysis for both gas and electrically heated homes. Tasks included data cleaning, merging with program databases, and weather data to create whole home savings estimates. Cory programmed variable based degree day (VBDD) and CalTRACK, DOE UMP, IPMVP Option C compliant degree day-based regression models to estimate weather normalized consumption before and after measure installation. Cory also disaggregated site level savings to calculate heating, cooling, and baseload energy components.

DE Dept. Natural Resources

Multi-Family Building Embedded M&V

Cory built CA NMEC Rulebook compliant TTOW baseline and performance period models for measuring centralized efficient boiler savings and calculated performance-based customer incentives. The ongoing project requires identifying missing data, data measurement errors using NRE/NRA methods impacting model goodness of fit metrics. Several of the program sites have required testing alternative modeling forms and/or variables to improve baseline and performance period model goodness of fit metrics.

Southern California Gas

Portfolio Evaluation

Cory assists the team with whole building analyses for the SEUs commercial and industrial programs. These program reviews include whole building M&V, which are commonly undertaken to validate the savings from large custom retrofit, retrocommissioning, and Pay for Performance projects. He developed a whole building M&V analysis tool, and provided training for evaluation team sub-consultants to ensure proper use and compliance with industry standards including ASHRAE Guideline 14, the UMP, and CALTRACK 2.0 Cory also led the evaluation of the Pay for Performance projects.

District of Columbia Sustainable Energy Utility



BITUL SINHA

SENIOR ENERGY ENGINEER

Professional Experience

- ▶ EcoMetric Consulting
Energy Engineer (2018-present)
- ▶ CLEAResult
Energy Engineer II (2016-2018)
- ▶ Industrial Assessment
Center (SFSU)
Graduate Student
Engineer (2014-2016)

Email

bitul@ecometricconsulting.com

Education

- ▶ MS, Energy Systems, San Francisco State University, San Francisco, CA, May 2016
- ▶ B.E., Electrical and Electronics Engineering, B.I.T.S. Pilani, Pilani (India), May 2014

Bitul Sinha is a Senior Energy Engineer at EcoMetric specializing in conducting onsite energy assessments, power metering activities, measurement & verification studies, and building automated tools for savings analysis. He has conducted several hundred onsite inspections and reviewed custom C&I electric and natural gas savings calculations for DSM program administrators. He has built engineering models to calculate over 16 million kWh and 3.2 MW peak demand savings from lighting upgrades, HVAC/Chiller retrofits, and other prescriptive measures in states such as Pennsylvania, Texas and New Mexico. Bitul has a Master's degree in Energy Systems and he is passionate about utilizing data analytical methods to verify savings traditionally calculated with engineering algorithms.

Relevant Projects

Act 129 Statewide Evaluation Pennsylvania PUC

Bitul is a member of the evaluation team responsible for verifying energy savings and demand reduction claims made by seven large electric distribution companies for the Act 129 DSM portfolio in Phase III. He is responsible for verifying the evaluation analyses completed by the utility evaluators for a wide range of residential, commercial and industrial programs, including new construction and data centers. Bitul supports the development of the Act 129 TRM, custom measure protocols, and mass-market protocols for measures such as new construction projects, upstream lighting, behavior, and education. He also supports end-use saturation and market potential studies to set targets for future phases.

Program Evaluation DC Sustainable Energy Utility

Bitul evaluated the large prescriptive, custom, new construction and whole-building P4P programs implemented by the DC Sustainable Energy Utility. The new construction engineering work included analyzing and verifying eQuest or OpenStudio program file inputs based on project documentation provided by the customer and implementer (VEIC). The measures reviewed in other programs included lighting, controls, HVAC systems, motor improvements, and operational changes at commercial and multifamily buildings across the DC metro area.

Portfolio Evaluation New Mexico Public Regulatory Commission

Bitul is part of the team evaluating all efficiency and load management programs in New Mexico for four utilities, including lighting & appliances, small business direct install, midstream, data centers and large C&I prescriptive & custom programs. He regularly verifies new construction and other whole building energy simulations with eQuest, EnergyPlus, or Energy Gauge. Bitul's day to day engineering activities include desk reviews, development of site-specific M&V plans, and on-site power metering.

Portfolio Evaluation Delaware Department of Natural Resources

Bitul is responsible for verifying energy savings and demand reductions claimed for four multi sector energy efficiency programs by the Delaware Department of Natural Resources. He supports the program efforts by conducting onsite inspections & power metering at various commercial and industrial sites sampled in the evaluation process. Bitul also supports the evaluation efforts of the Green Energy Renewable Program, which includes projects such as solar photovoltaic, solar water heater, and geothermal water-source heat pumps.

Professional Summary

Richard Faesy is a principal and co-founder of Energy Futures Group in Hinesburg, Vermont. With more than 30 years' experience in the clean energy industry working with hundreds of clients and programs throughout the U.S. and Canada, he is highly regarded as a national expert and reliable project manager. As a Certified Energy Rater, LEED Accredited Professional, and DOE Home Energy Score Assessor, he specializes in residential buildings, technologies and markets, with expertise in residential new construction and retrofits, strategic electrification, energy rating and labeling, building codes, financing, green building and effective energy efficiency policy, program design and implementation. Richard helped create the national home energy rating industry, 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), including a term as president. Richard was featured in a national Dateline/NBC story on energy efficiency and was awarded RESNET's Lifetime Achievement Award. He currently works with clients in California, Connecticut, Massachusetts, Maine, New York, Rhode Island, Vermont and the U.S. Department of Energy.

Experience

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

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

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

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

Education

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

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

Selected Projects

- **Connecticut Energy Efficiency Board.** Residential sector lead consultant, assisting the Board with goal setting, utility oversight and planning and technical assistance. (2007 to present)
- **Efficiency Vermont.** Senior Advisor for residential program design, implementation support and policy guidance for Vermont's statewide, award-winning energy efficiency utility. Focus on residential retrofit programs, fuel dealer partnerships, cold climate heat pump program, home energy labeling, energy savings guarantees. (2000-2014)

- **Green Mountain Power.** Led the development and project management for the Vermont Zero Energy Now Program/Solar Bonus Program (combining energy efficiency, heat pumps, biomass and renewables for deep savings in existing homes). (2016-2017)
- **Industrial Economics, Inc.** Delphi Panel expert participant in California Energy Commission's (CEC) Electric Program Investment Charge (EPIC) program. (2020)
- **Iowa Office of Consumer Advocate.** Team lead and senior advisor for utility program portfolio review, testimony development, and on-going program modifications and enhancements. (2008-2014)
- **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)
- **Long Island Power Authority.** Team lead on program design, planning, policy guidance and technical assistance on residential and multifamily sectors and development of Long Island Residential New Construction Technical Baseline Study. (2003-2010)
- **Maine Public Utilities Commission (PUC).** Lead consultant on team to assist in oversight and evaluation of the energy efficiency programs of the Efficiency Maine Trust. 2015-2017.
- **Massachusetts Clean Energy Center.** Team lead for innovative program offering 50 low/moderate income homeowners guaranteed positive cash-flow financing and services to support cold-climate heat pumps and solar PV systems. (2017 to present)
- **Massachusetts Energy Efficiency Advisory Council.** Consultant overseeing the residential new construction and existing homes programs in Massachusetts. (2007-2013)
- **New Jersey Office of Clean Energy, Board of Public Utilities.** Senior Advisor for program design and oversight of New Jersey ENERGY STAR Homes Program assisting the Honeywell Team and the Office of Clean Energy design and develop program modifications and enhancements, set goals, and provide budgeting and implementation assistance. (2004-2010)
- **Northeast Energy Efficiency Partnerships (NEEP).** Total Energy Pathways/Zero Energy Now program development of innovative deep energy savings approach for existing homes. (2019-present)
- **New York State Energy Research and Development Authority (NYSERDA).** Program lead for the Hudson Valley Heat Pump Program, offering comprehensive residential energy retrofits incorporating heat pumps, weatherization, and solar with real time data monitoring. Includes customer usage training, contractor application training for heat pumps and statewide marketing initiative. (2016-2019)
- **Rhode Island Energy Efficiency and Resource Management Council.** Consultant with the residential team overseeing the new construction and existing homes programs in Rhode Island. (2008 to present)
- **U.S. Department of Energy.** Led the Small Business Innovation Research project to develop and implement the Vermont Energy Mortgage financing solution for existing homes. (2020-present)
- **Vermont Public Service Department.** Senior Advisor to NMR Group on baseline study of residential new construction, remodeling and existing homes in Vermont. (2011 to present)

Professional Summary

David recently joined EFG, after 22 years of employment with VEIC, most recently as Director of Distributed Resources and a VEIC Policy Fellow. He is known nationally for his advancement of sustainable energy program design and evaluation, and renewable energy policy. David has been the principal investigator and led analysis teams for multi-year stakeholder informed studies on solar market and decarbonization pathways and scenarios.

David provides expert testimony and regulatory support; participates in international, national, and state boards; leads policy committees and conferences; provides comprehensive studies of the economic, technical, and achievable potentials for sustainable energy programming; and supports program budget planning and implementation. He has led or significantly contributed to the design and development of efficiency and renewable energy programs with annual budgets of \$100+ million for initiatives in New Jersey, Washington DC, New York, Vermont, Arizona, and Maryland. He has clients in more than a dozen states and six countries; several of them are international organizations.

Experience

Vermont Energy Investment Corporation (VEIC)

- Director, Distributed Energy Resources, Policy Fellow 2014 – 2020
- Managing Consultant 2010 – 2014
- Deputy Director, Planning and Evaluation 2008 – 2010
- Senior Consultant 2000 – 2008
- Consultant 1998 – 2000

Tellus Institute and the Boston Center of the Stockholm Environment Institute

- Research Associate 1993 - 1998

Education

Ph.D., University of Pennsylvania, Energy Management and Policy Planning, 1993.

- Fulbright Scholar: Dissertation research on energy decision-making in rural Nepal, 1991 – 1993.


Master's, University of Pennsylvania, Appropriate Technology and International Development, 1989.

B.A., Middlebury College, Geography and Political Science, 1986.

Selected Projects (from more than 100)

U.S. Department of Energy. Principal Investigator for a three-year SunShot Initiative Solar Market Pathways study, investigating the technical, regulatory, and business model implications of getting 20 percent of Vermont's total electric supply from solar by 2025.

Energy Futures Group, Inc

PO Box 587, Hinesburg, VT 05461 – USA |  802-482-4874 |  dhill@energyfuturesgroup.com

Sun Shares. Created and launched, and responsible for management and business development of, a community solar business subsidiary to provide “Easy and Affordable Solar for Employers and their Employees,” 2015 – present.

Maryland Office of Peoples Counsel. Expert witness and senior advisor for review and design of EmPOWER Maryland portfolio. Includes strategies for coordination with grid modernization and cost recovery, amortization and utility incentives. 2011- present.

Massachusetts Executive Office of Energy and Environmental Affairs. Leading modeling team responsible for integrating sub-sector building, transportation, electric, land use and non-energy models into a single economy wide framework for pathways to meet Global Warming Solutions Act targets. 2019-present.

Washington, D.C., Department of Energy and Environment. Led design and launch of the DC Sustainable Energy Utility’s Solar for All Initiative. Led comprehensive program design, budgeting, solicitation development and stakeholder engagement for rapid program launch and operations. Supports both single family and community solar installations directly benefitting income qualified households. 2017-2019.

Efficiency One. Expert testimony and presentation on lighting transition and implications for efficiency planning and portfolio development for Efficiency One in Nova Scotia. 2018-2019.

Pennsylvania Department of Environmental Protection. Led scenario analysis and modeling for Pennsylvania’s Solar Future. Stakeholder presentations at six workshops including extensive review and vetting of total energy sector modeling and implications of meeting 10% of Pennsylvania’s electric needs from in state solar by 2030. 2016-2019.

New Jersey Clean Energy Program. Program design and policy advisor for the renewable energy program for more than a decade. Oversaw administrative team that supported the installation of more than 10,000 net metered solar installations, starting from six installations in the first year. 2000-2010.

Rhode Island Office of Energy Resources. Strategic Advisor on State Energy Plan and System Reliability Procurement and Distributed Generation programs.

Alaska Energy Authority. Principal consultant for two studies on renewable and energy efficiency financing and funding strategies. 2012 and 2015.

New York State Energy Research and Development Authority (NYSERDA). Twice led the renewable energy analysis for 20-year forecast of energy efficiency and renewable energy potential, 2003 and 2012.

World Bank. Expert consultant on a short-term study of efficiency and micro- / mini-grid opportunities in Tanzania, 2014.

Arizona Public Service. Managed a rapid assessment and redesign of PV and solar hot water incentives, 2009.

Professional Summary

Dan specializes in the design, planning, and administration of commercial and industrial energy efficiency programs and is a national lighting technologies expert. He provides technical consultative services on energy efficiency technology capabilities, market analysis, technology adoption, savings potential forecasting, program planning and design, industry standards, training, and financing. He has designed, launched, and managed several industry-leading commercial energy efficiency programs. He has also consulted on hundreds of commercial efficiency projects across many jurisdictions nationwide and is a frequent speaker at national meetings on program design, policy development, industry standards, and lighting technology.

Experience

2020-present: Principal, Energy Futures Group, Hinesburg, VT

2017-2019: Senior Consultant, Energy Futures Group, Hinesburg, VT

2016-2017: Senior Strategic Planner, VEIC, Burlington, VT

2009-2016: Efficiency Vermont Commercial Lighting Lead, VEIC, Burlington, VT

2005-2009: Efficiency Vermont Business Energy Consultant, VEIC, Burlington, VT

1999-2005: Semiconductor Manufacturing Engineer, IBM, Essex Junction, VT

Education

B.S., Electrical Engineering, Michigan State University, 1999

Certifications

Professional Engineer (PE) – State of Vermont

Lighting Certified (LC) – National Council on Qualifications for the Lighting Professions

Certified Energy Manager (CEM) – Association of Energy Engineers

Leadership and Management Professional Certificate – University of Vermont

Select Projects

- **Rhode Island Energy Efficiency and Resource Management Council.** Provide technical consultative insights on commercial and industrial energy-saving measures. Advise on new technologies, programs, and models for accelerating innovation in achieving aggressive energy savings. (2018 to present)
- **Connecticut Energy Efficiency Board.** Provide technical consultative insights on commercial and industrial energy-saving programs and measures. Lead technical consultant to the Research, Development and Demonstration (RD&D) team. (2018 to present)

Energy Futures Group, Inc

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- **Massachusetts Energy Efficiency Advisory Council.** Provide technical consultative insights on commercial and industrial energy-saving programs and measures. (2018 to present)
- **DesignLights Consortium (DLC).** Conduct research for and provide technical assistance on the evolution of *Solid-State Lighting (SSL) Technical Requirements, Version 5.0*. Incorporate LED product requirements that enable the integration of networked lighting controls. (2018 to present)
- **Northwest Energy Efficiency Alliance (NEEA).** Senior advisor on a market assessment of Luminaire Level Lighting Controls. Perform secondary data analysis, energy code review, and in-depth interviews of relevant market actors. (2019-2020)
- **Alliance to Save Energy.** Conducted research and authored a report on lifetime savings, peak demand savings, and cost effectiveness of commercial LED and lighting controls. (2019)
- **Citizens Action Coalition (Indiana).** Critically review and deliver testimony on market potential study findings, action plans, and multi-year DSM plans for several utilities. (2018-present)
- **California Alternative Energy and Advanced Transportation Financing Authority.** Provide technical assistance on the design and implementation of commercial energy efficiency financing pilots. (2017 to present)
- **Efficiency Vermont Technology Roadmap.** Created a 3-year emerging-technology planning roadmap for Efficiency Vermont. Roadmap addressed technologies and residential, commercial, and industrial customer classes. Designed an interactive and dynamic Excel roadmap platform. (2017)
- **Vermont Demand Resources Plan.** Developed a 20-year forecast of efficiency potential from commercial and residential lighting for the Vermont Demand Resources Plan (DRP). The Vermont Public Utility Commission uses the DRP to set Efficiency Vermont's 3-year budgets and goals. (2017)
- **Efficiency Vermont Midstream Lighting Program.** Contributed to the design of, and eventually administered, the nation's first commercial lighting midstream program. Continuously expanded and evolved the program to keep pace with emerging technology and market changes. Managed distributor relationships and increased participation to 100% of electrical distributors. (2009-2016)

Select Publications

- Mellinger, Dan. 2019. *Commercial & Industrial Lighting Lifetime and Peak Demand Savings Analysis*. Alliance to Save Energy. <https://www.ase.org/lighting-savings-report>.
- Mellinger, Dan. 2018. *Energy Savings Potential of DLC Commercial Lighting and Networked Lighting Controls*. DesignLights Consortium. <https://www.designlights.org/resources/energy-savings-potential-of-dlc-commercial-lighting-and-networked-lighting-controls/>.
- Mellinger, Dan, and Lauren Morlino. 2018. *Getting to 50: How Vermont Plans to Reach 50% Market Adoption of Linear LED by 2025*. ACEEE Summer Study. <http://www.aceee.org/files/proceedings/2018/#/paper/event-data/p120>.
- Goetzler, Bill, George Lawrence, Dan Mellinger, and Mary Yamada. 2018. *Lighting Isn't Finished: Pivoting beyond the LED Bulb*. ACEEE Summer Study. <http://www.aceee.org/files/proceedings/2018/#/paper/event-data/p134>.

Professional Summary

Glenn Reed has more than 30 years of experience 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. Since mid-2019 he has led the Connecticut Energy Efficiency Board's Technical Consultant Team and for ten years prior, he had been the Board's Residential Technical Consultant. Mr. Reed is also a lead residential advisor to the Massachusetts Energy Efficiency Advisory Council and to the Rhode Island Energy Efficiency and Resource Management Council. For both Councils, he assists and oversees program design and implementation of residential lighting, appliance, HVAC, and consumer electronics programs. Prior to co-founding EFG, Mr. Reed was a Managing Consultant at the Vermont Energy Investment Corporation, Director of Regional Initiatives at the Northeast Energy Efficiency Partnerships (NEEP), Deputy Director of East Coast Consulting at XENERGY (now DNV GL) and principal analyst and the Massachusetts Executive Office of Energy Resources. At NEEP, Mr. Reed oversaw the development and implementation of the residential upstream lighting initiative that became the model for most of the country's current upstream lighting efforts.

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 DNV GL), Burlington, MA

1983-1987: Principal Planner, Massachusetts Executive Office of Energy Resources, Boston, MA


Education

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

Selected Projects

- **Connecticut Energy Efficiency Board (EEB).** Leads the EEB's Technical Consultant Team to provide oversight of the state's electric and gas efficiency programs. Works closely with the state's utilities to develop, implement, and evaluate cost-effective program designs and goals for the Three-Year Conservation and Load Management Plan. Also plays a key role in the scoping and review of residential program evaluation activities.
- **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

Energy Futures Group, Inc

PO Box 587, Hinesburg, VT 05461 – USA |  978-807-2785 |  greed@energyfuturesgroup.com

products (lighting, appliances, and consumer electronics) and HVAC programs. Works closely with National Grid staff to develop cost-effective program designs and goals for their energy efficiency plans and plays a lead role in scoping and reviewing residential evaluation projects.

- **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. This includes review of key screening tool inputs and development of three-year program savings goals. Also, assists Council evaluation consultants in review of key residential evaluation and market research studies and plays a key role in program and measure cost effectiveness review.
- **Natural Resources Defense Council.** Managed a nine-state affordable multifamily technical, economic, and achievable potential study for the Energy Efficiency for All advocacy group. This study was subsequently expanded to include California. Results from this study have been used in several regulatory proceedings.
- **Oklahoma Sustainability Network (OSN).** Provided ongoing support to this key stakeholder group. Have assisted with re-writing the state's DSM rules and provided critical review of the utilities' 2013 and 2014 annual reports. Provided review and comment on a statewide technical, economic, and achievable potential study and on recently filed three-year plans.
- **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. Both energy and carbon savings were analyzed and estimated.
- **Regulatory Assistance Project (RAP).** Co-authored report on the ten most common pitfalls encountered when performing potential studies: Ten Pitfalls of Potential Studies. Co-presented webinar on report findings.
- **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.

JENNIFER L. CHIDO, P.E., LEED AP BD+C

Jennifer Chido has over 30 years of experience creating and managing new approaches to garnering energy efficiency in the business sector while overseeing the implementation of thousands of energy efficiency, commissioning, and measurement and verification projects. Jennifer currently provides consulting services to nation-leading energy efficiency programs via her work with the Massachusetts Energy Efficiency Advisory Council and the Rhode Island Energy Efficiency and Resource Management Council. Jennifer is actively engaged in addressing global warming through building energy efficiency and as Vice-chair on the Board of the Vermont Green Building Network. She is an officer and member of the Board of Directors of Vermont Businesses for Social Responsibility and Policy Committee Chair.

While managing Cx Associates, she fostered the firm's development into a widely recognized leader in the areas of energy efficiency, commissioning, and evaluation, measurement and verification of energy efficiency projects and programs as well as a socially responsible business that is dedicated to using engineering to make buildings better for the people who they affect and for the planet.

Instrumental in the development of Efficiency Vermont, Jennifer managed the Business Energy Services Division from start-up through the successful fulfillment of the first contract term. Prior to her work with Efficiency Vermont, she led the development of an award-winning multifamily program that integrated weatherization and utility resources to comprehensively address low-income multifamily housing energy use. She developed and managed successful performance contracting projects. During Jennifer's 10-year stint as a project manager and electrical engineer in San Francisco, she led or was involved in the engineering design of such noteworthy projects as the Moscone Center; the 1 million square foot GSA Federal Building in Oakland, CA; the Monterey Bay Aquarium; and Five Fremont Center.

EXAMPLE PROJECTS

- Massachusetts Energy Efficiency Advisory Council Consultant on program implementation and evaluation
- Rhode Island Energy Efficiency and Resource Management Council Consultant on program implementation
- Evaluation design for a Consolidated Edison Demand Response Program
- Connecticut Energy Efficiency Board Evaluation Administrator
- Project Manager for NYSERDA Commercial and Industrial New Construction Program Impact Evaluations
- Program design for Efficiency Vermont's retrocommissioning program
- Developed Vermont's M&V protocols for compliance with ISO NE FCM requirements for custom C&I projects
- Design review of over 5,000,000 square feet of new construction in health care, universities, offices, and multifamily buildings with a focus on energy efficiency and system longevity
- Custom Measure Protocol development for the Public Utilities Commission of Ohio Technical Resource Manual

PROFESSIONAL EXPERIENCE

Present

JLC Consulting, LLC

Consultant

Providing expert consulting services to States, Program Administrators, and Implementers to improve energy efficiency program effectiveness.

2004 – 2020

Cx Associates, Burlington, VT

Co-founder and Managing Principal

Business management and consulting in energy efficiency, evaluation, green building & commissioning; business management, marketing, technical training, and facilitation

Prior Experience

Director of the Business Energy Services Division at the Vermont Energy Investment Corporation (VEIC) - responsible for implementation of Efficiency Vermont's Business energy services statewide. Developed and implemented performance contracts, led the development of the Energy Star Award winning REEP program and led greenhouse gas reduction initiatives while at VEIC.

Project Manager and Project Electrical Engineer positions at Syska and Hennessy Engineers and Glumac Engineers in San Francisco, California.

CERTIFICATIONS AND LICENSING

Professional Engineer (P.E.), Electrical Engineering, Vermont and California

LEED Accredited Professional, Building Design and Construction (AP BD+C)

EDUCATION

Sc.B. E.E., Brown University

Commissioning, Testing and Start-up of Electrical Systems; Regina, Saskatchewan

AFFILIATIONS

Vermont Businesses for Social Responsibility, Board of Directors Vice President; Policy Committee Chair

Vermont Green Building Network, Past Board Chair

USGBC Member, LEED Accredited Professional

IESNA Member

PAPERS AND PRESENTATIONS

Jennifer is active in presentations and publications. Noteworthy recent publications and presentations include:

"EUI Analytics: Roadmap for Climate Action," Jennifer Chiodo, Poster Presented at the International Energy Program Evaluation Conference, 2019, Denver, Colorado.

"Driverless Buildings: Harnessing Software for Uber Deep Savings," Jennifer Chiodo, Eveline Killian, Katherine Mason, and Rick Stehmeyer; Kevin Fuller and Bill Gnerre, Interval Data Systems, Inc., ACEEE, 2018

"Establishing a Solid Project Foundation through an Inclusive OPR Process – Lessons from the Field," Jennifer Chiodo and L. David Keelty, Better Buildings by Design 2018, and NECARRAPA 2019, Burlington, Vermont.

"Energy Models vs. Reality," Jennifer Chiodo and Eveline Killian, Presented at the Better Buildings by Design Conference, 2016, Burlington, Vermont.

Retrocommissioning Best Practice Study; Jennifer L. Chiodo, Massachusetts Energy Efficiency Advisory Council, July 2014

MARGARET A. LYNCH

111 Hooksett Road, Auburn, NH 03032
(978) 339-3412 • mlynch@coreenergyinsights.com

ENERGY EFFICIENCY EXPERIENCE

President, **Core Energy Insights, Inc.**

May 2013-present

- Lead residential consultant to the Massachusetts Energy Efficiency Advisory Council (EEAC) since 2013, managing a team of four experts.
 - Developed strategic program framework and analysis to support negotiation of nation-leading residential energy efficiency goals for the 2016-2018 and 2019-2021 Massachusetts Energy Efficiency Plan terms.
 - Provide recommendations to improve performance and cost efficiency of the residential programs on an ongoing basis, including programs to increase participation by underserved populations and in residential retrofit offers.
 - Identify innovative approaches and best practices to reducing greenhouse gas emissions, integrating active demand management strategies, and effectively collecting and using information for customer engagement and other purposes in the residential programs.
 - Present findings in various forms and forums, including verbal and written presentations to the EEAC and Residential Management Committee as well as quantitative analysis and research papers.
 - Manage relationships with EEAC councilors, program administrators, and other stakeholders to ensure appropriate information exchange and to advance EEAC priorities.
- Residential consultant to the Rhode Island Energy Efficiency & Resource Management Council.
 - Joined Consultant Team in May 2020 to support 2021-2023 planning process.
- Certified Women Business Enterprise in the Commonwealth of Massachusetts. (Currently going through recertification following relocation.)

Senior Program Manager

July 2010-June 2012

Program Manager

July 2007-July 2010

Consortium for Energy Efficiency, Boston, MA

- Managed 3-year process with CEE members and other stakeholders to develop CEE Consumer Electronics Program Center, which provides a platform for program administrators to collaborate on assessment and development of program opportunities using centralized sales data and other resources.
- Developed CEE Consumer Electronics Program Guide and Program Summary as tools to support new electronics program activity.
- Facilitated industry, program administrator, and government stakeholders to create framework for identifying program opportunities in residential windows.

- Established and facilitated working group of residential new construction program managers to exchange information to support their assessment of new construction program models, including adoption of ENERGY STAR® for Homes Version 3.
- Led residential team on an interim basis for nine months in 2011.

Publications

- Lynch, M., S. Wylie & K. Kaplan. "Maintaining the Value of Voluntary Performance Specifications for Consumer Electronics: Successful Elements for Addressing a Nimble and Prolific Market." *ACEEE 2010 Summer Study*.
- Lynch, M., R. Lee, T. Mauro & M. Michalski. "Achieving Real Energy Savings through Consumer Electronics Programs." *ACEEE 2008 Summer Study*.
- Granda, C., M. Lynch & S. Rashkin. "Tackling Efficiency Paradoxes: Possible Responses to Today's Landscape of 'Energy-Efficient' 10,000 sq. ft. Houses and 50-inch Televisions." *ACEEE 2008 Summer Study*.

Professional and Personal Development

- *The Zero Energy Home: What, How and If*, Boston Architectural College course, 2009.
- *Stow Energy Working Group*: Organized energy efficiency forum for town residents.
- Conceived and directed all aspects of construction of my new custom home, which received Silver certification in the LEED for Homes pilot program in 2007.

OTHER RELEVANT PROFESSIONAL EXPERIENCE

Director of Partnerships, Massachusetts Department of Conservation and Recreation, Boston, Massachusetts, 2005-2007.

Program Director; Community Planning Director, Jackson Hole Conservation Alliance, Jackson, Wyoming, 2001-2004

Executive Director, Friends of Pathways, Jackson, Wyoming, 1996-2001

Attorney, Beveridge & Diamond, P.C., Washington, DC, 1993-1995.

Law Clerk, Hon. Albert W. Coffrin, U.S. District Court, Burlington, Vermont, 1992-1993.

EDUCATION

Columbia University School of Law, New York, New York
Juris Doctor, 1992

Middlebury College, Middlebury, Vermont
Bachelor of Arts in Political Science, 1989

Ralph Prah, Independent Consultant

7613 Whitebridge Glen
University Park, FL 34201
Phone: (608) 334-9942
E-mail: Ralph.Prah@gmail.com

EXPERIENCE

1990-Present: Independent Consultant

Advised governmental and non-profit organizations on the planning, review and oversight of energy efficiency program evaluation and market assessment activities. Clients included the California, Connecticut, Massachusetts, New York, Wisconsin, New Hampshire 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:

- Evaluation advisor to the New Hampshire PUC, 2018-present
- Member of Evaluation Administrator Team, Connecticut Energy Efficiency Board, 2016-present
- Evaluation planning, review and oversight consultant to the Massachusetts Energy Efficiency Advisory Council, 2009-present
- Evaluation advisor to the Rhode Island Energy Efficiency and Resource Management Council, 2008-present.
- Development of protocols for the evaluation of market transformation initiatives on behalf of the Illinois Stakeholder Advisory Group, 2019
- Evaluation advisor to the California PUC, 2010-2018
- Evaluation advisor to the New York Department of Public Service, 2008-2017
- Development of long-term evaluation plan for New Hampshire PUC, 2014
- Lead evaluation planner and reviewer for the Wisconsin statewide public benefits evaluation team, 1999-2011.
- Evaluation advisor to the New York Power Authority, 2009-2011
- Assisting the California PUC in overseeing a series of market effects studies, 2007-2010 (subcontractor to the California Institute for Energy Efficiency)
- Evaluation planning and review consultant to Efficiency Vermont, 2000-2010.
- Evaluation planning and review consulting to Massachusetts Non-Utility Parties, 1998-2009.
- 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.

HONORS

Winner of the 2015 International Energy Program Evaluation Lifetime Achievement Award

REFERREED PUBLICATIONS

Author of approximately 75 refereed journal articles, book chapters, conference papers, and journal issues. Full publications list available upon request.

MISCELLANEOUS ACTIVITIES

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

Peer Review Panel for US DOE EM&V Certification Scoping Study, 2015-2016

Independent Peer Review Panel for evaluation of US DOE Better Buildings Neighborhood Program, 2012-2013. Invited member of five-person panel.

Independent Peer Review Panel for review of savings estimation methods for the US EPA Energy Star Program, 2009-2010. Invited member of five-person panel.

REFERENCES

Available upon request.

Rachel Sholly

48 Hudson Street, Providence, RI 02909 | 401-580-2901 | rachel.sholly@gmail.com

EXPERIENCE

Independent Consultant

Jan 2018 - Present

Rachel Sholly Energy Consulting, Providence, RI

- Education, communications, and stakeholder engagement projects for Optimal Energy
 - Plan and implement RI Energy Efficiency and Resource Management Council's activities to promote public awareness of energy efficiency programs and their benefits
 - Develop resources and training to increase Council member understanding of efficiency policy and programs and to support member-constituent communication
 - Facilitate stakeholder engagement and provides project management support as needed

Chief, Program Development

Jan 2013 - Dec 2016

Rhode Island Office of Energy Resources, Providence, RI

- Coordinated an interagency development team to establish the RI Efficient Buildings Fund, which provided long-term, low-interest financing for public sector energy projects. Administered the application and ranking process in close cooperation with the RI Infrastructure Bank and National Grid
- Led the RI Public Energy Partnership to build a sustained infrastructure for achieving deep energy savings in state and municipal facilities
- Provided staff support to the RI Energy Efficiency and Resource Management Council
- Represented OER on energy efficiency working groups including the Green Buildings Advisory Committee, the Demand Collaborative, Zero Net Energy, RI Alliance for Healthy Homes, Energy Expo Planning, Codes and Standards and utility-consultant team strategy groups

Interim Director

Aug 2012 - Dec 2012

URI Outreach Center, Kingston, RI

- Oversaw eight cooperative extension staff working in energy, urban agriculture and horticulture
- Managed an \$800,000 annual operating budget, including state appropriations, grants and program revenue
- Led URI's work on the RI State Energy Plan and RI Public Energy Partnership in coordination with RI OER
- Identified and secured creative funding and partnership opportunities that supported our mission

Assistant Director

May 2010 - Jul 2012

URI Outreach Center, Kingston, RI

- Managed diverse energy projects funded through federal, state and private entities (~\$1.7 million), including the US EPA Climate Showcase Communities program
- Oversaw an interdisciplinary energy team of staff and graduate and undergraduate students
- Led program evaluation, strategic planning, organizational development and staff meetings
- Coordinated the URI Energy Fellows internship program including hiring, professional development and field trips

Climate Action Plan Coordinator

Dec 2009 - Apr 2010

URI Division of Administration and Finance, Kingston, RI

- Co-authored a comprehensive plan to institutionalize energy conservation and sustainability on behalf of the URI Sustainability Council, chaired by Vice President Robert A. Weygand

Energy Fellows Program Coordinator

Jan 2008 - Feb 2010

URI Outreach Center, Kingston, RI

- Secured over \$750,000 in federal, state and private funds for energy projects
 - Managed concurrent and diverse energy programs, projects and events
-

EDUCATION

Master of Environmental Science & Management

Sep 2007 - May 2009

University of Rhode Island

B.S. Wildlife and Conservation Biology

Sep 2002 - May 2006

University of Rhode Island

**APPENDIX B: TWO SAMPLE CLIENT MEMOS WITH RECOMMENDATIONS –
ANNEX TO PROPOSAL SECTION E**

- Assessment of energy efficiency programs of CPS Energy in San Antonio, Texas, with recommendations, commissioned by the Sierra Club and completed to inform the City Council of San Antonio
- Review of legal and economic considerations for establishing appropriate discount rate to apply to energy efficiency costs and savings for the Pennsylvania PUC

**CPS ENERGY SAVE FOR TOMORROW ENERGY PLAN
REVIEW OF PHASE 1 AND RECOMMENDATIONS FOR PHASE 2
EXECUTIVE SUMMARY¹**

SAVE FOR TOMORROW ENERGY PLAN (STEP)

In 2009, the City of San Antonio and its municipal utility, CPS Energy, launched the Save for Tomorrow Energy Plan (STEP) energy conservation program. STEP was an effort to avoid the need for future supply-side resources by investing in demand-side and on-site generation resources. The initial plan established a goal of reducing overall electric demand by 771 megawatts by 2020.

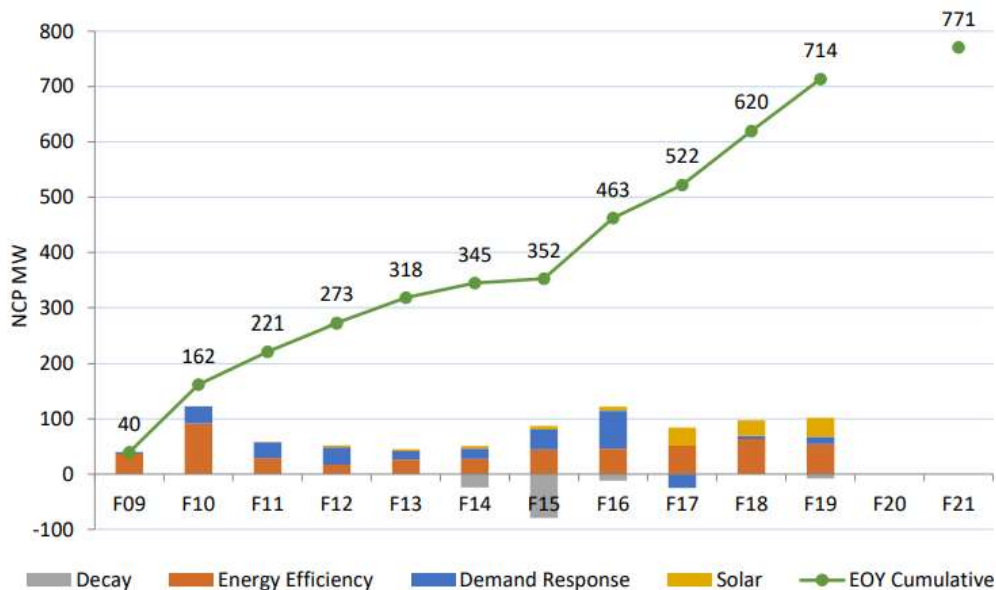


Figure 1. Cumulative evaluated progress toward meeting STEP goal.

STEP has reduced energy demand (MW) and energy use (MWh), saved customers money, reduced environmental impacts, and delayed the need for investment in generating capacity. As of Fiscal Year (FY) 2019, CPS Energy was on track to meet this goal. At a recent presentation before the CPS Energy Board in January, CPS Energy reported meeting the goal by achieving 825 MW of overall demand reduction since the advent of the program. CPS Energy will soon be launching phase 2, FlexSTEP.

¹ The full report was prepared by Optimal Energy Inc. for Sierra Club Lone Star Chapter and is available here: <https://www.optenergy.com/optimal-energy-charts-a-course-for-how-demand-side-management-could-reduce-san-antonios-ghg-emissions-11-by-2030/>

STEP PROGRAM COMPARED TO OTHER LARGE MUNICIPAL UTILITIES

Energy efficiency programs often target savings that are “coincident” with system-wide peaks, when demand for electricity is highest. These savings are more valuable because they reduce the need to build new power plants. The original STEP goal targeted non-coincident peak demand savings that occur at any time of day. **Specifically targeting non-coincident peak demand is uncommon among energy efficiency programs because it does not provide any specific economic or environmental benefits to society.** More commonly used savings metrics include reducing coincident peak demands, with the goal of mitigating the need for new utility infrastructure (Ex - Austin Energy), or reducing overall energy consumption, with the goal of reducing total greenhouse gas emissions (Ex – Los Angeles Department of Water and Power aka LADWP). The most comprehensive goals, such as those of Massachusetts’ nation-leading Mass Save program, have several targets including demand reductions and consumption reductions, and direct greenhouse gas emissions reductions.

CPS Energy’s goal is also less aggressive than other large municipal utilities. Table 1 compares CPS Energy’s to Austin Energy and LADWP.

Table 1. Comparison of municipal utilities scale and goals.

	CPS Energy	Austin Energy	Los Angeles DWP
Electric customers	840,750	485,204	1,500,000
Electric sales	31,340 GWh	13,410 GWh	22,269 GWh
Peak demand	4,738 MW	2,514 MW	6,502 MW
Demand-Side Management and Renewable Energy Goals	<ul style="list-style-type: none"> ● 771 MW in <u>non-coincident peak</u> demand savings by 2020 (1.5% per year) 	<ul style="list-style-type: none"> ● 1,200 MW in peak demand savings by 2030 (2.1% per year) ● Additional 1% annual energy savings goal (measured in MWh) ● 65% renewable by 2027 ● 375 MW local solar by 2030 ● 20% CO2 reduction by 2020 and 100% by 2035. 	<ul style="list-style-type: none"> ● 3,600 GWh in energy savings by 2027 (1.5% per year) ● 500 MW of Demand response by 2026 ● 100% carbon neutral by 2045 (CA state law)

Figure 1 shows energy savings (measured in MWh) as a percent of sales, a standard metric for energy efficiency programs, and compares CPS Energy to Austin Energy, LADWP and the national average over the last five years. This shows that more aggressive savings are attainable, even with more comprehensive goal structure.

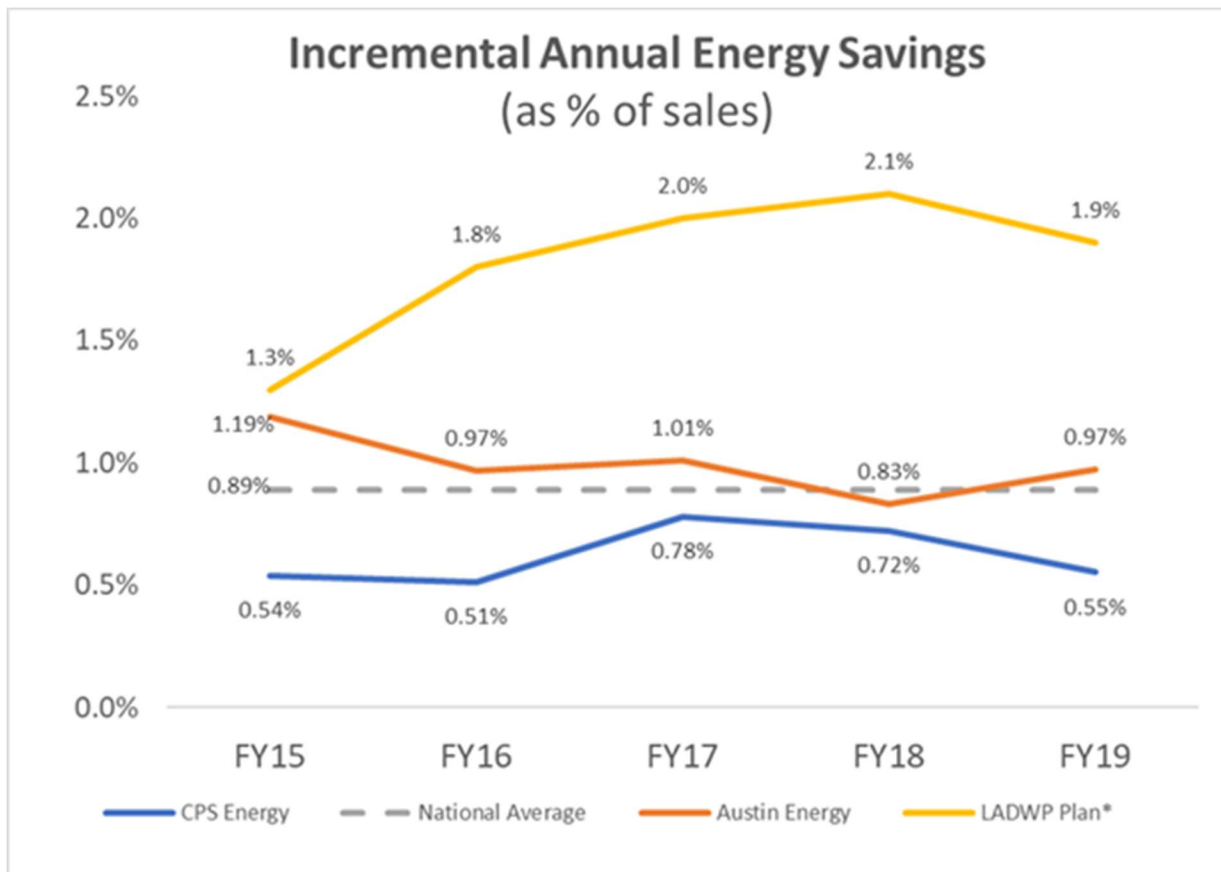


Figure 1. Comparison of incremental annual energy savings (MWh) for CPS Energy, national average, Austin Energy, and Los Angeles Department of Water and Power.

GOALS FOR 2030: FINDINGS AND RECOMMENDATIONS

- *Non-coincident peak savings* delivers no specific customer, societal or environmental benefits.
- Energy efficiency goals are typically set based on independently conducted energy efficiency potential studies, and reviewed by impartial third parties. CPS Energy should conduct such a third-party study within six months based upon well-established best-industry practices.
- Goals for FlexSTEP should be comprehensive by targeting electric and natural gas savings (kWh and MMBtus), coincident peak demand savings (kW) and carbon reductions.
- CPS Energy should commit to the following achievable goals -
 - 1.5 percent annual electric savings (measured in MWh)
 - 0.8 percent annual gas savings (measured in MMBtus)
 - 940 MW of coincident peak savings of over 10 years
 - 1.8 million metric tons CO2 saving over 10 years

- FlexSTEP should not abandon traditional EE programs, including weatherization; these measures are proven to save customers money, reduce peak electricity demands and defer the need for additional investments in new capacity.
- CPS Energy recently instituted a change to their residential solar rebate structure. As of the latest report (Q3 2020), this has not had an adverse impact on residential solar installations. All parties should continue to monitor residential solar installation data to ensure these rebates still drive healthy growth in that market.
- Consider either enhancing upfront rebates for C&I solar or end them altogether since current rebates are too low to influence customer decisions.
- Make the solar rate structure more transparent by exploring current net-metering policies and looking at other options for both residential and commercial customers.
- Expand support for programs like the SolarHostSA program and the Big Sun Community Solar program and explore additional community solar programs that are available and accessible to those with limited-incomes.
- Invest in additional control of customer assets and/or energy storage. systems (stationary batteries, EVs and thermal storage) as a new source of demand response service.
- Form a City Council committee dedicated to CPS Energy issues like Austin has for their municipal utility; CPS issues currently are only considered as part of a broader planning committee that merely addresses association land use and utility infrastructure.

IMPACTS OF A STRONGER FLEXSTEP PROGRAM

Utility efficiency programs in mature markets currently achieve higher savings rates than CPS Energy is achieving. When evaluating goals, it is important to understand the associated costs and benefits. A common mistake is to look at rate impacts from energy efficiency charges in isolation from the reduced energy use that results. Rather we should focus on average bill impacts, which is what customers are interested in. Utilities achieving higher savings spend more on energy efficiency per capita, but these cost-effective investments result in lower average energy bills for customers.

San Antonio's recently approved Climate Action and Adaptation Plan has an aggressive goal of carbon neutrality by 2050. This requires bold action. A stronger FlexSTEP will contribute toward reaching that goal. The efficiency goals outlined above represent a potential 11 percent reduction in the City's GHG emissions by 2030.

MEMORANDUM

To: TUS Staff of the Pennsylvania PUC

From: Sam Ross, Phil Mosenthal; Optimal Energy

Cc:

Date: April 8, 2019

Re: Discounting and Pennsylvania Act 129

The Pennsylvania Public Utility Commission (PUC) is tasked with updating the 2016 Total Resource Cost (TRC) Test Order¹ for Phase IV of Act 129. One component of the TRC Order is instruction regarding the appropriate discount rate for regulated Electric Distribution Companies (EDCs) to use for program planning and implementation.

This memo explains why the Pennsylvania Statewide Evaluator (SWE) believes the appropriate discount rate to use in the context of Pennsylvania's Energy Efficiency and Conservation (EE&C) programs is about 6% in nominal terms,² or about 3% in real terms. The SWE is tasked with developing an energy-efficiency and demand response market potential study (MPS), which will be a key input in the process of setting efficiency targets for EDCs in Phase IV of Act 129. In part, this memo seeks to ensure the MPS uses the same discount rate as the yet-to-be-developed Phase IV TRC Order. The rest of this section summarizes the key points that inform the SWE's perspective on discount rate selection, which are described in greater detail in following sections.

A discount rate is the percentage used to discount future costs and benefits over time. Discounting reflects the reality that, all else equal, people prefer benefits now rather than later, and vice versa for costs. When choosing a discount rate, it is important to consider whose preferences should be reflected by the discount rate. In the case of energy-efficiency programs and other public policy, discount rates are typically selected to reflect the preferences of the public at large. Public preferences usually lean toward investing resources today to increase future benefits, though benefit-cost analysis (BCA) of public policy options always use a positive real discount rate. This reflects the reality that even as a collective group, people still prefer benefits today rather than later.

¹ The Act 129 Phase III TRC Order, Docket No. M-2015-2468992, entered June 22, 2015, can be found at: http://www.puc.state.pa.us/filing_resources/issues_laws_regulations/act_129_information/total_resource_cost_test.aspx

² The proposed discount rate is an average of discount rates reported by ten states in the 2014 ACEEE Summer Study paper on Cost-Effectiveness adjustments (<https://aceee.org/files/proceedings/2014/data/papers/8-1084.pdf>). In the ACEEE study, all discount rates are in nominal terms, meaning they are not adjusted for inflation. For this memo, all discount rates are real discount rates (i.e., adjusted for inflation) unless stated otherwise.

1. Fundamentals of Discounting

Discount rates are an important part of benefit-cost analysis (BCA), the practice of using economic analysis of alternative options to help make informed decisions. A discount rate is the percentage used to discount future costs and benefits over time. This is important to do for at least two reasons – returns available on investments, and time preferences. In essence, people’s preferences for benefits now rather than later can be motivated by their ability to earn a return on investment in hand, resulting in increased total benefits in the future. It can also be informed by a preference for benefits now due to impatience, an expectation of greater wealth in the future so benefits now represent a more scarce resource, or the risk that some or all of the future benefits will not materialize (see [Box 1](#) later in this memo for more discussion of risk/uncertainty).

In general, people’s preferences represent a bedrock principle of all economic analysis, and BCA is no exception. Discounting is particularly important when analyzing decisions whose costs and benefits have different distributions over relatively long time horizons, like energy-efficiency and other types of energy infrastructure investment, where the savings often accrue over many years. It is also important to note that net present valuation underlies all BCA. Net present values (NPVs) are calculated by applying a discount rate to all the costs and benefits of each alternative in a decision,³ and summing the results over time to reach a NPV for each alternative. These summary figures can then be compared to see which alternative represents the highest overall present value. Importantly, in order to accurately compare two alternatives, it is essential to use the same discount rate. Doing otherwise means that two different dollars earned in the same future year would not be valued equally in today’s terms simply due to different accounting treatment. Discount rates are particularly important for analyzing energy-efficiency investments because they generally require upfront costs, but the benefits accrue over a much longer time period.

2. Historical Discounting Approach for Act 129

In the context of Pennsylvania’s Act 129, discount rates have been discussed in the TRC, but not statutorily set. The 2009 TRC Order⁴ included a discussion of the appropriate discount rate for Act 129 programs.

We agree that using an EDC’s weighted average cost of capital (WACC) may cause some energy efficiency programs to be undervalued and that the appropriate discount rate requires further consideration. Because of the short time period to complete this Order, for the first year of TRC testing we shall, nonetheless, use the EDC’s post-tax WACC as the discount rate. The source of the discount rate will be an EDC’s (or its parent’s) WACC based on its most recent SEC 10-Q report. We envision that this will be the April 1st SEC report filing. The discounted time period will be the expected useful life of the measure. Our decision to take this approach for the first year will not, however, be controlling for future years.

³ Technically, the discount rate r is applied to each year separately for each alternative option, according to the formula $NPV_{t,i} = (B_{t,i} - C_{t,i}) / (1+r)^t$, where $B_{t,i}$ and $C_{t,i}$ are the benefits and costs of alternative i in year t measured in real dollars, $NPV_{t,i}$ is the equivalent net benefit if it occurred in year 0, and r is the discount rate. These are then summed to calculate the NPV of each alternative i .

⁴ <http://www.puc.pa.gov/pdocs/1057172.docx>

Accordingly, while we will use the EDC's post-tax WACC as the discount rate for the first year, on a going-forward basis for years beyond the first year of TRC testing, the issues of the appropriate discount rate, whether we should adopt multiple discount rates, and the sources of the discount rates will be addressed in the future in stakeholder working group sessions.

Although the 2009 TRC Order characterized the discount rate as a topic for further consideration, subsequent TRC Orders included limited discussion. The 2013 TRC Order⁵ simply stated “The discount rate for the Pennsylvania TRC Test is the EDC’s weighted average cost of capital.”

The 2016 TRC Order⁶ included a discussion of whether a different discount rate might be appropriate for CHP projects. The conclusion of this discussion was the following:

The EDC's weighted average cost of capital is the correct basis for the discount rate so that supply-side and demand-side alternatives are placed on a level playing field. Accordingly, EDCs shall continue to use the EDC's weighted average cost of capital as the discount rate used in TRC calculations for all measures and programs that are eligible for Act 129 funding.

This perspective on the discount rate, like most other aspects of the Act 129 TRC Test, originated with the California’s Standard Practice Manual (CSPM).⁷ The CSPM states that the TRC Test is intended to “identify cost-effectiveness relative to other resource options.”⁸ This perspective attempts to treat energy-efficiency in the same way construction of a power plant might be considered in the Integrated Resource Plan of a vertically integrated utility. The Pennsylvania EDCs own no generation assets and instead acquire power through an organized regional market. The National Standard Practice Manual⁹ released in 2017 includes an excellent discussion of this topic.

The goal of cost-effectiveness analysis is to compare the relative economics of investing in different resource options. The cost of capital used for resource acquisition varies across resource types. Therefore, even from a utility perspective, the discount rate used for such comparisons should reflect the cost of capital across the resource options under consideration.

*A subset of resource costs, such as avoided capacity for generation, transmission, and distribution facilities, are financed by utility debt and equity. In contrast, it is often the case that EE resources and some supply-side resource costs have a much lower cost of capital than the WACC. The utility system costs of acquiring efficiency resources are typically recovered promptly through reconciling charges, and therefore involve no debt or equity costs. Similarly, **some supply-side resource costs, such as fuel and purchased power costs are recovered promptly through reconciling charges, and therefore have little to no cost of capital.***

⁵ <http://www.puc.state.pa.us/pcdocs/1190750.docx> page 4

⁶ <http://www.puc.pa.gov/pcdocs/1367195.docx> page 66

⁷ http://www.calmac.org/events/SPM_9_20_02.pdf

⁸ Ibid page 6

⁹ https://nationalefficiencyscreening.org/wp-content/uploads/2017/05/NSPM_May-2017_final.pdf page 77-78

For a state like Pennsylvania that uses a single benefit-cost test, customization of the TRC test to reflect regulatory and policy objectives is especially important. It is also worth noting that WACC is often built in to avoided costs used in Market Potential Studies, so even if it is not used as the discount rate, it is not necessarily ignored. Essentially, the estimates of avoided energy and capacity costs already reflect the returns earned on them. For Pennsylvania, the rate of return for avoided energy costs, as well as generation capacity costs, would be that of the generation asset owner since, as stated above, the EDCs simply pass through these costs to ratepayers as expenses that are fully recovered in the year they are made. In summary, there is no need to align the MPS with the WACC.

3. How Discount Rates are Chosen

There are two components to consider when selecting a discount rate: whose preferences need to be reflected, and how the numerical should rate be determined (see [Figure 1](#)).

Figure 1: Four Representative Discount Rates

		<u>Whose preferences should be reflected?</u>	
		Private Preferences	Public Preferences
<u>How should the rate be chosen?</u>	Opp Cost	Private Opportunity Cost	Public Opportunity Cost
	Time Pref	Private Time Preferences	Public Time Preferences

The first question is, *whose preferences should be reflected?* The possible answers are, broadly speaking, private preferences, or public preferences. This can be thought of as the preferences an individual has for how they personally would choose to split money between consumption today and investment for future benefits, compared to how a governmental entity would choose to split money. It is generally the case that public entities choose to invest a greater share of their money for future benefits, which corresponds to a lower discount rate.

In the context of the Act 129 TRC, the question is, whose preferences should be reflected by the discount rate used to compute the net present value of future energy and capacity savings generated by upfront expenditures? There are at least three compelling reasons that the public's preferences should be reflected. First, the State of Pennsylvania has determined that selecting a discount rate is within the purview of the PUC, which is charged with reflecting the public's interests. Second, efficiency programs at Pennsylvania's EDCs are government mandated investments and funded by ratepayers, i.e., the general public. Third, these programs were conceived and designed to generate benefits for ratepayers, and for Pennsylvania as a whole.

While it can be tempting to view energy-efficiency programs through the lens of an individual who is considering whether to participate, the decision of an individual whether to participate is separate from the policy decision of whether to use ratepayer money to incentivize or otherwise enable that individual to utilize efficient technologies. It is the latter of these questions to which a discount rate for Phase IV TRC applies. Similarly, it is sometimes put forward that, because utility companies are directly making the specific investments that collectively constitute efficiency programs, their preferences should be reflected by the choice of discount rate. This assertion is incorrect. While the funds do pass through the utility, the utility only acts as a fiscal agent and collects and spends ratepayer money, which it typically recovered within the same year. Again, the selection of discount rate should be driven by the public policy choice of *whether and how to allocate ratepayer money to energy-efficiency programs*, which must reflect the preferences of ratepayers, whose money and interests are fundamentally at stake.

To summarize, it is the SWE's opinion that the Act 129 TRC discount rate should reflect public rather than private preferences.

It is now time to ask the following question: *how should a specific discount rate be selected?* There are two principal methods:

Opportunity Cost Discount Rate: Calculate the discount rate based on the earnings that are available if benefits received now are converted to dollars and

invested to create more benefits later. In this framework, market-based data are often used, such as by looking at costs of capital or stock market returns. However, due to their short time horizon,

Box 1. Risk's Role in DSM Discounting

Though this discussion primarily applies to the Opportunity Cost Discount Rate method, it is still an important consideration when considering discount rate selection.

The key point is as follows: it is important to adjust for the relative risk of investments that were used to determine a given discount rate, and the risks of the policies that are being discounted. For example, capital-intensive traditional energy infrastructure investments are seen by investors and lenders as risky, and so a higher rate of return is demanded to compensate for this risk. However, since Demand Side Management (DSM, consisting of EE and DR) is generally compensated intra-year through reconciling charges, cost recovery is nearly risk free for utilities. Consequently, the relevant risk is DSM performance risk, not infrastructure investment risk.

It is generally considered that DSM investments are much less risky than alternatively supply-side investments. There are number of reasons for this. First, DSM is made up of lots of diverse individual investments, so the risk of failure or poor performance of all the different efficiency measures is not significant, as it is with a single large power plant. Secondly, most efficiency measures are *load following*, so benefits correlate with the overall load and value of efficiency. For example, while the savings from an efficient air conditioner can vary, the higher the cooling load the more savings will be realized.

Overall, it would be inappropriate to discount DSM using a rate affected by the much higher risk premium of traditional electricity infrastructure investments.

frequency of market distortions, and variation over time, Opportunity Cost Discount Rates should be utilized with caution, especially in the context of decisions with relatively long time horizons. In addition, risk can be an important distortion, as described in [Box 1](#).

Time Preference Discount Rate: Calculates the discount rate based on individuals' preferences. Conceptually, the discount rate is the answer to the question, "How much more (in percentage terms) would I have to receive one year from now to forgo \$1 (or \$100) today?" Though there are formulae used to calculate Time Preference Discount Rates,¹⁰ for the purposes of this memo it is sufficient to think in terms of long-term expectations about Gross Domestic Product (GDP) growth, which is essentially the rate at which the public collectively expects to grow wealthier, one of the key underlying reasons that people prefer money now rather than later.

Here again, in the context of Act 129, there are a number of reasons to prefer a Time Preference Discount Rate to an Opportunity Cost Discount Rate. First, capital markets and stocks may be effective at capturing available rates of return over one to a few years, but when investments have impacts further into the future (such as energy efficiency, where benefits often accrue over 10 to 15 years), the level of confidence regarding what rates of return will be in the later portion of that time is, appropriately, quite low. It is not clear that the return on investment available today is a good estimator for what will be available in 5, 10 or 15 years.

Second, the Opportunity Cost Discount Rate is influenced by a number of factors that can be difficult to adjust for, and generally skew the rate upward compared to the underlying time preferences discounting is intended to capture. As already mentioned, taxes and inflation must be accounted for, but other distortions are harder to measure, such as risk premiums, imperfect competition, financial regulations, and international markets which are impacted by a wide array of policies both domestic and foreign. All of these play a role in determining the available rate of return in the market. Additionally, the rate of return in the market reflects a risk premium relative to low risk investments such as US Treasury Bonds.¹¹ This premium should also be removed to yield an Opportunity Cost Discount Rate that reflects preferences rather than other factors.

4. A Discount Rate for Pennsylvania's Act 129 TRC

In summary, Act 129 energy-efficiency programs are regulated by a public agency, are funded by ratepayer (public) money, and generate benefits that accrue to the public at large. Thus, it is the public's preferences that should be reflected by the discount rate. In addition, a Time Preference Discount Rate is preferred, because the data used to proxy this type of discount rate is less variable over time, and subject to fewer biases related to short-term market dynamics.

Long-term GDP growth rates can be used as a rough proxy for the public's preference for tradeoffs over time. In the US, real GDP growth has averaged 3.22% since 1947, according to the US Bureau of Economic Analysis.¹² However, in part because GDP growth only proxies for the wealth-related aspect of public time preferences, it is not sufficient to solely examine long-term GDP growth when selecting a discount rate. It is common to also consider rates used elsewhere

¹⁰ The Ramsey Rule in particular is cited and studied frequently as a strong formulation of the public's rate of time preference. Though it accounts for more than expected growth rates in consumption, this is the most easily proxied (via GDP) and the most temporally variable factor, and a sufficient guide for this discussion.

¹¹ Long-term treasury bonds are also commonly used as a discount rate proxy, and are currently at 2.5% for 10 years

¹² <https://tradingeconomics.com/united-states/gdp-growth>

for public policy discounting. Here, there are two places worth looking to for guidance: official US Federal Policy, and common practice elsewhere in energy-efficiency policy analysis.

The US Office of Management and Budget (US OMB) requires federal benefit-cost analysis to use both a 3% and a 7% real discount rate, to understand the sensitivity of results to this key parameter.¹³ In fact, these rates are the US OMB's own estimates of the Opportunity Cost and Time Preference-based public discount rates. These OMB rates are also consistent with the previously used Opportunity Cost-based discount rates based on EDC WACC, which averaged 7% in nominal terms in the Act 129 SWE Annual Report for Program Year 9. To examine practices in energy-efficiency, a report from ACEEE in 2014 identified discount rates used in 13 different jurisdictions.¹⁴ These rates averaged about 6% in nominal terms. Subtracting the long-term inflation of about 3% over the past 100 years, yields the 3% real discount rate that the SWE believes is the most reasonable choice given the balance of the data and considerations discussed in this memo.

Tables 1 & 2 illustrates the difference between the SWE's suggested 3% Time Preference-based real discount rate, and the previously used Opportunity Cost-based discount rate based on EDC WACC. Table 1 shows the average WACC across EDCs, while Table 2 shows the Net Present Value calculation for an illustrative efficiency project with an upfront cost of \$30 that saves 100 kWh per year for 10 years with an avoided energy cost of \$0.035/kWh. The BCR for this project is 1.06 (31.87/30) using the WACC-based discount rate of 4%, but rises to 1.11 (33.36/30) when using the SWE's suggested 3% discount rate. One key result of this shift in CBA is that using the SWE discount rate will allow more measures with CBA values near 1.0 to pass cost-effectiveness screening, and these measures tend to be longer-lived measures with deeper savings but higher costs.

Table 1. Weighted Average Cost of Capital, PA EDCs

EDC	Nominal	Real
West Penn	6.7%	3.7%
Penn Power	6.9%	3.9%
MetEd	6.6%	3.6%
Duquesne	6.9%	3.9%
PPL	7.6%	4.6%
PECO	7.6%	4.6%
Penelec	6.8%	3.8%
Average	7.0%	4.0%

¹³ https://obamawhitehouse.archives.gov/sites/default/files/page/files/201701_cea_discounting_issue_brief.pdf; For comparison, the UK Treasury's Green Book recommends a real-dollar discount rate of 3.5%

¹⁴ <https://aceee.org/files/proceedings/2014/data/papers/8-1084.pdf>

Table 2. Net Benefits and Costs using Different Discount Rates

<i>Project Year</i>	<i>Cost (\$)</i>	<i>Savings (kWh/yr)</i>	<i>Avoided Energy Cost (\$/kWh)</i>	<i>Benefits (\$, undiscounted)</i>	<i>Net Present Benefits (\$, WACC)</i>	<i>Net Present Benefits (\$, PDR)</i>
0	\$ 30.00	100	\$ 0.04	\$ 3.50	\$ 3.50	\$ 3.50
1	\$ -	100	\$ 0.04	\$ 3.50	\$ 3.36	\$ 3.40
2	\$ -	100	\$ 0.04	\$ 3.50	\$ 3.24	\$ 3.30
3	\$ -	100	\$ 0.04	\$ 3.50	\$ 3.11	\$ 3.20
4	\$ -	100	\$ 0.04	\$ 3.50	\$ 2.99	\$ 3.11
5	\$ -	100	\$ 0.04	\$ 3.50	\$ 2.87	\$ 3.02
6	\$ -	100	\$ 0.04	\$ 3.50	\$ 2.76	\$ 2.93
7	\$ -	100	\$ 0.04	\$ 3.50	\$ 2.66	\$ 2.85
8	\$ -	100	\$ 0.04	\$ 3.50	\$ 2.55	\$ 2.76
9	\$ -	100	\$ 0.04	\$ 3.50	\$ 2.46	\$ 2.68
10	\$ -	100	\$ 0.04	\$ 3.50	\$ 2.36	\$ 2.60
TOTAL	\$ 30.00	1,100	--	\$ 38.50	\$ 31.87	\$ 33.36

In summary, the SWE's perspective is that 3% is an appropriate real discount rate for the Act 129 TRC, based on the discussion of underlying theory, the long-term historical growth rate of US GDP, and discount rates used elsewhere for energy efficiency policy.