year period and that the need for a trained qualified workforce to meet EPS goals will continue to drive training for existing contractors. The expanded energy efficiency programs will create a need for more trained building trades' technicians providing strong job opportunities for those students and workers seeking to enter the energy conservation field. This emerging workforce will provide large numbers of students seeking quality energy efficiency training. Based on the infrastructure developed for its existing workforce development programs, NYSERDA will quickly and appropriately respond to meet increased student demand for this technical training.

2.10. CUSTOMER OUTREACH

NYSERDA marketing efforts for workforce training will be significantly ramped up to promote workforce training initiatives and opportunities. NYSERDA will work closely with its partners, such as DPS Staff, the Department of Labor, and others, to market the EEPS training programs and will be a multi-media approach.

A comprehensive workforce training and education web portal will be developed to serve as a central location for information on all residential and commercial training programs and job opportunities within the State. The portal will link to resources offered through the www.GetEnergySmart.org website to recruit students, market training programs, market partnerships with colleges, universities and private companies participating in the internship and apprenticeship programs, and coordinate with entities such as the NYC EDC to educate consumers about the benefits of working with nationally certified contractors and other trained providers.

NYSERDA plans to coordinate with New York City's marketing and customer outreach efforts underway associated with its plaNYC to address energy efficiency workforce issues. The Mayor's Office of Long Term Planning and Sustainability, NYC & Company and the Economic Development Corporation's Energy Policy Department will work with NYSERDA to incorporate workforce issues in their ongoing energy efficiency campaign.

2.11. COLLABORATIVE APPROACH

. NYSERDA works closely with the members of the Governor's Renewable Energy Task Force and the EEPS Workforce Development Working Group and relied on their input in developing this Program. Representatives of the EEPS Workforce Working Group have provided information on training needs, available resources, job placement, student population issues, and funding needs. NYSERDA is a Co-Convener of the EEPS Workforce Working Group.[89]

2.12. FUEL INTEGRATION

. Much of the training for this Program supports a comprehensive, whole- building approach. As students learn to identify and address energy conservation opportunities for both electric and gas utilities, benefits accrue across customer classes and fuel sources.

2.13. TRANSPARENCY

Training evaluation reports, including attendee lists, training schedules, instructor performance evaluations, and other supporting data are available for public review and accessible to other program administrators.

[89] The EEPS Working Group VII members are: the New York State Department of Labor, SUNY Alfred, New York State Department of Public Service, Hudson Valley Community College, Association for Energy Affordability, New York Energy Consumers Council, investor-owned utilities, Siemens, ACE-NY, Conservation Services Group, New York City Economic Development Corporation, and NYSERDA.

2.14. PROCUREMENT

. Workforce development tasks described in this proposal will primarily be implemented by third-party providers that are competitively procured by NYSERDA. New training programs and initiatives that meet new or changing EEPS needs will also be competitively procured.

2.15. BUDGET.

The table below shows the projected Workforce Development Program budget for 2009-2011.

Table V-1. Workforce Development: Budget (Projected) 2009-2011

EEPS	2009	2010	2011	Total
Workforce Development	$6,176,919	$5,526,717	$4,551,414	$16,255,050

	2009	2010	2011	Total
Marketing	710,619	635,817	523,614	1,870,050
Implementer	1,929,231	1,726,154	1,421,539	5,076,924
Incentives	3,537,069	3,164,746	2,606,261	9,308,076

2.16. EVALUATION.

Evaluation Goals: Evaluation goals related to this effort include conducting a joint process and market study to assess awareness of trainings, perceptions of trainings by training participants as well as employers, program penetration, number of jobs created, satisfaction and barriers to participation. An impact evaluation is not planned with evaluation funds set aside for this program, but energy savings impacts resulting from work force training efforts can be examined through evaluations conducted on the associated end-use programs (e.g., Home Performance, Multifamily Performance, etc).

Brief Overview of the Evaluation Approach: The evaluation approach presented in this section was designed based on NYSERDA's current plans for the design and implementation of the Workforce Development Program, and in the absence of complete knowledge about final evaluation protocols, and potential funding set-asides and plans for overarching evaluation projects that would serve the needs of all EEPS program administrators. Thus, these plans have been prepared in order to afford NYSERDA and its independent contractors flexibility to adapt the evaluation approaches that best suit the program as implemented once a greater understanding is in place regarding final evaluation protocols and funding. NYSERDA's estimated evaluation budget for this program includes a set-aside for developing a full evaluation plan, an effort that will involve DPS Staff and the EEPS Evaluation Advisory Group.

Evaluation Budget: NYSERDA expects the evaluation budget for the Work Force Development Program to be approximately equal to 5% of the program funding level, less yet-to-be determined funds set aside for Statewide studies and other overarching costs borne by program administrators. As the Work Force Development Program is not expected to separately count direct energy savings, evaluation funding will be designed to account for the specific needs of the program, and allocated roughly equally to process and market evaluation. Should funding be provided by the NYS Department of Labor, discussions should determine what portion, if any, will be allocated to evaluation. If funds are added for evaluation, they could be used to supplement the proposed activities presented in this plan.

Evaluation Schedule: Process evaluation is expected to occur during each year that the program is operating. During 2009 and 2010, NYSERDA's independent evaluation contractors will work with

NYSERDA evaluation and program staff to develop post-training survey questions for assessing curriculum usefulness and effectiveness for each training program funded by NYSERDA. These surveys will be implemented at the close of each training effort. The evaluation will likely also involve phone interviews with a sample of training participants each year to assess response to the training and assess the level of learning. In 2011, NYSERDA's independent evaluation contractors will conduct a full evaluation of the training effort, including interviews with program staff, trainers, and surveys of a sample of participants and their employers regarding their post-training experience.

Market evaluation is expected to occur in 2009 and again in 2011. In 2009, NYSERDA's independent evaluation contractors will conduct an initial assessment of market needs among energy efficiency services industry employers exploring topics related to staffing needs, required skillsets, availability of skilled labor, and anticipated evolution of the marketplace. In 2011, a follow-up study is expected to assess the degree to which the training efforts have affected the market needs of energy efficiency services industry employers examining time-series trends in the data collected during the first year evaluation effort as well as additional researchable issues identified by earlier evaluation work.

Table V-2. Workforce Development: Evaluation Schedule

Evaluation Element	Expected Completion		
	2009	2010	2011
Process Evaluation	X	X	X
Market Evaluation	X		X

Measurement and Verification and Net-to-Gross: Impact evaluations are not planned for this program. Energy savings impacts resulting from work force training efforts can be assessed through evaluations conducted on the associated end-use programs (e.g., Home Performance, Multifamily Performance, etc). Interviews with market actors who participated in the workforce development training and with those who did not can be used to estimate energy savings impacts due to these efforts.

Process and Market Evaluation. Evaluations of work force training efforts should be grounded in Kirkpatrick's four levels of evaluation for assessing training effectiveness[90]. The four levels address response of the trainee to the training, assessing what was learned, assessing performance in the workplace and estimating the effects of the training on the work place. Addressing these four levels requires both process and market evaluation activities such as surveys and interviews with program implementation staff, NYSERDA program staff, trainers, participating and nonparticipating technicians, and actual and potential employers in the market place and broadly examining the market response to the efforts.

The planned evaluation efforts will assess awareness and knowledge of NYSERDA and other related training efforts in New York, perceptions of the NYSERDA-funded training effectiveness and usefulness, recruitment vs. certification rates, and participant and employer satisfaction. A key component of the

[90] Kirkpatrick. D. *Techniques for Evaluating Training Programs.* Journal for the American Society of Training Directors, 13. 21-26, (1959b).

efforts will be to assess the first year for each training effort and provide feedback to the trainers on student response to the curriculum. As each training effort matures, the evaluation efforts will shift toward examining market response to the training, exploring topics related to employer staffing needs, availability of skilled labor, and anticipated evolution of the marketplace.

The breadth of impact anticipated from workforce training requires a variety of data collection efforts. Sampling strategies will be developed for each training activity to ensure that sufficient feedback is provided such that the program curriculum can evolve effectively. Timing is also critical in that input should be provided to trainers as soon as possible after training efforts are initiated so trainers can improve their curricula based on initial market feedback and also develop a mindset founded on the concept of continual improvement. As the workforce training effort grows, sampling of participants and targeted employers can be conducted at the 90/10 confidence/precision level. Information will be collected from market actor surveys and interviews by NYSERDA's independent evaluation contractors. Data analysis will be conducted by NYSERDA's evaluation contractors following established protocols.

The process evaluation will be conducted at a modest level for 2009 and 2010 to provide on-going feedback regarding the curriculum and training effort implementation and associated participant response. A full scale process evaluation will be completed in 2011. A baseline market study with energy efficiency services industry employers will be conducted in 2009 with a follow-up study conducted in 2011 to examine the effects of the training efforts on the energy efficiency services industry needs and examine longitudinal trends in the baseline parameter measurements.

Evaluation Plan Variations. Given the level of uncertainty regarding final evaluation protocols, statewide studies to be conducted by all program administrators, and funding levels needed to support overarching evaluation studies and activities, the evaluation plan presented in this section should be viewed as scalable and flexible. With reduced funds, NYSERDA would likely reduce the number of evaluation cycles. With enhanced funds, the market assessment anticipated for this project could be conducted at a much broader level to include traditional, non-energy efficiency services industry employers (e.g., architects, engineers, contractors, unions, etc.), but such a study would require statewide participation.

3. ENHANCED ELECTRIFIED RAIL PROGRAM

3.1. PROGRAM ELEMENTS

Program Description

The Enhanced Electrified Rail Program (Program) will achieve savings of grid-supplied electric energy (MWh). A recent assessment of the energy efficiency potential associated with introduction of new technology and advanced energy controls in the New York City rail system indicates that over 500,000 MWh in annual energy savings could be cost effectively achieved. This represents one of the single largest potential opportunities for electric efficiency improvements in the NYC metropolitan area.

This Program will sponsor permanent installation of equipment developed in the program (for example, energy-efficient track de-icing, a technology previously developed through the SBC program). The Program will also develop and qualify additional advanced technologies for the electrified rail system (examples include more efficient electrical conductors and electric insulators). In addition to the immediate benefits derived from installed measures, The Program will deliver "real world" experience with systems in an effort to inspire wide-scale adoption by the Metropolitan Transit Authority (MTA), or confirm payback period aspects as a means of attracting New York Power Authority (NYPA) financing.

It is anticipated that after a few years of simultaneously installing equipment, such as track de-icers and additional technologies, track de-icers subsidies will no longer be necessary and the newly-qualified technologies will be appropriate for permanent installations.

Program Goals and Objectives .

The Program will deliver permanent installation of energy-efficient equipment with an anticipated lifespan of 20 years. Electric savings attributable to The Program will also assist with alleviating grid constraints and preventing electric losses otherwise attributable to transmission and distribution (T&D) resistance in the highly constrained New York City T&D load pocket. Each year The Program will install a limited number of systems in the MTA electrified rail network.

Program Theory.

The Program will use an annual competitive solicitation, allowing NYSERDA to select the most promising projects to deliver the expected savings and additional technologies for development and qualification. Milestone-based contracts will be issued, and for those projects involving permanently-installed equipment, the majority payment will be tied to the installation and commissioning of the equipment. Contracts will include rigorous measurement, verification, and data reporting requirements. Program design and administration will be subject to change contingent upon marketplace response (for example, the quantity and quality of proposals received).

Anticipated Spending and Savings.

With an annual program budget of $5,376,344 (electric funds), approximately $5,000,000 will be earmarked for incentives. Annually, The Program will install a limited number of systems with collective savings of approximately 20,000 MWh/yr. Approximately half of the program budget will be used to permanently install equipment (and may be pursued as a single contract); the other half will be used to develop/qualify additional technologies. Projects permanently installing equipment will be eligible to receive up to 50% of the overall cost of the project. Projects developing/qualifying additional technologies will be eligible to receive $500,000 or 50% of the overall cost of the project, whichever is less.

Table V-3. Enhanced Electrified Rail Program: Total Expenditures (Projected) 2009-2015 [net of administration and evaluation]

	2009	2010	2011	2012	2013	2014	2015	Total
Annual EEPS Spending	$5.0M	$5.0M	$5.0M	0	0	0	0	$15.0 M
Note: There is no marketing budget for this program.								

Table V-4. Enhanced Electrified Rail Program: Installed MWh Impacts (Projected) 2009-2015

	2009	2010	2011	2012	2013	2014	2015
Annual Savings installed in the current year	0	20,000	20,000	20,000	0	0	0
Annual Savings installed in prior years		n/a	20,000	40,000	60,000	60,000	60,000
Cumulative Annual Savings		20,000	40,000	60,000	60,000	60,000	60,000

NYSERDA has developed initial evaluation plans with the intention of providing the rigor and reliability necessary for metrics to be used by the NYISO and transmission and distribution system planners. NYSERDA will continue to work with DPS Staff and the EEPS Evaluation Advisory Group to devise final evaluation plans that meet established protocols and produce results that can be used as inputs for system planning and forecasting.

Program Schedule.

Program launch in Q1 2009 with one-year lagtime before permanently-installed equipment is installed/operational. Operate the program for three (3) years (CY 2009 – CY 2011).

3.2. DEMAND REDUCTION AND SYSTEM BENEFITS:

It is anticipated that the measures developed and deployed in this program will result in permanent verifiable load reductions to the Con Edison distribution system. Thus the impact on peak load and system load factor, including metrics can be relied on by the New York Independent System Operator.

3.3. MARKET SEGMENT NEED.

The MTA's subway and commuter rail system is a 1,100 MW load served by the Con Edison distribution system, and annually consumes over 2 billion kilowatt-hours of electricity in the New York Metropolitan load pocket. There are no other programs focused on reducing this extremely large load.

3.4. COORDINATION.

There are no programs in New York focused on introducing new energy efficient technologies for the MTA's electrified rail system. Neither the MTA nor NYPA (the MTA's primary electric provider) have programs focused on innovative ways to reduce this large load. NYPA is prepared to finance energy efficiency measures based on shared savings, however these measures must first be developed and

verified. This program provides that technology verification and initial financial incentive necessary for early stage products to meet the return on investment criteria required by NYPA. Given the limited funding requested here, this program will not finance full build-out of the measures. Rather, it will characterize risk, demonstrate technology, and enable MTA and/or NYPA to make subsequent investments needed to achieve what is estimated to be a 500,000 MWh per year efficiency savings in New York City.

3.5. CO-BENEFITS.

Load reductions in the J and K areas improve reliability and reduce cost for all customers in those areas. Cost reductions and improvements to the performance of public transit systems benefit New York tax payers that subsidize the system and all residents. New York State business will be utilized to develop and manufacture the products deployed in the program creating employment and increased economic activity in the State.

3.6. PORTFOLIO BALANCE.

Not applicable.

3.7. DEPTH OF SAVINGS.

Not applicable.

3.8. UNDERSERVED MARKETS.

Refer to Coordination discussion above.

3.9. COMMITMENT.

A minimum of a five year commitment is necessary to develop and deploy a technology within the electrified rail system.

3.10. CUSTOMER OUTREACH.

Participation in the program will be encouraged through the marketing of competitive solicitations to stakeholders.

3.11. COLLABORATIVE APPROACH:

The program has been developed in consultation and in conjunction with the MTA, NYPA and potential technology providers.

3.12. FUEL INTEGRATION.

Not applicable.

3.13. TRANSPARENCY.

The program will be transparent regarding the program, including program design, benefit/cost analysis, and supporting data, are available for public review and accessible to other program administrators.

3.14. PROCUREMENT.

Each activity will be procured through competitive processes except to the extent they are performed directly by the program administrator.

3.15. EVALUATION.

The evaluation approach for early demonstrations of technologies necessitates flexibility; work varies with the technology and project types/stages such as product development/qualification, demonstration, and business development. This program will demonstrate products developed under SBC (such as a

"track de-icing" product) with energy savings; the demonstration is expected to motivate the Metropolitan Tranist Authority (MTA) to widely deploy the technology and evaluation will verify the project's capabilities.

Subsequent project technologies in earlier stages of development, selected through annual competitive solicitations, may not produce near-term savings and some projects may not prove successful. An evaluation will be conducted for each technology, with evaluation plans being tailored for the individual technologies as they are selected; consequently, the proposed evaluation plan presented here is general in nature and will evolve as the program develops.

Evaluation Goals

The evaluation goals for permanently installed energy efficient technologies are two fold: (1) to ensure rigorous impact evaluation of the claimed electricity (MWh) and associated demand (MW) savings, and (2) to collect feedback from MTA employees on their perceptions of and satisfaction with the technology's performance. The evaluation goals of the technologies yet-to-be-chosen will be determined based on the technology and its stage of development.

Brief Overview of the Evaluation Approach

The evaluation approach presented in this section was designed based on NYSERDA's current plans for the Enhanced Electrified Rail Program, and in the absence of complete knowledge about final evaluation protocols, and potential funding set-asides and plans for overarching evaluation projects that would serve the needs of all EEPS program administrators. Thus, these plans have been prepared in order to afford NYSERDA and its independent contractors flexibility to adapt the evaluation approaches that best suit the program as implemented once a greater understanding is in place regarding final evaluation protocols and funding. NYSERDA's estimated evaluation budget for this program includes a set-aside for developing a full evaluation plan, an effort that will involve DPS Staff and the EEPS Evaluation Advisory Group.

Permanently installed technologies will undergo impact evaluation to verify the claimed annual electricity (MWh) and associated demand (MW) savings. Additionally, the process evaluation will assess the technology and possible further adoption as judged by MTA employees. The evaluation approach for the new technologies will be determined once the technologies are selected. As the MTA is expected to be the only customer, these will be census evaluations.

Evaluation Budget

NYSERDA expects the evaluation budget for the Enhanced Electrified Rail Program to be approximately 5% of the program funding level, less yet-to-be-determined funds set aside for statewide studies and other overarching costs borne by program administrators. It is expected that the Enhanced Electrified Rail Program evaluation budget will be designed to account for the specific needs of the program, and allocated primarily to impact evaluation (65%) with the remainder to process evaluation.

Evaluation Schedule

Installed equipment needs to be in operation for a minimum of one full year to assess its performance, reliability, and operations and maintenance (O&M). Scheduling must take into consideration if a technology is operational only part of year, *i.e*, seasonal. For example, the performance of the de-icer must be evaluated during extreme cold and snow; necessitating the time frame be late 2010 and early 2011, with commencement of any necessary pre-installation visits in winter 2009. The table below shows the main evaluation components and the expected timing of their completion.

Table V-5. Enhanced Electrified Rail Program: Evaluation Schedule

Evaluation Element	Expected Completion		
	2009	2010	2011
M&V (Impact)	X		X
Process Evaluation	X	X	X

Impact Evaluation

Impact evaluation of the Enhanced Electrified Rail will consist of measurement and verification only. Net-to-gross analysis will not be performed for reasons cited below.

Measurement and Verification

The de-icer requires pre and post site visits with extensive long-term energy use or metered data both before and after installation. The specificity of energy use data that might already be available needs to be assessed. This would be used to further develop the impact evaluation plan and to determine what extent energy use data (along with weather and operating data) could be used to conduct the impact evaluation versus the need and extent of metering data. Consistency and reliability of equipment performance under varied conditions may also be assessed.

Energy use data must first be assessed for its appropriateness in the development of calibrated engineering. The evaluation plan development will likely involve such an assessment. Evaluation of this program could require long-term metering/data collection at the site both before and after installation. Data to be collected and the methodology will be determined with NYSERDA's independent contractors using established evaluation protocols as applicable to evaluating this specialized technology and circumstances.

Analysis may include research to estimate impacts on the specific transmission congestion points targeted and MW impacts. NYSERDA and its independent evaluation contractors will include the EEPS Evaluation Advisory Group (EAG) and the DPS evaluation advisors in the evaluation plan development to the extent these specialized technologies and circumstances require specialized evaluation designs and analysis and to ensure that the evaluation needs for the EEPS are met.

Net-to-Gross

Here, as in most circumstances of early demonstrations of technologies, net-to-gross does not apply. Freeridership does not occur for technologies that would not exist or would not be accepted into commercial applications without investments in technology development and early demonstration. Also, while the concept is similar to spillover, technology replication is more limited and part of program design and intent; consequently, replication will be assessed in the impact evaluation.

Process Evaluation

The process evaluation will involve working with employees at the site before installation (such as MTA employees for the de-icing technology) to establish a process to provide ongoing feedback so that real time concerns/points of interest can be incorporated in the process analysis.

A primary goal of early demonstration of technologies programs is to assess a technology and to identify lessons learned. Feedback in these areas will be an important part of this continual process evaluation effort.

The evaluations will also include interviews with program staff, the product developer, as well as test site contacts. These site contacts are those who are regularly in a position to assess the day-to-day operation of the equipment, training to operate the technology, O&M, reliability, and impact on other equipment.

The process evaluations will: identify issues of data reliability for the impact evaluation; develop a program theory and logic model for the program as implemented; and provide actionable recommendations on the feasibility of the technology and will incorporate lessons learned to inform future program development efforts.

Data collection and analysis will be conducted by NYSERDA's independent contractors based on established evaluation protocols and approved evaluation plans. With pre-installation contacts beginning in 2009 and new technologies yet to be solicited, process evaluations are anticipated to occur in 2009, 2010, and 2011.

Evaluation Plan Variations

Given the level of uncertainty regarding final evaluation protocols, statewide studies to be conducted by all program administrators, and funding levels needed to support overarching evaluation studies and activities, the evaluation plan presented in this section should be viewed as scalable and flexible. Although measurement and verification of electric savings is critical, the evaluation could also examine each technology's viability for potential for commercialization. If NYSERDA's evaluation funding for this program were reduced, the process evaluation would be scaled back by limiting the number of interviews. Conversely, if this program were to be allocated more of NYSERDA's evaluation funding, process evaluation could be expanded to capture quantitative data.

3.16. PROGRAM SELECTION CRITERIA

This section provides screening metrics for the Enhanced Electrified Rail Program required per Appendix 3 of the Commission's June 23, 2008 EEPS Order. As discussed earlier, NYSERDA intends to provide screening metrics related to electric and gas rate impacts (Screening Metrics 2, 3, 4, 8, 10, 11, and for the suite of programs Screening Metrics 1 and 2) in a separate supplemental filing. Also, for reasons described earlier, estimated MWh and coincident peak MW reductions in 2015 if the program continues to expand and extends through 2015 (Screening Metrics 5a and 6a) are not included.

Total Resource Cost Test Benefit/Cost Ratio (Screening Metric 1)

The tables below show the resource savings and average measure life used as inputs for the benefit/cost analysis, the present value of the costs and benefits used in the analysis, and the Program Administrator Cost (PAC) and Total Resource Cost (TRC) results. Appendix A provides additional information on benefit/cost definitions and inputs.

Table V-6. Enhanced Electrified Rail Program: Cumulative Annual Savings

	Program Years	Average Life of Electric/Gas Measures (Years)	Cumulative Annual GWh/Year	Cumulative MW	Cumulative Annual Fuel Savings (MMBtu)	% Downstate (Con Edison)
Electric Funding Only	2009-2011	20	60.0	--	--	100%

Table V-7. Enhanced Electrified Rail Program: Program and Participant Costs ($2008)

	Present Value of Program Administrator Cost ($Millions)	Present Value of Program and Participant Costs ($Millions)	Present Value of Resource Benefits ($Millions)
Electric Funding Only	$15.4	$28.9	$80.5

Table V-8. Enhanced Electrified Rail Program: Benefit-Cost Ratios

	Program Administrator Cost (PAC) Test	Total Resource Cost (TRC) Test
Electric Funding Only	5.2	2.8

Total Resource Cost Test Benefit-Cost Ratio with Carbon Externality (Screening Metric 8)

The table below shows the PAC and TRC test results when the estimated benefits of carbon reduction are included. Carbon was valued at $15 per ton, resulting in a total present value of carbon benefits of $5.9 Million.

Table V-9. Enhanced Electrified Rail Program: Benefit-Cost Ratios with Carbon

	Program Administrator Cost (PAC) Test	Total Resource Cost (TRC) Test
Electric Funding Only	5.6	3.0

MWh Saved in 2015 (Screening Metric 5b)

Assuming the program functions only for as long as proposed, the Program is expected to achieve 60,000 MWh (cumulative annual) in 2015.

MW of Coincident NYISO Peak Saved in 2015 (Screening Metric 6b)

Some projects funded through the program will provide savings only in the winter. Therefore, coincident savings were not estimated.[91]

Peak Coincidence Factor of MWh Saved in 2015 (Screening Metric 7)

See above.

Number of Participants as a Percentage of Customers in the Class (Screening Metric 9)

The Enhanced Electrified Rail Program is intended to assist a single customer – the Metropolitan Transportation Authority.

[91] NYSERDA defines coincident on-peak period as being between 12:00 noon and 6:00 PM on summer non-holiday week days.

4. SMART GRID END USE EFFICIENCY

4.1. PROGRAM ELEMENTS

Program Description.

"Smart Grid" end-use efficiency improvements address the challenges and opportunities that flow from an optimized transmission and distribution (T&D) system.[92] In the program, end-user improvements will be chosen that incorporate information and analyses from the utility-side of the meter to allow enhanced control of electricity use on the customer-side of the meter. Smart Grid and T&D optimization include integrated applications that rely on robust two-way communications, advanced sensors, and information technologies to improve the efficiency, reliability, and safety of power delivery and use. The June 23, 2008 Order assigns utilities the task of investigating sources of system losses and identifying potential measures to reduce system losses and optimize system operations.[93] The Order states that some solutions to ameliorate system loss may involve installation of equipment by end users.

The utility T&D loss efffort will result in individual utility reports to the Commision this December. A technical confcrence, held in July, scoped out a strategy for the proceeding and included reports by DPS Staff, utilities, NYISO and others providing an overview of system operations and the current state of knowledge. Presentations also included the customer perspective as well as local load factor considerations. Consolidated Edison provided information showing overall system efficiency for each component of the overall electric power sector: generation (33%), T&D (93%) and customer end-use (15-45%); as well as the seasonal and non-linear nature of T&D losses demonstrating disproportionate losses during summer and on-peak periods.

This Progam addresses the nexus where significant end-use opportunities intersect with the time and location of high T&D system losses. This program will result in installations of technical options such as enhanced building management systems and controllable ballasts for the commerical and industrial sector that deliver both kWH and kW savings. For the residential sector, options include controllable thermostats for central and for room air conditioners, electric domestic hot water, pool pumps and home energy management systems to deliver both kWh and kW savings. The program design is intended to address direction provided in the Order that both efficiency and demand reduction are critical objectives, with impacts demand, particulaly in constrained areas, as an important criterion.

Final program design will encompass input from stakeholders, including DPS, utilities, EPRI and NYISO; and be informed by the utility reports provided in December. Stakeholder discussions and reports will focus aggregated end-use efficiency and control projects on the time frames and in the locations of maximum benefit.

4.2. DEMAND RESPONSE AND SYSTEM BENEFITS

Project installations will be targeted based on information provided by utilities regarding constrained areas. The program will target these areas for energy efficiency measures that result in approximately 1,600 kW of peak load reduction. When efficiency measures are installed, controls and communications equipment will also be installed to enable curtailment of an additional 8,000 kW of peak load. Advanced

[92] Deploying the Smart Grid became the policy of the United States with passage of Title 13 of the Energy Independence and Security Act of 2007.

[93] Case 08-E-0751 Proceeding on Motion of the Commission to Identify the Sources of Electric System Losses and Means of Reducing Them.

communication capabilities will equip contractors and customers to exploit real-time electricity pricing, incentive-based or emergency load reduction signals.

Table V-10. Smart Grid End-Use Efficiency: Total Program Expenditures (Projected) 2009-2015

Annual EEPS Spending	2009	2010	2011	2012	2013	2014	2015	Total
	$.34M	$4.37M	$6.64M	$0	$0	$0	$0	$11.35M
Projected Outreach/Marketing costs: $0.25M in 2009; $0.25M in year 2010; $0.67M in 2011.								

Table V-11. Smart Grid End-Use Efficiency: Installed MWh Impacts (Projected) 2009-2015

	2009	2010	2011	2012	2013	2014	2015
Annual Savings Installed in the Current Year	0	6,500	10,000	0	0	0	0
Annual Savings Installed in Prior Years	0	0	6,500	16,500	16,500	16,500	16,500
Cumulative Annual Savings	0	6,500	16,500	16,500	16,500	16,500	16,500

NYSERDA has developed initial evaluation plans with the intention of providing the rigor and reliability necessary for metrics to be used by the NYISO and transmission and distribution system planners. NYSERDA will continue to work with DPS Staff and the EEPS Evaluation Advisory Group to devise final evaluation plans that meet established protocols and produce results that can be used as inputs for system planning and forecasting.

4.3. MARKET SEGMENT NEED

Customers indicate a growing interest in gaining control of their energy consumption and cost, reliability of supply, reducing associated environmental impacts, and are increasingly savvy with information technology. The detailed utility T&D information to be provided later this year will further define the extent and locations where this effort will be of the greatest benefit.

4.4. COORDINATION

Coordination with utilities is important to the success of the Program and NYSERDA will build on previous successful efforts in this area such as the many demand response programs and projects and the implementation of Consolidated Edison's controllable thermostat program for central air conditioning. Complimentary utility resources as well as the identification and details regarding load-constrained areas, and if cost-effective, performance payments similar to distribution and load relief programs. Should similar programs be proposed or approved, more extensive coordination will be undertaken.

4.5. CO-BENEFITS

Smart Grid technologies incorporate consumer equipment and behavior in the design, operation, and communications protocols in the Grid. Implementing Smart Grid technologies enables consumers to

control "smart appliances" and "intelligent equipment" in homes and businesses, permits interconnecting energy management systems in "smart buildings," and enables consumers to improvement energy use management and, thus, reduce energy costs. Appropriately targeted installations support reliability and help defer the need for additional T&D infrastructure.

4.6. PORTFOLIO BALANCE

NYSERDA offers a portfolio of complementary programs providing customers with a holistic approach to energy projects, enabling all customer sectors to identify opportunities to meet their specific needs. This Program is a key component of that portfolio.

4.7. DEPTH OF SAVINGS

Significant untapped energy efficiency opportunities could be realized in implementing grid-integrated technology solutions. By providing incentives for end-use measures with rigorous efficiency requirements, and by requiring installation of communication technologies that enable aggregation and control of energy efficiency measures from remote sources, energy efficiency is achieved and curtailment is possible from remote locations. The program attribute is less depth of savings in a sector, but rather depth of savings where savings provide the greatest societal benefit.

4.8. UNDERSERVED MARKETS

To date, there are relatively few installations of high efficiency and grid-integrated equipment and technologies that achieve energy savings and kW reductions. The small-to-mid-sized commercial and residential markets have contributed relatively little in the way of demand response participation.

4.9. COMMITMENT

Sufficient time, a commitment to funding, clear terms, conditions, milestones, deliverables and payment schedules will all be critical to program success.

4.10. CUSTOMER OUTREACH

Marketing, outreach, and education are important components of the Program. Staff will build upon their strong alliances with energy service providers and contractors, including outreach that targets appropriate sectors. NYSERDA also anticipates working closely with the utilities to most effectively integrate and implement projects.

4.11. COLLABORATIVE APPROACH

NYSERDA has conducted numerous meetings with service providers working to develop business models and identify customers to incorporate Smart Grid concepts in demand response applications. NYSERDA discussed Smart Grid concepts with representatives of Energy East with regard to that Company's plans to implement a widespread Advanced Metering Infrastructure (AMI) program. NYSERDA researched Smart Grid technology solutions to integrate energy efficiency and demand response efforts into a program offering. NYSERDA is an active party and has provided input into the Commission's ongoing AMI proceeding.

4.12. FUEL INTEGRATION

While this Program will focus on electric savings and potential demand reductions, the technology program and communications platform used to generate electric energy savings could be transferable to end uses beyond those that that are electric.

4.13. TRANSPARENCY

Program development will be based on significant planning and coordination in late 2008, early 2009. This process will be open to input from all interested stakeholders and will include, at a minimum, the

utilities, DPS, NYISO and NYSERDA Staff. This will result in the release of a competitive solicitation in 2009. Program savings and costs will be available for public consumption through the detailed reports developed by NYSERDA and external evaluators.

4.14. PROCUREMENT

Final program design and solicitation release is planned for 2009 based on research described above, as well as input from stakeholders, utilities, the Commission and DPS Staff. It is anticipated that contractors will be invited to compete for performance-based energy funding. Contractors will be required to specify the amount of funding needed to implement specific projects, within the bounds of decisions made with regard to the instant proceeding and the subsequent set of program guidelines to be designed. Procurement will be based on one or more open and competitive solicitations.

4.15. EVALUATION PLAN

Evaluation Goals

The primary goal of the evaluation is to assess the energy and demand savings attributable to program activities. A secondary goal will be to provide feedback to support an efficient delivery mechanism.

Brief Overview of the Evaluation Approach

The evaluation approach presented in this section was designed based on NYSERDA's current plans for the design and administration of the Smart Grid End-Use Program, and in the absence of complete knowledge about final evaluation protocols, and potential funding set-asides and plans for overarching evaluation projects that would serve the needs of all EEPS program administrators. Thus, these plans have been prepared in order to afford NYSERDA and its independent contractors flexibility to adapt the evaluation approaches that best suit the program as implemented once a greater understanding is in place regarding final evaluation protocols and funding. NYSERDA's estimated evaluation budget for this program includes a set-aside for developing a full evaluation plan, an effort that will involve DPS Staff and the EEPS Evaluation Advisory Group.

Evaluation Budget

NYSERDA expects the evaluation budget for the Smart Grid End-Use Program to be approximately equal to 5% of the program funding level, less yet-to-be determined funds set aside for statewide studies and other overarching costs borne by program administrators. It is expected that the Smart Grid End-Use evaluation budget will be designed to account for the specific needs of the program, and allocated primarily to impact evaluation (80%) and the remainder for process evaluation.

Evaluation Schedule

Evaluation studies included as part of the Smart Grid End Use Program evaluation plan are shown in the table below along with the time frame for their anticipated completion. The evaluation plan is expected to include multiple measurement and verification, net-to-gross, and process evaluation studies.

Table V-12. Smart Grid End-Use Efficiency: Evaluation Schedule

Evaluation Element	Expected Completion			
	2009	2010	2011	2012
Impact - M&V				X
Impact - Net-to-Gross		FR, MT	FR, SO, MT	
Process Evaluation	X			

FR = Freeridership examination SO = Spillover examination MT = Market transformation, top-down examination

Impact Evaluation

Measurement and Verification

Several of NYSERDA's programs promoting newer technologies have included significant pre-post metering data requirements, with twelve months of post-retrofit monitoring / metering, and independent quality assurance (QA) efforts. The evaluation team will recommend a similar data collection effort for the Smart Grid End-Use program for the large commercial projects, at a minimum. Logging of operating hours for individual measures pre and post can be substituted if the controlled appliance represents a small percentage of total load. Deemed savings may be used for smaller commercial and residential projects. Given the diverse sectors and technologies that will likely be addressed by this program, having this level of program data can allow for high quality impact evaluation methods within the limited evaluation budget.

Initially, the impact evaluation will involve review and assessment of the quality and comprehensiveness of the metering and monitoring data. If the data sets are complete, there may be little value gained in performing additional near-term metering. Therefore, M&V work will focus on the baseline assumptions for each project. If needed, strategies will be developed for addressing gaps in the data, including additional data logging and on-site data collection. For example, interviews with participants may shed light on the reasons for variations in measured data.

Participants will be put into homogenous groups. The detailed evaluation plan will be developed based upon the availability of quality pre-post metering data, the number of participants and expected savings per homogenous group. The initial evaluation plan for this program is to conduct analysis on electricity use by means of this data. With this evaluation method, billing analysis will be conducted on all participant electricity use data and efforts will be made to assess potential bias for those where data is not available or adequate for evaluation. Alternative evaluation methods will be explored if the pre-post metering data is not available or appears to be potentially biased.

The M&V evaluation is scheduled to be completed in 2012. This timing is based on the need for twelve months of post-retrofit use, metering, and monitoring data from all participants.

Net-to-Gross

This program generates direct savings and is also capable of operating as a market transformation effort. Given this, a combined approach of enhanced self-report and top-down market inquiry will be pursued for the largest expected savings sector or market niches to assess attribution.

The sampling procedures for the enhanced self-report methods will be representative of all participants in the program. The enhanced self-report method will survey multiple decision-makers including building owners, vendors, technical assistance providers, residents, etc. involved in adopting energy efficiency and controls. Proper examination of the multiple decision-makers, their level of influence and when decisions occur can provide higher quality freeridership estimates. The surveys will include alternative inquiries to test and provide construct validity for the net to gross (NTG) estimates. Sample sizes will be calculated to target 90% confidence and 10% sampling precision at the program level.

Inquiries related to influences in the decision-making process generally produce the most reliable results when they are conducted closer to the point of the decision. No completes are expected in 2009. The freeridership inquiries will, therefore, be completed in 2010 and 2011 for projects completed in each of those two years. Spillover decisions, however, are made after project implementation. Thus, the spillover inquiry is planned for 2011 in order to allow sufficient time for these effects to occur.

To supplement the self-report survey approach to assessing NTG, a top-down approach, also referred to as the market transformation (MT) examination, will be employed. For the largest expected savings sectors or market niches the evaluation will examine the market chain pre and post implementation. The approach for this area of the NTG analysis will be further developed in the detailed evaluation plan. In general, the sector, technology, market niche will be examined through interviews with multiple market actor groups concerning how these technologies are currently being distributed, installed and used, and how these factors will be changing over time. The MT research is expected to occur in 2010 and 2011.

Process Evaluation

Process evaluation activities will focus on the participation and decision-making process in the program. The implementation team will track contractors who are contacted for participation or who request information about the program services. Those who do not participate in the program will form the partial participant and non-participant population. Areas of inquiry expected for the process evaluation work will likely include:

- Barriers to participation
- Barriers to full-scale implementation
- Value of services provided to homes and business (non-energy and monetary)
- Benefits of participation and the equipment
- Overall customer satisfaction with the program services and the equipment
- Examination of customer decision-making, including roles of people involved and factors influencing the decision

The process evaluation work will generate actionable recommendations for improvements to the program. It is expected that process evaluation will be conducted approximately a year after the program start date so as to provide early feedback regarding the program processes and participation rates.

As the process evaluation will be in the field a year before the impact evaluation starts, the process evaluation will also involve an "evaluability assessment" and data review for the Smart Grid End-Use Program, which will ensure that the needed data are available for impact evaluation. Recommendations for data collection, validation and organization will be included as part of the process evaluation report and feedback to NYSERDA will be transmitted as findings and recommendations are available.

Market Evaluation. A separate market evaluation will not be conducted. However, specific small market niche studies are planned within the impact evaluation, discussed above, for the market niches with the largest expected savings.

Evaluation Plan Variations. Given the level of uncertainty regarding final evaluation protocols, statewide studies to be conducted by all program administrators, and funding levels needed to support overarching evaluation studies and activities, the evaluation plan presented in this section should be viewed as scalable and flexible. Specifically, if the total evaluation budget for this program needs to be reduced, impact evaluation would not be able to meet 90% confidence for 10% sampling precision. Conversely, if more of NYSERDA's total evaluation funding could be allocated to this program, the additional funds would allow for more site-specific data collection as part of the impact evaluation and larger sample sizes, e.g., by utility service territory and technology.

4.16. PROGRAM SELECTION CRITERIA

This section provides screening metrics for the Smart Grid End Use Efficiency Program required per Appendix 3 of the Commission's June 23, 2008 EEPS Order. As discussed earlier, NYSERDA intends to provide screening metrics related to electric and gas rate impacts (Screening Metrics 2, 3, 4, 8, 10, 11, and for the suite of programs Screening Metrics 1 and 2) in a separate supplemental filing. Also, for reasons described earlier, estimated MWh and coincident peak MW reductions in 2015 if the program continues to expand and extends through 2015 (Screening Metrics 5a and 6a) are not included.

Total Resource Cost Test Benefit/Cost Ratio (Screening Metric 1)

The tables below show the resource savings and average measure life used as inputs for the benefit/cost analysis, the present value of the costs and benefits used in the analysis, and the Program Administrator Cost (PAC) and Total Resource Cost (TRC) results. Appendix A provides additional information on benefit/cost definitions and inputs.

Table V-13. Smart Grid End-Use Efficiency Program: Cumulative Annual Savings

	Program Years	Average Life of Electric/Gas Measures (Years)	Cumulative Annual GWh/Year	Cumulative MW	Callable Load MW[94]	Cumulative Annual Fuel Savings (MMBtu)	% Downstate (Con Edison)
Electric Funding Only	2009-2011	12	16.5	4.8	8.0	--	38%

[94] The market price effect for the call-able load attributable to this Program is $7.3 million (present value, 2008$).

Table V-14. Smart Grid End-Use Efficiency Program: Program and Participant Costs ($2008)

	Present Value of Program Administrator Cost ($Millions)	Present Value of Program and Participant Costs ($Millions)	Present Value of Resource Benefits ($Millions)
Electric Funding Only	$11.7	$25.1	$41.0

Table V-15. Smart Grid End-Use Efficiency Program: Benefit-Cost Ratios

	Program Administrator Cost (PAC) Test	Total Resource Cost (TRC) Test
Electric Funding Only	3.5	1.6

Total Resource Cost Test Benefit-Cost Ratio with Carbon Externality (Screening Metric 8)

The table below shows the PAC and TRC test results when the estimated benefits of carbon reduction are included. Carbon was valued at $15 per ton, resulting in a total present value of carbon benefits of $2.4 Million.

Table V-16. Smart Grid End-Use Efficiency Program Benefit-Cost Ratios with Carbon

	Program Administrator Cost (PAC) Test	Total Resource Cost (TRC) Test
Electric Funding Only	3.6	1.7

MWh Saved in 2015 (Screening Metric 5b)

Assuming the program functions only for as long as proposed, the Program is expected to achieve 16,500 MWh (cumulative annual) in 2015.

MW of Coincident NYISO Peak Saved in 2015 (Screening Metric 6b)

Assuming the program functions only for as long as proposed, the Program is expected to achieve 4.8 MW (cumulative) of coincident peak reduction in 2015, based on increased end-use efficiency.[95]

Peak Coincidence Factor of MWh Saved in 2015 (Screening Metric 7)

The peak coincidence factor is a measure of the extent to which the MWh savings from efficiency measures is concentrated at the time of system peak. The peak coincidence factor for the program is 0.39.[96]

[95] NYSERDA defines coincident on-peak period as being between 12:00 noon to 6:00 PM on summer non-holiday week days.

[96] Peak coincidence factor = annual MWh saved/(MW saved on peak)(8,760 hours). For this equation, annual MWh saved is the cumulative annual savings expected in 2015 if the program is offered only as long as proposed, i.e., Screening Metric 5b.

Number of Participants as a Percentage of Customers in the Class (Screening Metric 9)

The table below shows the number of expected program participants as a percentage of the number of customers in the class. The number of expected program participants represents NYSERDA's best estimate of participation for the current funding request through 2011.

Table V-17. Smart Grid End-Use Efficiency Program Participants as a Percentage of Customers in Class

Customer Class	Number of Customers in Class[1]	Number of Anticipated Program Participants	Participants as a Percentage of Number of Customers in Class
Residential - Electricity	6,240,788	6,750	0.1%
Commercial - Electricity	1,002,856	250	0.02%

[1] Sources: DPS Five Year Index Book of Files and DPS Electricity and Natural Gas Retail Access Migration Reports. Electricity figures do not include LIPA, municipal electric utility, rural electric cooperative, or NYPA customers. Gas figures do not include Keyspan/Long Island customers. Retail Access Migration Reports do not separate commercial and industrial customers and label all-such customers as "non-residential". Commercial and industrial customers estimated by NYSERDA.

VI. INDEPENDENT PROGRAM PROPOSALS SUBMITTED FOR CONSIDERATION BY NYSERDA

1. BACKGROUND

The June 23, 2008 Order invited the submission of innovative proposals by independent program administrators to NYSERDA or to a utility company to expand the range of program proposals, help achieve the 15% energy reduction by the year 2015, and encourage innovation.[97] Independent program administrators could submit proposals for programs to be implemented within the 2009-2011 time period. The Order further required that any proposal received by NYSERDA, or the utilities, must be considered for inclusion in the entity's 90-day submission, and its inclusion or omission must be explained. In response to the Order, NYSERDA established a process for independent program administrators to submit their proposals to NYSERDA and for NYSERDA to evaluate any submitted proposals.

2. NYSERDA'S PROCESS FOR INDEPENDENT PROGRAM PROPOSAL SUBMISSIONS

On July 14, 2008, NYSERDA issued Program Opportunity Notice (PON) 1259 to provide a vehicle for independent program administrators to submit proposals and for NYSERDA to evaluate any such proposals. The PON was a competitive solicitation that sought proposals for innovative programs that would not duplicate programs currently being offered by NYSERDA, or the utilities, or assigned to NYSERDA or utilities in the June 23, 2008 Order. The selection criteria stated in the PON were adopted from the June 23, 2008 Order contained in Appendix 3.

In response to the PON, twelve proposals were submitted to NYSERDA and reviewed by a Technical Evaluation Panel (TEP) consisting of both internal NYSERDA staff and external members. The TEP recommendations were submitted to NYSERDA's Management Review Process and two proposals were found to merit further investigation. NYSERDA has notified all proposers as to their status of inclusion in or omission from this filing. Upon request, NYSERDA will provide each proposer with a full debriefing regarding the evaluation of their proposal. NYSERDA will also, upon request, provide a more detailed explanation to the Commission or DPS Staff regarding the process undertaken or the resulting recommendations.

No funding has been included in this Program Proposal to accommodate the two proposals found to merit further investigation.

3. INDEPENDENT PROGRAM ADMINISTRATOR PROPOSALS RECOMMENDED FOR FURTHER INVESTIGATION

NYSERDA recommends that proposals submitted by EnerNOC, Inc. and EnSave, Inc. (both proposals are attached as appendices) be further investigated and have highlighted specific recommendations regarding these proposals.

EnerNOC, Inc. — EnerNOC proposes a Monitoring-Based Commissioning Program to assist commercial customers in better understanding their energy use and identifying strategies to reduce consumption. The proposed program offers potential to provide valuable information related to this program design and technical approach. NYSERDA recommends that the program be considered on a more limited basis of $5 million and using a recognized regional or national benchmarking scorecard rather than a proprietary approach. The program would also benefit by closer coordination with NYSERDA and utility programs, clarification of its payment and deliverables schedule (including

[97] Order at page 59.

reducing front-loading and linking payments to energy savings performance), and increased goals for market penetration.

EnSave, Inc. — EnSave proposes to implement projects at farms sites and to work with upstream markets to expand the energy efficiency options available from equipment manufacturers and dealers. EnSave's experience with the agricultural sector and key partners, its comprehensive approach, and the needs of this sector warrant support and further investigation of this proposal. NYSERDA recommends that the proposer designate a greater proportion of program funding for incentives to end-use or midstream market players. It would also benefit the program to reduce redundancy and provide closer coordination with NYSERDA and utility programs (leading to a greater understanding of existing programs and processes available for this sector). EnSave needs to clarify payment and deliverables schedule, coordination on measurement and verification with NYSERDA programs, and how therms savings incentives were derived.

4. Independent Program Administrator Proposals Not Recommended for Further Investigation

Based on the established selection criteria and policy issues, the remaining proposals are not recommended for further investigation. The following in intended to provide a brief summary of the proposals received and identify the primary factors for NYSERDA's determination to omit the proposals from this filing.

Air Power USA, Inc. - Air Power USA proposes to provide air compression audits, implementation support and monitoring for twenty-five large industrial customers.

American Wind Power & Hydrogen, LLC (AWP&H) – AWP&H proposes the installation of an energy efficiency project that would provide base load and peak power production through the use of hydrogen-powered fuel cells.

City University of New York (CUNY) Institute for Urban Systems - CUNY proposes to establish a New York City Retro-Commissioning Center tasked at retro-commissioning and enhanced building operations potential in New York City buildings. The main objective of this proposal is to accelerate the adoption rate of retro-commissioning. This Center proposes to work with the utilities and NYSERDA.

Consumer Powerline, Inc. - Consumer Powerline proposes to create an energy efficiency cap and trade market. This system would be based on the purchase and sale of "white certificates" representing energy efficiency achieved by the end user. By implementing energy efficiency measures any consumer in New York could obtain white certificates which could be sold, thereby giving the end user greater incentive to install energy efficient measures.

CoolNRG USA, Inc. - CoolNRG proposes to target residential customers in Con Edison territory to distribute 2.7 million free CFLs in March 2009. CoolNRG proposes to work in partnership with a single retail chain in New York City with roughly 220 stores.

EarthKind Energy, Inc. – EarthKind proposes a program to provide solar thermal technologies to electric hot water customers across the State. Note, this Proposal was marked 'Confidential'.

Matrix Energy Services, Inc - Matrix Energy Services proposes to provide demand control ventilation (DCV) and other low-cost/no cost measures for 120 entertainment complexes such as movie theaters in New York. The proposed program would also provide a site energy audit to identify other energy efficient and demand response measure opportunities.

Nexant, Inc. - Nexant proposes to design and implement a Data Center Energy Management Program. The program focuses on existing buildings although it is potentially applicable to new construction.

SAIC - SAIC proposes an enhanced version of NYSERDA's New Construction Program delivery model for existing Healthcare Facilities in Consolidated Edison territory. SAIC proposes to create a Healthcare Advisory Board that would be the recipient of funds and provide advice and consent to SAIC for the administration of the funds.

State University of New York (SUNY) - SUNY proposes the installation of energy efficient projects, primarily combined heat and power projects and lighting retrofits, at 26 upstate SUNY campuses.

5. BASIS FOR RECOMMENDATION

The recommendation to not pursue further investigation of the remaining proposals is based on the established selection criteria and policy issues summarized below.

- The extent to which resource acquisition benefits (MWh reduction) are not achieved within the timeframe outlined in the June 23, 2008 Order: Air Power USA, AWP&H, CUNY, Consumer Powerline, and Earthkind Energy.

- Insufficient alignment of payment and deliverables schedule: AirPower, AWP&H, CUNY, Consumer Powerline, Earthkind Energy, Matrix, Nexant, SAIC and SUNY.

- The potential for unfair competitive advantage: AWP&H, CoolNRG, CUNY, EarthKind Energy, Matrix, Nexant, and SAIC.

- Equity and rate impact concerns associated with programs paying a high proportion (as much as 100%) of measure cost: AWP&H, CoolNRG, and SUNY.

- The redundancy or conflict with NYSERDA programs: Air Power, CoolNRG, Consumer Powerline, CUNY, EarthKind Energy, Matrix, Nexant, SAIC, and SUNY.

- Did not distinguish project development and management versus program development and management, and are more appropriately considered individual projects eligible to participate in NYSERDA or utility programs. In such cases, NYSERDA will encourage each proposer to submit their proposed projects to the appropriate NYSERDA programs: AWP&H, Air Power, Matrix, SAIC and SUNY.

APPENDIX A: BENEFIT/COST DEFINITIONS AND INPUTS

This Appendix provides definitions of benefit/cost terms, describes how certain concepts were applied to the Total Resource Cost analysis, and presents tables showing the key inputs to the benefit/cost analysis.

Avoided Electric Energy, Capacity, and Distribution Costs.

Energy - Historical New York Independent System Operator (NYISO) day-ahead (DA) clearing prices were used to estimate avoided energy costs in six time periods categorized as summer on-peak, summer off-peak, summer shoulder, winter on-peak, winter off-peak, and winter shoulder. For each period, a three-year average price from 2005 through 2007 was used as the starting point and future prices were indexed to the natural gas price forecast. Avoided electric energy costs used in the analysis are shown in Table A-1. These prices reflect the 7.2% line loss factor.

Capacity - Average historical clearing prices in the NYISO capacity auctions from 2005 to 2207 were used to estimate capacity costs for two regions: downstate (Consolidated Edison Service area) and upstate. Future prices were indexed to the natural gas price forecast. The avoided capacity costs are shown in Table A-1. These prices reflect the 15% reserve margin requirement, 7.2% line loss factor, and the avoided distribution costs estimated to be $55 per kW-year upstate and $110 per kW-year downstate.[98]

Discount Rate. A real discount rate of 5.5% was used.

Focal Year. The focal year of analysis was 2008 and all values are shown in 2008$.

Gross Measure Cost. This is the estimate of the full or incremental cost of equipment. For retrofit programs, measure costs include cost of design, installation, and full cost of equipment. For new construction programs and programs designed for normal replacement, incremental cost (difference in cost between high- and standard-efficiency equipment) is used.

Line Loss Factor. Line loss was estimated to be 7.2% of the energy and capacity savings.

Avoided Natural Gas Cost. The basis of the avoided natural gas cost was Energy and Environmental Analysis, Inc.'s forecast of prices conducted in mid-2008. Adjustments were made to this forecast to reflect heating, water heating, and baseload use and to reflect avoided peaking and T&D costs. The forecast is shown in Table A-2.

Net-to-Gross Ratio. Assumed to be 1.0 for this analysis.

Program Administrator Costs. These costs include program implementation costs, incentives paid to customers, marketing, and NYSERDA administration and evaluation costs. For all

[98] CASE 07-M-0548, Staff's January 9, 2008 IR Response to the Joint Utilities' Questions on the "Revised Proposal for Energy Efficiency Design and Delivery and Reply Comments of the Staff of the Department of Public Service" Dated November 26, 2007, and the "Staff Revised Proposal for Energy Efficiency Design and Delivery and Reply Comments" Dated December 3, 2007.

programs, NYSERDA administration costs were set to equal 7% of total program budget and evaluation costs were set to equal 5% of total program budget.[99]

Program and Participant Costs. The sum of the Program Administrator Cost and the participants' share of cost.

Program Administrator Cost (PAC) Test. This test divides the present value of the benefits by the present value of the Program Administrator Costs. A benefit-cost ratio greater than 1 indicates benefits exceed NYSERDA costs.

Total Resource Cost (TRC) Test. This test divides the present value of the benefits by the present value of Program and Participant Costs. A benefit-cost ratio greater than 1 indicates benefits exceed NYSERDA and participant costs.

[99] Total program budget includes administration and evaluation costs.

Table A-0-1. Avoided Electric Energy and Capacity Cost Forecast

	Summer on-peak	Summer off-peak	Summer shoulder	Winter peak	Winter off peak	Winter shoulder	Summer Capacity	Winter Capacity
	$/kWh	$/kWh	$/kWh	$/kWh	$/kWh	$/kWh	$/kW-yr	$/kW-yr
Upstate								
2007	0.10	0.07	0.08	0.09	0.07	0.08	42.04	35.11
2008	0.12	0.08	0.10	0.10	0.08	0.09	49.64	41.45
2009	0.13	0.09	0.10	0.11	0.09	0.10	53.24	44.46
2010	0.13	0.09	0.11	0.12	0.09	0.11	55.90	46.69
2011	0.14	0.10	0.11	0.12	0.09	0.11	57.72	48.21
2012	0.14	0.10	0.11	0.12	0.09	0.11	58.79	49.10
2013	0.14	0.10	0.11	0.12	0.10	0.11	59.21	49.45
2014	0.14	0.10	0.11	0.12	0.10	0.11	59.07	49.33
2015	0.14	0.10	0.11	0.12	0.09	0.11	58.47	48.83
2016	0.14	0.09	0.11	0.12	0.09	0.11	57.50	48.02
2017	0.13	0.09	0.11	0.12	0.09	0.11	56.25	46.98
2018	0.13	0.09	0.11	0.11	0.09	0.10	54.83	45.79
2019	0.13	0.09	0.10	0.11	0.09	0.10	53.32	44.53
2020	0.12	0.09	0.10	0.11	0.08	0.10	51.82	43.28
2021	0.12	0.08	0.10	0.11	0.08	0.09	50.43	42.12
2022	0.12	0.08	0.09	0.10	0.08	0.09	49.25	41.13
2023	0.12	0.08	0.09	0.10	0.08	0.09	48.36	40.38
2024	0.11	0.08	0.09	0.10	0.08	0.09	47.86	39.97
2025	0.11	0.08	0.09	0.10	0.08	0.09	47.84	39.95
2026	0.11	0.08	0.09	0.10	0.08	0.09	47.83	39.94
2027	0.11	0.08	0.09	0.10	0.08	0.09	47.82	39.93
2028	0.11	0.08	0.09	0.10	0.08	0.09	47.81	39.92
2029	0.11	0.08	0.09	0.10	0.08	0.09	47.79	39.91
2030	0.11	0.08	0.09	0.10	0.08	0.09	47.78	39.90
2031	0.11	0.08	0.09	0.10	0.08	0.09	47.77	39.89
Downstate								
2007	0.15	0.09	0.11	0.11	0.08	0.10	116.65	87.27
2008	0.18	0.10	0.13	0.13	0.10	0.12	137.72	103.03
2009	0.19	0.11	0.14	0.14	0.11	0.13	147.72	110.51
2010	0.20	0.12	0.15	0.15	0.11	0.13	155.11	116.03
2011	0.21	0.12	0.15	0.15	0.12	0.14	160.16	119.81
2012	0.21	0.12	0.15	0.16	0.12	0.14	163.13	122.04

	Summer on-peak	Summer off-peak	Summer shoulder	Winter peak	Winter off peak	Winter shoulder	Summer Capacity	Winter Capacity
2013	0.21	0.12	0.15	0.16	0.12	0.14	164.29	122.90
2014	0.21	0.12	0.15	0.16	0.12	0.14	163.90	122.61
2015	0.21	0.12	0.15	0.15	0.12	0.14	162.22	121.36
2016	0.21	0.12	0.15	0.15	0.12	0.14	159.53	119.34
2017	0.20	0.12	0.15	0.15	0.11	0.13	156.07	116.76
2018	0.20	0.11	0.14	0.14	0.11	0.13	152.12	113.80
2019	0.19	0.11	0.14	0.14	0.11	0.13	147.94	110.67
2020	0.19	0.11	0.14	0.14	0.10	0.12	143.79	107.57
2021	0.18	0.11	0.13	0.13	0.10	0.12	139.93	104.68
2022	0.18	0.10	0.13	0.13	0.10	0.12	136.64	102.22
2023	0.17	0.10	0.13	0.13	0.10	0.11	134.16	100.37
2024	0.17	0.10	0.13	0.13	0.10	0.11	132.78	99.33
2025	0.17	0.10	0.13	0.13	0.10	0.11	132.74	99.30
2026	0.17	0.10	0.13	0.13	0.10	0.11	132.71	99.28
2027	0.17	0.10	0.13	0.13	0.10	0.11	132.67	99.25
2028	0.17	0.10	0.12	0.13	0.10	0.11	132.64	99.23
2029	0.17	0.10	0.12	0.13	0.10	0.11	132.60	99.20
2030	0.17	0.10	0.12	0.13	0.10	0.11	132.57	99.17
2031	0.17	0.10	0.12	0.13	0.10	0.11	132.53	99.15

Note: Electric energy prices for 2007 reflect average load-weighted hourly day-ahead NYISO clearing prices from 2005 to 2007, adjusted for line loss. Forecasted prices (2008 to 2031) reflect the pattern of prices in the Henry Hub natural gas price forecast developed by Energy and Environmental Analysis, Inc., in 2008. Capacity prices for 2007 is the average capacity auction clearing prices from 2005 to 2007, adjusted for a 15% reserve margin requirement, 7.2% line loss, and avoided distribution costs of $50 per kW upstate and $110 per kW downstate. The "upstate" capacity price is a weighted clearing price from all zones except "J" & "K" for all auctions. The "downstate" capacity price is a weighted average of the New York City Total Cost and the "Upstate" prices applicable to zones "H" and "I".

Table A-2. Natural Gas Price Forecast

Year	Upstate $/MMBtu				Downstate $/MMBtu			
	Heating C/I	Heating Residential	Base-load	Water Heating	Heating C/I	Heating Residential	Base-load	Water Heating
2007	11.63	14.41	8.64	9.38	12.19	15.26	9.50	10.17
2008	13.56	16.67	10.22	11.05	13.66	16.87	10.83	11.54
2009	14.49	17.78	10.99	11.87	14.40	17.68	11.50	12.23
2010	15.19	18.60	11.57	12.47	14.95	18.28	11.99	12.73
2011	15.68	19.17	11.97	12.89	15.31	18.68	12.32	13.07
2012	15.97	19.51	12.21	13.15	15.52	18.90	12.51	13.26
2013	16.10	19.66	12.31	13.26	15.59	18.98	12.57	13.33
2014	16.08	19.64	12.30	13.24	15.54	18.93	12.53	13.28
2015	15.95	19.49	12.19	13.13	15.40	18.77	12.40	13.15
2016	15.73	19.23	12.01	12.94	15.17	18.52	12.19	12.94
2017	15.44	18.88	11.77	12.68	14.89	18.21	11.94	12.68
2018	15.10	18.49	11.49	12.39	14.57	17.86	11.65	12.38
2019	14.74	18.07	11.20	12.08	14.23	17.49	11.34	12.06
2020	14.39	17.65	10.91	11.77	13.93	17.17	11.07	11.79
2021	14.06	17.27	10.64	11.49	13.64	16.85	10.81	11.52
2022	13.79	16.95	10.41	11.26	13.39	16.58	10.59	11.29
2023	13.60	16.72	10.26	11.09	13.22	16.39	10.43	11.13
2024	13.51	16.62	10.18	11.01	13.14	16.30	10.35	11.05
2025	13.54	16.66	10.21	11.04	13.17	16.33	10.38	11.08
2026	13.72	16.87	10.36	11.20	13.33	16.51	10.53	11.23

Note: Natural gas prices are based on the most recent Energy and Environmental Analysis, Inc.'s forecast of Upstate and Downstate prices, adjusted for end-use type and avoided peaking and T&D costs.

APPENDIX B. ENERNOC, INC. PROPOSAL

ENERNOC

get more from energy

Monitoring-Based Commissioning Energy Efficiency Program Proposal

In Response to:

Request for Independent Program Administrators
Energy Efficiency Portfolio Standard
Program Opportunity Notice (PON) 1259

Presented to:

NYSERDA

Presented by:

EnerNOC, Inc.

Table of Contents

Executive Summary

Pursuant to Ordering Paragraph 8 of the New York State's Commission June 23, 2008 Order Establishing Energy Efficiency Portfolio Standard and Approving Programs in Case 07-M-0548, EnerNOC hereby submits its proposal to NYSERDA to act as an independent program administrator. Specifically, EnerNOC is proposing to offer Monitoring-Based Commissioning (MBCx) services to appropriate customers throughout the state. MBCx assists commercial customers to better understand their energy usage, participate in a comprehensive audit, implement cost-effective energy efficiency measures and eugage in an ongoing, monitoring-based commissioning process that will generate substantial energy efficiency savings.

Working Group IV carefully considered this innovative and cost-effective approach to energy efficiency and recommended that the Commission approve MBCx as an eligible EEPS measure. We are confident that MBCx is exactly the sort of measure that the Commission was referring to when it solicited "innovative proposals bronght forward by competitive suppliers." EnerNOC's national experience uniquely qualifies us as "capable of administering and delivering programs" and our performance-based pricing demonstrates that we are "willing to be held accountable for results."

The implementation budget of $15,021,525 assumes that the program will be implemented for a total of 53 customers who will conserve an estimated 277,000 MWh, 9.3 Million Therms, and reduce peak demand by 4.8 MW, through 2015. The budget is an initial estimate and EnerNOC is prepared to modify this target to meet NYSERDA's program objectives. Customers will be enrolled in 2009-2011, and each customer will receive three years of ongoing monitoring. As designed, the program has a TRC Benefit/Cost ratio of 1.65(excluding carbon benefit).

Following the receipt of the proposal, EnerNOC is looking forward to cooperatively working with NYSERDA to refine the design and deployment of the MBCx program to meet your specific program objectives. EnerNOC expects to work with NYSERDA to provide additional information, including estimates of ratepayer bill impacts and, to the extent possible, other information, as provided for in the Order.

1 Program Description

1.1 Program Summary

EnerNOC is proposing to implement a unique *Monitoring-Based Commissioning* program for NYSERDA, to target existing commercial customers in the New York service territory. The objective of the program is to help commercial customers gain a better understanding of their energy usage, participate in a comprehensive audit, implement cost-effective energy efficiency measures (with possible help from incentives, if deemed appropriate and necessary), aud engage in an ongoing, monitoring-based commissioning process that will generate substantial energy efficiency savings for customers and NYSERDA.

Monitoring-Based Commissioning (MBCx) is a relatively new energy efficiency application. Broadly speaking, it refers to the combination of remote retro-commissioning and continuous commissioning activities, coupled with ongoing, techuology-based monitoring to ensure the persistence of savings. In our proposed approach, targeted customers are carefully screened and selected for participation in the program. We are not seeking to enroll a very large number of customers with this program; rather, we want to carefully select customers that are likely to yield the greatest savings and are able to fully participate iu the program.

Once customers have been selected aud eurolled, EnerNOC will install monitoring technology at each facility to capture energy usage data from interval meters, install sub-meteriug or data loggers where appropriate and necessary, and interface with building control and energy management systems (BCS/EMS). At NYSERDA's discretion, the cost of installing this equipment may be covered iu part or in whole by the program, to offset this iuitial customer cost barrier. The data collected will then used to continuously track building operation and performance, aud to create benchmarks for optimal building operations. At the same time, all participating facilities will go through a comprehensive audit remote monitoring based commissiouiug process to identify inefficient operations, as well as opportunities for system or capital upgrades that could lead to a cost-effective reduction in energy usage. Upou receipt of the comprehensive audit, and at the discretiou of NYSERDA, participating customers will have access to per-kWh inceutives to offset the cost of implementing some of the proposed measures. Once all measures have been installed or implemented, the program will measure and verify the impact of the installed measures, and transition the customer to the ongoing monitoriug phase of the program.

Siuce all buildings invariably drift away from optimal operations, the ongoing monitoring ensures that building managers are alerted to any deviations from the

optimal range of operation, as well as to any maintenance or scheduling issues as they arise. With help from the program, building managers can then take the appropriate remedial action on a timely basis, and ensure that the buildiugs contiuue to perform at an optimal level, and that the savings are persistent.

For this program, EnerNOC will provide a technology solution (PowerTrak®), expertise in commercial building energy efficiency, and assistance with implementation, as well as overall program management. For each enrolled customer, EnerNOC will integrate with meter and BCS/EMS data, monitor and analyze energy usage, perform a comprehensive audit, manage customer implementations, provide follow-through monitoring, and deliver monthly MBCx Scorecards that provide recommendations for changes or upgrades and track savings from already-implemented measures.

1.2 Scope of Work

For the purpose of clarity, the implementation plan has been broken out into seven major phases:

1: Program Design
2: Program Setup
3: Program Launch
4: Customer Enrollment
5: Installations & Scorecards
6: Measurement and Verification
7: Program Termination.

These phases are described in more detail below.

1. Program Design

As a first step in implementing this program, EnerNOC will revise its initially proposed program design to incorporate comments and recommendations from NYSERDA staff, and adjust for any recent developments in the market. EnerNOC will develop a revised program design that will incorporate all of these factors, and also include adjustments to address tie-ins with any other applicable programs. The final program design will address all of the following major design components: marketing and outreach, customer selection, enrollment process, incentive levels, interface with other programs, verification plan.

2. Program Setup

Ouce the program design has been finalized and approved, EnerNOC will move to the program setup phase, where we will build all of the processes, documents and materials

necessary to launch and operate the program. During this phase, we will focus on the following key aspects:

- Development of *marketing materials* (see below), which will include a website, a descriptive program brochure, a short program narrative, frequently-asked questions, and other material as appropriate.
- Development of *comprehensive program process documents* to address the following key processes:
  - Customer Selection
  - Customer Screening
  - Customer Enrollment
  - Customer Comprehensive Audit
  - Delivery of MBCx Scorecards
  - Measure Installation
  - Measure Verification
  - Incentive Calculation
  - Incentive Payment
  - Customer Complaint Resolution
  - Customer Feedback
  - Program Termination
  - Program Reporting
- Development of *key forms and materials* associated with the above processes (i.e. customer enrollment form, incentive payment form, audit report form, etc.)

During this setup phase, EnerNOC will work closely with NYSERDA and its representatives to ensure that all program elements follow established guidelines, are in line with other program processes, and do not lead to customer confusion.

3. Program Launch

Once the program design and setup has been approved, EnerNOC will officially launch the program and perform customer outreach. EnerNOC's outreach efforts will be focused on identifying the right customers for the program. EnerNOC will reach out to eligible customers in several ways, according to the marketing plan described in Section 1.7 below. EnerNOC will initially focus its primary outreach efforts on identifying customers within its existing customer base, and that present a good fit for this proposed program. EnerNOC will use its existing sales capabilities in place in New York to reach out to customers via traditional marketing channels.

4. Customer Enrollment

All prospective customers will be screened initially to determine whether they meet the program eligibility requirements, and that the facilities in question are good candidates for the program. Careful screening will ensure that the program does not invest in facilities that are not going to produce substantial savings. Screening requirements will include, but will not be limited to: appropriate BCS/EMS system, adequate levels of staffing, and program buy-in from building owners and facilities staff. Approved candidates will be required to enter into an agreement with the program to ensure that

they remain committed to the program. During the screening phase, EnerNOC will meet with the customer representative and perform a simple site assessment to ensure that the customer is a good fit for the program.

Once a customer has been identified and screened to ensure compatibility with the program eligibility and requirements, the customer will then be enrolled in the program. As part of enrollment, the customer will be required to enter into an agreement with the program to ensure proper commitment. The enrollment agreement will essentially guarantee that the customer is willing to dedicate some internal resources to comply with program requirements, and acknowledges that there will be some customer costs. If applicable, the agreement will also require the customer to implement certain measures before obtaining any incentive funds from the program.

5. *Installations & Audits*

Once any system upgrades required for integration have been completed, the program engineers will install additional permanent monitoring equipment at the customer location(s) to integrate EnerNOC's PowerTrak® application with the interval data recorders and BCS/EMS systems. The installed equipment may include additional meters for sub-metering, where appropriate, as well as connectivity equipment. Please see Appendix A – Technical Documentation, for a complete description of PowerTrak, as well as technical information on the equipment used to counect to these systems. At NYSERDA's discretion, the program may bear some or all of the costs to install this equipment.

EnerNOC will then collect and store meter data, along with building BCS/EMS data, in PowerTrak, EnerNOC's internet-based energy management platform. EnerNOC will augment this data with weather data, and building-specific data collected from databases such as IFMA (International Facility Management Association), APPA (Association of Physical Plant Administrators) and CBECS (Commercial Buildings Energy Consumption Survey). EnerNOC may also integrate with other systems to capture square footage data, average building occupancy, building type, schedules, and other relevant data.

EnerNOC's program engineers will monitor the buildings remotely, create baselines for the customer facilities, and review energy usage against those baselines. The program will also process all building data through PowerTrak filters, to uncover any equipment issues, schedule issues, or set point issues. All data and analysis will be performed using PowerTrak, and will be accessible to the customer, the utility, and to authorized third-parties via PowerTrak's web-based interface. In addition, program engineers will conduct a thorough and comprehensive audit of the participating facilities to uncover auy areas of inefficiency. On a monthly basis EnerNOC will deliver Scorecard reports to the participating facilities. The Scorecard will include recommendations to the customer

on equipment and operational upgrades that could result in energy efficiency improvements, as well as track the savings from previously-implemented efficiency measures. These recommendations will distinguish between three types of measures: 1) measures that require simple maintenance or repairs, 2) measures that require enhancements to the controls systems, and 3) measures that require major repairs or the investment in new equipment. The recommendations will also include estimate savings and costs for each measure identified.

Upon review of the Scorecard, the customer will then enter into an agreement to implement specific and approved measures, based on the recommendations of the program. Based on the design of the program, the costs of improvement measures may be offset by pre-determined incentives. Measures will be implemented either by the customer, or by a contractor approved by the program. Measures with payback times of less than 1 year will only be eligible for incentives if approved by the program.

6. *Measurement and Verification*

EnerNOC will track and capture energy usage information before and after implementation to provide baseline data that will assist with the Measurement and Verification of the implemented measures. The objective of this process is to ensure that the savings realized through the program are persistent and to calculate the program impact and incentive payments. This information is displayed in the Scorecard report and is updated monthly.

7. *Program Termination*

The process outlined above will be employed for the duration of the program until the last customer is selected and enrolled in the program. EnerNOC will begin to ramp the program down after the last customers have gone through the process and develop the necessary reports and documents to assist with the final evaluation of the program.

Throughout the process outlined in the seven stages above, EnerNOC will also ensure that a reporting process is pnt in place with NYSERDA to provide the necessary program reports and administrative oversight. EnerNOC will maintain all records associated with customer participation for the duration of the program. Once the program is terminated, EnerNOC will turn over required documentation to NYSERDA and will continue to keep records for a period of 5 years.

1.3 Targeted Customers

The program will target large electric customers in the commercial, educational, healthcare, government and commercial real estate sectors. A typical customer will have a peak load of 1.5 MW or greater, will consume on average 10 million kWh per year or more, and will have multiple facilities. All participating customers will have a building

control or an energy management system with which EnerNOC will be able to interface. Examples of targeted customers include: public universities and community colleges, private schools and universities, commercial campuses, large commercial property, and government buildings.

EnerNOC has reviewed its existing customer base and has identified several customers that may be suitable for this program, primarily in the educational and government sector. EnerNOC has also performed a detailed analysis of NYSERDA's customer base, and has identified the potential for targeting this program in the service territory. This analysis is further detailed in Section 2 of this proposal.

1.4 Customer Eligibility

This program is a targeted program that, by design, is focused on a small set of customers. Eligible customers must meet the following initial criteria:

- Customers receive service from NYSERDA, with peak load (for all facilities) of 1.5 MW or greater (with some exceptions to accommodate smaller but well-suited customers).
- Customers are in the commercial segment and in the education, commercial property, healthcare or government sub-segments.
- Customers have an interval data recorder and use a BCS/EMS system.

1.5 The Customer Participation Process

To provide additional context to the program implementation plan described above, and to ensure that the program design does not overlook any key issues, EnerNOC has created a customer process to describe the steps that customers will take when they participate in the program. This process is illustrated in Figure 1 and described in more detail below.

Figure 1

1. *Customer Screening*: All prospective customers will be screened initially to determine whether they meet the program eligibility requirements, and that the facilities in question are good candidates for the program. During the screening, the customer will be introduced to the program and will receive quick on-site assessment to ensure compatibility with the program. There will be no obligation at this stage, which is expected to last *on average 1 month per customer.*

2. *Customer Enrollment*: Once an interested customer has been screened and found to be eligible, the customer will be enrolled. As part of enrollment, the customer will be required to enter into an agreement with the program to ensure proper commitment. The enrollment agreement will require that the customer is willing to dedicate some internal resources to comply with program requirements, and acknowledges that there will be some customer costs. If applicable, the agreement will also commit the customer to implementing measures in order to obtain any incentive funds from the program. This enrollment step is expected to last, *on average, 1 week per customer.*

3. *Monitoring Equipment Installation*: Program engineers will then go onsite to install monitoring equipment at the customer's premises. Depending on NYSERDA's direction, the program may bear the cost of installing this equipment. EnerNOC will then collect and store meter data, along with building BCS/EMS data, EnerNOC may also integrate with other systems to capture additional data, such as square footage, occupancy, building type, and schedules. This process also includes an initial site assessment audit, which is used to determine the customer's operational conditions, such as equipment and systems, operational profiles and special customer requirements (for example: the labs must run 24/7/365 and maintain a constant temperature of 72°F). During this audit EnerNOC will also make note of general equipment conditions and take note of equipment or systems that should be considered for upgrades or replacement. The expected duration of this step is, *on average, 2 months per customer.*

4. *Comprehensive Audit, Ongoing Monitoring and Scorecard Report* After the equipment has been installed and data begins to flow, the customer will undergo a comprehensive audit to uncover any areas of inefficiency. EnerNOC will also deliver a mouthly Scorecard report to each customer. The Scorecard will include and receive recommendations for equipment and operational upgrades that could result in energy efficiency improvements. These recommendations will distinguish between three types of measures: 1) measures that require simple maintenance or repairs, 2) measures that require enhancements to the controls systems, and 3) measures that require major repairs or the investment in new equipment. The recommendations will also include estimated savings and costs for each measure identified. The comprehensive audit is expected to last, on average, 3 months per customer. The Scorecard will be provided on *a monthly recurring fashion throughout the term of the contract.*

5. *Measure Implementation:* Upon review of the comprehensive audit Scorecard report, the customer will then enter into an agreement to implement specific and approved measures, based on the recommendations of the program. If deemed

appropriate, the cost of measures *with a simple payback time greater than one year* will be offset by incentives. Measures will be implemented either by the customer, or by a contractor approved by the program. This step is *a monthly recurring event throughout the term of the contract.*

6. *Measurement and Verification:* Following Measure Implementation, EnerNOC will perform a verification of the measure installation, and initiate the process for the customer to receive incentives, if NYSERDA elects to offer incentives. The expected duration of this step is, *on average, 1 month per customer.* If incentive payments are to be used, the customer will receive an incentive payment once the verification has been completed and NYSERDA has approved the installation.

7. *Ongoing Monitoring*: Enrolled customers will receive ongoing monitoring for their enrolled facilities to ensure that the savings are persistent and to uncover any new opportunities. These new opportunities will be processed as described through Steps 5 and on above. The customer will receive a monthly report and review proposed measures with the program on a quarterly basis. Please see Appendix A – Technical Documentation for a sample of the report. The program will support the customer in this phase for 3 years. At the end of this period, the customer will have the opportunity to continue participating in an ongoing monitoring phase by contracting directly with EnerNOC.

1.6 Examples

The MBCx concept was successfully pioneered as part of the UC/CSU/IOU Energy Efficiency Partnership, which demonstrated that the installation of permanent energy monitoring equipment, combined with retrofit activities, results in robust and more persistent energy efficiency savings[1]. Several recent studies have evaluated the impact of this program, most uotably Brown, Anderson and Harris, *How Monitoring Based Commissioning Contributes to Energy Efficiency for Commercial Buildings,* published in the Proceedings of the American Council for an Energy Efficient Economy. The analysis shows that MBCx can deliver cost-effective energy savings for higher-education campuses and other commercial facilities.

EnerNOC is also currently implementing a similar version of the program proposed here with some of the California State University campuses involved in the UC/CSU/IOU partnership. The program is currently under development..

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[1] Anderson, M., McCormick, A., Meiman, A. and Brown, K. 2007. *Quantifying Monitoring-Based Commissioning in Campus Buildings: Utility Partnership Program Results, Lessons Learned, and Future Potential.* National Confercnce on Building Commissioning: May 2 – 4, 2007

1.7 Marketing Materials & Outreach

The program marketing will include the development of specific program materials, along with customer enrollment and screening forms and a program website. EnerNOC will also explore recruiting potential customers through proven marketing channels, such as trade allies, industry organizations, and trade shows.

Customer Outreach

Given our strong presence in the New York demand response marketplace, EnerNOC has a dedicated and robust sales team that will reach out to prospective customers daily and attract new participants. In addition, EnerNOC has found that working with NYSERDA account managers can be a very effective strategy to identify eligible customers. EnerNOC therefore proposes to work with NYSERDA account representatives to identify the initial set of prospective customers.

Based on our experience in a variety of programs with utilities across North America, EnerNOC has consistently found that the most successful programs are those where we work in "partnership" with our utility client in program marketing and customer recruitment. While EnerNOC takes on the ultimate responsibility for recruiting customer participants, we have learned that branding the program as a utility offering – and having active participation by the utility's account executives in promoting the program – enhances customer satisfaction and delivers increased value to the utility.

Marketing Materials

EnerNOC's will work closely with NYSERDA to design an appropriate branding and messaging strategy for the program. As mentioned above, we recommend that the program marketing materials focus on NYSERDA's brand identity and identify EnerNOC as the "program implementation contractor." We are happy to discuss other marketing strategies as well. All marketing materials and messaging will be sent to NYSERDA for approval before use.

In most of our monitoring-based commissioning program implementations, EnerNOC has utilized materials that provide an overview of the program and describe the key benefits of participation. We have found that a "frequently asked questions" insert can also be very useful.

In line with our targeted recruitment strategy, EnerNOC will produce a small set of materials and distribute them either via mail or through in-person meetings. Materials will also be available for download via the program website. Figure 2 illustrates some EnerNOC marketing materials.

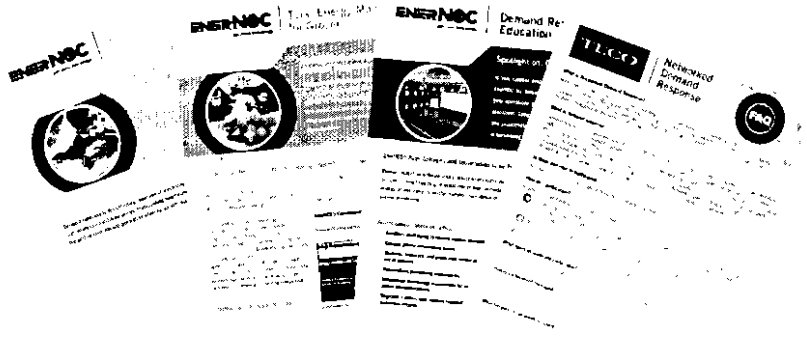

Figure 2: Examples of EnerNOC's Program-specific Marketing Collateral

Program Website

In addition to printed marketing materials, EnerNOC will create a program-specific website where customers can obtain more information about the program, download program documentation and get more information. The website branding will align with all other marketing materials to create consistency and reduce customer confusion. For an example of such a site developed by EnerNOC, please visit http://www.keeplibertyalight.com/.

2 *Company Information*

EnerNOC, Inc. is a leading developer and provider of clean and intelligent energy solutions for commercial, institutional, and industrial customers, as well as for electric power grid operators and utilities. Our technology-enabled demand response and energy management solutions help optimize the balance of electric supply and demand. As part of our energy efficiency offering, we provide monitoring-based commissioning services, and work with customers to implement energy efficiency solutions that achieve measurable and reliable energy savings.

General Information (Headquarters)	
Company Name	EnerNOC, Inc.
Mailing Address	24 West 40th Street 16th Floor New York, NY 10018
Telephone Number	212.624.0000
Fax Number	212.624.0001
Website	http://www.enernoc.com
Contact Information	
Contact Name	Lance Charlish
Mailing Address	24 West 40th Street 16th Floor New York, NY 10018
Telephone Number	617.895.8471
Fax Number	212.624.0001
Email Address	lcharlish@enernoc.com
Business Information	
Nature of Business	Developer and Provider of Clean Energy Solutions for Euergy Efficiency and Demand Response
Ownership Structure	C Corporation
Date Business Formed	December 2001
Parent Company	None
Affiliates	None
Subsidiaries	MDEnergy, South River Consulting
For Profit of Tax-Exempt	For Profit
Management Information	
Chief Executive Officer	Tim Healy
President	David Brewster

Chief Operating Officer	Darren Brady
Chief Financial Officer	Neil Isaacson
General Counsel	David Samuels

3 *Experience and Qualifications*

3.1 Overall Project Experience and Results

Since 2001, EnerNOC has been working closely with end-use customers to enable superior demand response solutions. As our demand response efforts have grown, many customers have asked us to provide additional energy management services. Our engineers and project managers routinely identify equipment upgrades and process improvements that not only reduce peak loads but save energy year-round. Until recently, these demand side activities were conducted separately by different entities. In New York, EnerNOC has worked with NYSERDA to disseminate an integrated demand response and efficiency solution for end-use customers.

At the end-use customer-level, EnerNOC provides customers with monthly reporting and analysis of energy usage in the form of a "Scorecard" report. This type of "hands-on" approach allows EnerNOC and the end-use customer to identify and track specific energy efficiency opportunities and activities including process changes and equipment upgrades. These reports are further detailed in the Appendix. For oue particular customer, EnerNOC has identified, through monitoring based commissioning, and in less than a year, measures that effectively translated in a reduction in energy usage of approximately 13%.

EnerNOC is also currently implementing a pilot version of the MBCx program with the California State University (CSU) as part of the UC/CSU/IOU partnership. This pilot targets six campuses and seeks to identify permanent energy efficiency savings based on a process that is very similar to the one outlined in this abstract. This pilot installation phase is in full gear and as such has not yet returned any results.

4 *Program Staffing & Planning*

4.1 Staffing Plan

Key Personnel

The key personnel supporting this proposed program, along with their primary responsibilities, are:

- ***Account Executive*** **– Noel King will manage the relationship between EnerNOC and NYSERDA, and be involved as an account executive representing EnerNOC.**
- ***Program Manager*** **– Bill O'Connor will manage all aspects and day to day operations of the program.**
- ***Marketing Manager*** **– Taj Ait-Laoussine will manage program design, and will develop and manage the marketing plan.**
- ***Customer Manager*** **– Our staff of Business Development Managers will meet with potential customers to pre-qualify them for the program, develop and manage the relationships with customers, and handle the interface with subcontractors.**
- ***Energy Analyst*** **– Rick Paradis will review and analyze collected submeter and building management system data to determine potential energy efficiency projects.**

The qualifications of the personnel described above are listed below. In addition to the key personnel above, various other EnerNOC personnel will fulfill specific tasks related to this project. These roles include:

- ***Site Technician & Energy Auditors*** **– EnerNOC will provide personnel to perform on-site system auditing, site walk-through, and engineering analysis, and manage the energy efficiency project installation and system upgrades as necessary.**
- ***Program Administration*** **– EnerNOC staff with experience administrating energy efficiency programs for utilities will provide general administrative support to address reporting, document management, invoicing, customer service and other administrative tasks.**

4.2 Qualifications of Key Staff Members

The following table lists the qualifications of all key personnel that will participate in this program implementation.

Staff Members	*Qualifications*
Gregg Dixon *Senior Vice-President, Sales*	Gregg will lead EnerNOC's marketing and sales team to successfully engage customers in the program, as he has in similar programs for utilities across North America. Prior to joining EnerNOC, Gregg was Vice President of Marketing and Sales for Hess Microgen, the leading provider of commercial

Staff Members	*Qualifications*
	onsite cogeneration systems and services in the US. As a recognized expert in distributed generation, Gregg pioneered efforts to bring more than 20 MW of cogeneration to leading grocery, hospitality, commercial property, and manufacturing customers and developed Hess Microgen's leading-edge, Internet-based monitoring system, CONIFER. Gregg was also a partner at Mercer Management Consulting where he advised global Fortune 1000 technology, consumer products, and energy clients on customer and product strategy, economic choice analysis, and new business model development. Gregg graduated from Boston College with bachelor's degrees in Business Administration and Computer Science.
Noël King *Senior Director, Utility Sales*	Noël will serve as NYSERDA's point of contact through implementation of this program. Noël has over twenty years of experience in the utility and energy field. Prior to joining EnerNOC, Noel was a Director of Mercer Management Consulting's Energy Utilities practice, where he worked with utilities to develop business strategies and improve operational performance. Noël received a B.S. in Geology from Yale University and an M.S. in Applied Economics and Finance from MIT's Sloan School of Management.
Olav Hegland *Director of Energy Services*	Olav will act as an adviser to the program. Olav oversees the engineering and execution component of PowerTrak at EnerNOC. Olav has over 17 years of experience in the electricity consulting industry, including demand side management, performance contracting, measurement & verification and continuous commissioning. Prior to joining EnerNOC, Olav was Director of Services with Cimetrics, Inc in Boston, MA, Director of Project Development for Abacus Engineered Systems in Seattle, WA and held positions with Coneco Corporation, ERI Services and XENERGY Inc. Olav holds a Master of Science in Mechanical Engineering at the University of Massachusetts, Amherst, and did his undergraduate work at the University of Manchester Institute of Science and Technology in England and at the University of Massachusetts, Amherst. Olav is a registered Professional Engineer in the State of Massachusetts and a Certified Energy Manager (AEE).
Rick Paradis *Senior Energy Analyst*	Rick will be the primary program engineer for this project, performing the main analyses to identify opportunities and estimate the potential impacts. As Senior Energy Analyst, Rick is responsible for EnerNOC's Total Energy Management service offering, which includes monitoring-based commissioning and identification and M&V of energy efficiency projects. Rick has been in energy efficiency since 1978. Rick has experience writing technical assistance audit reports; developing design alternatives for HVAC, lighting, thermal storage, and alternative energy projects; providing construction observation and review services and monitoring and verification protocols. Rick has also managed and supervised technical potential studies and various technical assessments of end-use equipment for natural gas utilities in Massachusetts and New Jersey to develop utility

Staff Members	*Qualifications*
	demand side management (DSM) programs. Rick graduated from Clark University. Rick is also a MEOER Certified Energy Auditor and a Certified Energy Manager. He co-authored two publications: "Intelligent Use of Energy at Work: A detailed account of Saving Energy and Cost at the Wellness Center of the University of Miami" and "How to Automate Strategies That Make Companies Energy Savvy" both in AEE publications.
TajAit-Laoussine *Senior Marketing Manager*	Taj will oversee the program planning and design and manage the marketing for tbis project. Taj will also help to project manage the project during its initial year. As Senior Marketing Manager Taj Ait-Laoussine is responsible for setting the marketing strategy and coordinating all of EnerNOC's marketing activities related to energy efficiency. Taj has over twelve years experience working with utilities and large end-use customers, with a focus on energy efficiency, demand response and energy management software applications. Prior to joining EnerNOC, Taj was a Senior Product Manager for Nexus Energy Software, where he managed the development of meter data and energy management applications. He also held positions at Silicon Energy and Hagler Bailly Consulting. Taj has extensive experience designing, managing and implementing and evaluating energy efficiency programs. Taj has a B.A. in Physics for the University of California at Berkeley, and an M.S. in Energy and Resources, also from the University of California at Berkeley.

5 *Program Impact, Deliverables, Budget and Pricing*

5.1 Market Potential

In developing this proposal, EnerNOC has performed a detailed analysis of the market potential in NYSERDA's service territory. To perform this analysis, we have used the following criteria to identify qualified customers:

- ***Market Segments*: our experience has shown that the most attractive MBCx targets are in the higher education, healthcare and owner-occupied commercial property (including the government sector). We therefore focused our analysis on these particular segments.**
- ***Customer Size*: MBCx is also most applicable to the larger commercial customers. EnerNOC typically targets customers that use, an average, 10 million kWh per year or more. While smaller customers may be eligible aud benefit from an MBCx program, we have found that the best targets are in the 10 million kWh range.**
- ***Customer Characteristics*: ideal MBCx customers will have multiple buildings, and will manage at least part of those building using a BCS/EMS. We impose the presence of a BCS/EMS as a requirement, and only cousider campus-like or multi-building customers as part of our targets.**

5.2 Per Customer Impacts

EnerNOC has developed a comprehensive analysis of the MBCx process, and of its impacts and associated costs. This analysis is documented in a Technical Work Paper included in this proposal as Appendix A. The Work Paper provides a detailed example of how MBCx is implemented, drawing on examples from past EnerNOC experieuce, as well as a review of the existing literature. Table 1 highlights the impacts and costs associated with performing MBCx at a typical customer. The data is supported by the Work Paper. Note that this data is based on actual EnerNOC implementations of MBCx, and that this data was adjusted specifically to address customer in the New York climate zones.

Table 1

Measure Name	*Customer Annual Electric Savings (kWh/unit)*	*Customer Peak Electric Demand Reduction (kW/unit)*	*Customer Annual Therms Savings (Thm/unit)*	*Measure Installed Cost ($/unit)*
Monitoring Based Commissioning	893,000	92	30,000	$83,230

The costs shown in Table 1 are the costs associated with implementing measures identified as part of the MBCx process, but do not include the installation cost associated with enabling an MBCx customer. In past implementations, EnerNOC has had part or all of this cost borne by the program budget, since these costs are often barriers to the customer enrolling in the program. EnerNOC will look to NYSERDA's guidance in how to address these costs, which are estimated to be approximately $25,000 per customer for a typical customer, and which are highlighted in the budget.

5.3 Proposed Program Impacts

Using the data presented in Section 5.2, we can calculate the proposed program impacts, as documented in Table 2. This table shows the analysis of the estimated program impacts, assuming that the customers are enrolled over a period of 3 years (2009-2011), and that each customer is then monitored by EnerNOC for a period of 3 years. After that three year monitoring mark, the customer can elect to extend the monitoring beyond 3 years by contracting directly with EnerNOC, but those costs are not covered by the program. EnerNOC is happy to provide NYSERDA with a program design that uses a different length of time for the ongoing monitoring. We have initially settled on a 3-year duration for the monitoring because it extends the impacts of the program through 2015.

Table 2

Overall Program Impact Analysis	2009	2010	2011	2012	2013	2014	2015
Avoided Energy(MWh)	11,609	29,469	47,329	47,329	47,329	47,329	47,329
Avoided Demand (kW)	1,196	3,036	4,876	4,876	4,876	4,876	4,876
Avoided Gas(Therms)	390,000	990,000	1,590,000	1,590,000	1,590,000	1,590,000	1,590,000

5.4 Reliability and Persistence of Savings

There have been several studies that have documented that MBCx programs result in persistent energy efficiency savings. In particular, Brown, Anderson and Harris reviewed the UC/CSU/IOU Energy Efficiency Partnership, and concluded that "enhanced monitoring capabilities have proven valuable in identifying, diagnosing, and quantifying measures to reduce energy use. Monitoring also provides a means to increase persistence of commissioning-related savings."[2]

There have also been numerous studies on the success of retro-commissioning in increasing the efficiency of facilities, and in realizing persistent savings. For instance,

[2] Brown, K., Anderson, M. and Harris, J. 2007. *How Monitoring Based Commissioning Contributes to Energy Efficiency for Commercial Buildings.* Proceedings of the 2006 ACEEE Summer Study, Asilomar, CA.

Bourassa, Piette and Motegi, in a study of a retro-commissioning program at SMUD, found substantial, energy savings persistence well into the fourth year after the program[3]. In our analysis, we have assumed that the measure lifetime, on average, will be 5 years. We believe a measure lifetime of 5 years is appropriate, and is in line with the desired results of this program.

In addition to the efficient way in which savings can be identified and implemented, the thrust of EnerNOC's MBCx process is the built-in persistence associated with the long term monitoring of all critical building parameters. Once a building has reached the most optimum efficiency level, the fault detection filters and applications continue to work on the customers behalf. Instead of relying on measures not drifting back after 5 years, EnerNOC's remote monitoring and analytics ensures that all measures that recur or drift back as a result of operator adjustments are quickly brought back to it efficient state.

The intent with the MBCx offering presented here is that EnerNOC's data center and analytics will remain in full effect throughout the 5 year performance persistence period.

5.5 Customer Deliverables

As described in Section 1 above, the energy savings will be captured through the implementation of energy efficiency measures by the customer, based on the recommendations coming out EnerNOC's Comprehensive Audit and Scorecard Report. We expect that multiple recommendations will be provided per customer, and that the customer will be responsible for implementing the measures, with help as needed from the program. Our experience has shown that, on average, a customer going through this process may receive over 40 recommendations in the first year, and about half of that in subsequent years. Not all measures are implemented, but those that are lead to savings on the order of 5% - 15% of the total energy usage.

The specific deliverables to the customer, as part of EnerNOC's Monitoring-Based Commissioning Program, include:

- *Comprehensive Audit* Each customer will receive a comprehensive audit, which will identify recommendations on equipment and operational upgrades that could result in energy efficiency improvements. These recommendations will distinguish between three types of measures: 1) measures that require simple maintenance or repairs, 2) measures that require enhancements to the controls systems, and 3) measures that

[3] Bourassa, N., Piette, M.A., Motegi, N. 2004. Lawrence Berkeley National Laboratory, Berkeley, CA.

require major repairs or the investment in new equipment. The recommendations will also include estimate savings and costs for each measure identified.

- *Ongoing MBCx Scorecard Report*: For each customer, EnerNOC will provide an MBCx report, as illustrated in Appendix A – Technical Documentation. This Scorecard will provide a list of all identified measures, corrected measures, building profiles, benchmarks, as well as an ongoing summary of the results of program participation. Customers will receive this report on a monthly basis. The Scorecard also tracks the savings that have accrued from previously-implemented measures.
- *An Annual M&V Report:* This report will be an annual roll-up report of actual performance achieved through the implementation of energy efficiency measures.
- *Portfolio M&V Report:* This report represents a NYSERDA view of the performance of the participating customers, with a roll-up of portfolio results and performance.

5.6 Project Time Line

EnerNOC is proposing a project timeline that completes the NYSERDA contract over 3 years (2009-2011), but allows for monitoring over a 3-year period beyond that time frame. This time line is reflected in Table 4 of the proposal. If selected, EnerNOC will work with NYSERDA to develop a detailed project plan and time line to ensure that the program milestones and deliverables are in line with NYSERDA's expectations.

5.7 Program Budget

Table 3 below provides a breakdown of the proposed budget for this program. Please note the following assumptions that were employed in arriving at that budget:

- The budget assumes that the program will be implemented for a total of 53 customers. As noted above, EnerNOC is using this figure as an initial estimate, and is prepared to modify this target to meet NYSERDA's preferred objectives.
- Customers will be enrolled in 2009-2011, and each customer will receive three years of ongoing monitoring. The budget shown below accounts for future monitoring costs (i.e. those costs incurred in 2012 and 2013) having been brought forward to 2009-2011.
- The budget does not include any incentives or offsets to the customer: this budget only reflects EnerNOC costs.
- The impacts associated with this budget are shown in Table 4.

Table 3

Program Budget Analysis	2009	2010	2011	Total
EnerNOC Program Administration	$662,500	$662,500	$662,500	$1,987,500
EnerNOC Customer Enablement	$585,000	$900,000	$900,000	$2,385,000
EnerNOC Customer Monitoring	$1,398,357	$3,549,675	$5,700,993	$10,649,025
Total EnerNOC Budget	**$2,645,857**	**$5,112,175**	**$7,263,493**	**$15,021,525**

As illustrated in Table 3, our budget is broken down into the following categories:

- ***Program Administration*** **– The administrative costs designated for this project encompass all the program overhead costs associated with the program design, implementation, and management.**
- ***Customer Enablement*** **– These costs included the costs associated with enabling the customers being targeted for this program. These costs only represent EnerNOC costs, and do not include any incentives to the customers, or any offsets of the costs required for installing the monitoring equipment. The costs shown in this category represent steps 1 through 6 of the customer process outlined in Section 1.5.**
- ***Customer Monitoring*** **– The Customer Monitoring Costs represent the costs of performing the ongoing monitoring for 3 years with each customer. Note that although these costs extend beyond the 3-year program window, they have been brought forward to facilitate the budgeting process. EnerNOC is open to considering different arrangements whereby the monitoring costs are incurred in line with when the monitoring occurs.**

The overall budget for the EnerNOC MBCx program is designed to maximize the kWh and kW savings from each project undertaken in the program. While this proposal is based on a total of 53 implementations, this is only an approximate target. EnerNOC will be happy to adjust the budget to reflect a different scope for this program.

6 *Selection Criteria*

6.1 Cost/Benefit Ratios and Program Impacts

TRC Analysis

EnerNOC has conducted a cost-effectiveness analysis using the TRC test to provide some guidance on the cost-effectiveness of the proposed program. The TRC analysis presented here is based on input obtained from the New York State Department of Public Service, and may need to be adjusted pending additional or updated data to be provided by NYSERDA. The assumptions behind the TRC analysis are documented below. Note that the avoided cost numbers we used are statewide numbers, without the inclusion of Long Island.

- *Discount Rate:* **5.5%, per New York State Department of Public Service input**
- *Measure Life:* **5 years, as documented in Appeudix B – Technical Work Paper**
- *Ongoing Monitoring:* **3 years**
- *TRC Benefits:* **we assumed TRC benefits attributable to the following sources:**
  - *Avoided Energy Costs:* **we obtained avoided energy costs, inclusive of liue losses, from the New York State Department of Public Service. These costs are listed in Appendix B.**
  - *Avoided Capacity Costs:* **we obtained avoided capacity costs, which included T&D and liue losses, also from New York State Department of Public Service. These costs are also listed in Appendix B.**
  - *Avoided Gas Costs:* **finally, we obtained avoided gas costs, also from New York State Department of Public Service. These costs are also listed in Appendix B.**
- *TRC Costs:* **we assumed TRC costs attributable to the following sources:**
  - *Program Administration Costs*: **these costs correspond to the EnerNOC budget described in Section 5.7. We have not included any administrative costs attributable to NYSERDA managing the program.**
  - *Customer Costs*: **which include the measure costs of $83,230, as highlighted in the Appendix B – Technical Work Paper, and the $25,000 monitoriug equipmeut installation costs, for a total of $108,230 per customer.**

The analysis shows that the proposed program has a *TRC Benefit/Cost ratio of 1.65*, when calculated using the assumptions documented above. This TRC ratio does not include any incentives or customer iustallation costs, as these are transfers and therefore do not factor into the analysis. This analysis also does uot include auy benefits attributable to avoided CO2 emissions. Those are included and described later in this section.

Our calculations do not include the program administrator costs other than those budgeted for EnerNOC. We assume that there are no increases in supply costs, since this program do not results in any increases in supply.

Electric Rate Impact

As noted in the footnote of Appendix A of the RFP, NYSERDA indicates that there may not be sufficient information in the RFP to perform this calculation. Once additional information is available, EnerNOC will be happy to conduct this analysis for NYSERDA.

Electric Rate Impact per MWh saved

As noted in the footnote of Appendix A of the RFP, NYSERDA indicates that there may not be sufficient information in the RFP to perform this calculation. Once additional information is available, EnerNOC will be happy to conduct this analysis for NYSERDA.

Electric Rate Impact per MW Saved

As noted in the footnote of Appendix A of the RFP, NYSERDA indicates that there may not be sufficient information in the RFP to perform this calculation. Once additional information is available, EnerNOC will be happy to conduct this analysis for NYSERDA.

MWh Saved in 2015

As described in previous sections and in the supporting documentation, the program shows an estimated MWh savings for 2015 of 47,329 MWh. This figure is the same whether the program only functions for the period proposed, or if the program is extended, since we are performing ongoing monitoring until 2015. This figure, however, may change if the program is expanded to include more customers.

MW of Coincident NYSIO Peak Saved in 2015

As described in previous sections and in the supporting documentation, the program shows an estimated peak kW savings for 2015 of 4,876 kW. This figure is the same whether the program only functions for the period proposed, or if the program is extended, since we are performing ongoing monitoring until 2015. This figure, however, may change if the program is expanded to include more customers.

In order to perform this calculation accurately, EnerNOC recommends using load shape data to compare the load shape impact of the proposed measure to the NYSERDA system profile. We have deliberately chosen a conservative figure here absent any load shape information. This is reflected in our coincident factor calculation.

Peak Coincidence Factor

Using the figures noted above, the peak coincidence factor for this program is calculated to be 1.1. This derives from a measure kWh savings of 893,000 and a measure peak kW savings of 92. Given that this number is greater than 1, it implies that the savings accrue more frequently during the off-peak hours than the on-peak hours. As noted above, EnerNOC recommends using load shape date to compare the load shape impact of the propose measure to the NYSERDA system profile. In addition, the possibility exists for enrolling the customers targeted by this proposal into demand response programs, providing an additional peak demand reduction. This reduction is not calculated as part of this proposal, but EnerNOC can easily provide additional information or analysis if requested.

TRC Calculation with Carbon

To account for the environmental benefits associated with the program, we used a figure of $15 / ton of CO2, as well as an average factor of 0.454 ton per MWh for the service territory. This is based on data obtained from the EPA E-Grid Database[4].

We performed the TRC calculation with Carbon benefits. The results of this analysis shows that the resulting *TRC Benefit / Cost Ratio climbs to 1.75*.

Number of Participants as Percentage of Customer Class

The proposed program will result in an implementation with 53 commercial customers in the commercial property, education, government, and healthcare industries. EnerNOC does not have access to the total number of customers in the customer class to calculate the percentage that this represents, but we would be happy to do so if provided with the data.

Gas Rate Impact

As noted in the footnote of Appendix A of the RFP, NYSERDA indicates that there may not be sufficient information in the RFP to perform this calculation. Once additional information is available, EnerNOC will be happy to conduct this analysis for NYSERDA.

Gas Rate Impact per MBTU saved

As noted in the footnote of Appendix A of the RFP, NYSERDA indicates that there may not be sufficient information in the RFP to perform this calculation. Once additional information is available, EnerNOC will be happy to conduct this analysis for NYSERDA.

6.2 *Narrative Considerations*

[4] http://www.epa.gov/cleanenergy/energy-resources/egrid/index.html

Demand Reduction and System Benefits

The demand reduction that we expect to achieve through this program is detailed Table 5 below. The determination of this impact is described in full in Sections 5.2 and 5.3 of this proposal.

Table 4

Overall Program Impact Analysis	2009	2010	2011	2012	2013	2014	2015
Avoided Energy(MWh)	11,609	29,469	47,329	47,329	47,329	47,329	47,329
Avoided Demand (kW)	1,196	3,036	4,876	4,876	4,876	4,876	4,876
Avoided Gas(Therms)	390,000	990,000	1,590,000	1,590,000	1,590,000	1,590,000	1,590,000

At this stage, the demand reduction impact proposed here is significant, but will probably not rise to the attention of the New York Independent System Operator. The overall energy savings impacts are more significant. As described above, the possibility exists for enrolling the customers targeted by this proposal into demand response programs, providing an additional peak demand reduction that could provide value for the ISO and could be relied on by T&D System Planners. This reduction is not calculated as part of this proposal, but EnerNOC can easily provide additional information or analysis if requested.

Evaluation

EnerNOC's approach to Measurement and Verification is to deploy a consistent approach between energy savings estimates and verified energy savings. Savings estimates presented to customers play an important role in the implementation decision-making process. The verified energy savings represent the true performance delivered to NYSERDA.

EnerNOC realizes that it is important for the estimated and verified energy savings to be consistent. Therefore we have devised an M&V approach that will use two IPMVP Options (B and C) to bring confluence between energy savings estimates communicated to the customer for implementation (Option B), and overall program performance delivered to NYSERDA (Option C). The following summarizes EnerNOC's approach to M&V.

The savings for this program are expected to be in the 10% range. According the IPMVP this is the threshold given for the effective use of Option C; whole building monitoring. In this savings range, factors such as occupancy schedules, production, and weather, and unaffected loads such as plug loads, can make it difficult to isolate the true measure impact. However, because the MBCx measures affect the whole building and often interact with other measures, the Option C approach is desirable, provided it can be

combined with an effective mechanism for isolating external factors. Wherever the Option C approach introduces significant noise, EnerNOC intends to use Option B to document and fill in for factors that interfere with the accurate use of Option C.

The M&V plan can be summarized as follows:

- Option B - the combination of engineering computations and continuous measurement of energy proxies, will be utilized to determine the ongoing savings estimates to the customer.
- Option C - whole building metering, will be used to true-up the savings after the completion of measure implementation.
- Parameters monitored in the Option B approach will be used for mitigating external factors that affect energy consumption, and which are outside of the scope of the implemented measures. This includes the monitoring of system operating factors during, before, and after the Option C energy baseline is developed.
- A comparison between the "bottom-up" Option B results will be compared to the "top-down" Option C results. The Option C baseline and post-installation energy consumption will remain the primary performance criteria in EnerNOC's M&V approach, but whenever static or noise factors interfere, Option B results will be used to supplement measure isolated results for performance verification.
- In this program the aggregated Option B results will be considered equivalent to the Option C results whenever the two options are within ±10% confluence.

Market Segment Need

EnerNOC believes that this program provides an excellent fit into NYSERDA's existing portfolio of programs, and fills a previously unmet need for end-use customers. Opportunities deriving from Monitoring-Based Commissioning have not been substantially achieved in the state of New York, and present a significant need. The proposed program will seek to meet that need, and unlock an efficiency potential that is currently not heing met.

Coordination

EnerNOC will coordinate this program with other programs offered in the state, to the extent appropriate. It is important to note that there is an opportunity to coordinate this program with other existing demand response programs, for which EnerNOC is a provider in New York State. This coordination may enable customers to use the same monitoring equipment to not only achieve the demand reductions and energy savings illustrated in this proposal, but also to enable a significant and additional demand-

response load. That capacity is not included as part of this proposal. However, EnerNOC can provide additional information or analysis if requested.

Co-Benefits

EnerNOC has found that many of the commercial customers that participate in an MBCx program will generally experience additional value stemming from improved maintenance practices and reduced maintenance costs. The MBCx approach allows customers to keep their facilities running more smoothly: they are alerted to potential problems as soon as they occur, and have an opportunity to address those problems early on. Indeed, MBCx can be seen as a form of preventative maintenance, which can significantly reduce repair costs. At this stage, EnerNOC does not have quantitative information on the savings associated with this benefit, but we expect it to be significant to the customers considering this opportunity.

Portfolio Balance

NYSERDA offers a wide and comprehensive array of programs for energy efficiency. EnerNOC believes that this proposed program is an innovative approach to capture energy efficiency opportunities that will complement and balance the NYSERDA portfolio. EnerNOC will coordinate this program with other programs offered in the state, to the extent appropriate.

Depth of Savings

During the analysis and benchmarking phase, EnerNOC will not limit the process to a specific set of measures. The analysis will review all systems in use at the customer facilities and provide recommendations on a broad range of measures, from lighting to HVAC to process. While the objective of this program is to implement permanent measures, the analysis will undoubtedly uncover additional opportunities for efficiency that do not require any capital investment, but are primarily a result of incorrect settings, schedules or equipment operation. The reports provided to the customer will highlight those measures, and encourage the customer to implement additional energy efficiency opportunities. A sample customer report is included in Appendix A, and highlights the comprehensive nature of this offering. In addition, the analysis may uncover measures that are best addressed by other New York programs. We will refer the customer to those programs as appropriate.

Underserved Markets

This program is not targeted at underserved markets.

Commitment

The process for obtaining customer commitment is described in detail in Section 1.5 of this proposal. In summary, customer will be required to enter into an agreement with the program to ensure proper commitment. The enrollment agreement will essentially guarantee that the customer is willing to dedicate some internal resources to comply with program requirements, and acknowledges that there will be some customer costs. If applicable, the agreement will also commit the customer to implementing measures in order to obtain any incentive funds from the program. The customer will then receive ongoing monitoring for a period of 3 years, along with all the customer deliverables described in Section 5.5 of this proposal.

Customer Outreach

The focus of the program outreach will not be on finding all customers, but on finding the *right* customers. As discussed above, this program will target a select group of customers in the commercial sector. Our implementation plan contains a very extensive customer screening and enrollment process to ensure that the customers that participate will deliver the most value to NYSERDA and successfully meet the program objectives. A key part of this process will center on the identification of a program champion within each customer. In our experience, we have found that program champions are key facilitators of customer engagement, swift implementation, and successful kWh reductions. The selection criteria described below are designed to ensure that the program enrolls eligible and desired customers:

- ***Basic Selection Criteria*: First we ensure that the customer meets the basic selection criteria, i.e. size, type of facilities, presence of building control systems, history of energy efficiency efforts.**
- ***Customer Commitment*: We screen customers for their ability to commit to the program. This will be based on their willingness to dedicate time and resources, their ability to identify a program champion, and their openness to meeting with EnerNOC program managers. During the screening phase, we will evaluate prospective customers against these criteria.**
- ***Empowered Champion:* Our experience shows that one of the keys to a customer's success is that the decision-maker with which we interface is empowered to make decisions about elements that will affect the program. For example, we will make sure that the proposed program champion will be able to clear any barriers regarding the installation of monitoring equipment and the use of resources' time.**
- ***Customer Stability*: The last element we will evaluate when selecting a customer is whether the customer and project champions are likely to remain stable and in place during the implementation. We have experienced changes in management in the past**

that have affected the outcome of our programs. We will determine, ahead of enrollment, whether such changes are likely to occur and develop strategies to address challenges should there be turnover during the program.

The program will seek to gain commitment from the program champion and explore, *before enrollment*, the willingness of the champion to agree to and implement the cost effective measures identified in the Scorecard Report.

Collaborative Approach

This program proposal was developed in a short time-frame which precluded extensive cooperative discussions. However, the EnerNOC staff has held numerous conservations and discussions about this program with the various New York Utilities, NYSERDA, the New York State Public Commission, and the New York Department of Public Service. If our proposal is accepted EnerNOC will conduct additional conversations with other administrators, customer representatives, and community organizations to ensure that the program is delivered through a collaborative approach.

Fuel Integration

The program will focus on both electricity and gas, and generate savings for both fuels. The approach does not favor one fuel over another. The electric impacts will be more significant, given that the end-uses targeted are more weighted towards electricity. The program will address both electric and gas savings through a single customer contact.

Transparency

The data identified in Appendix A (i.e. the Sample Scorecard report) will be made available to end-users as well as program administrators, to ensure full transparency.

Procurement

EnerNOC will perform all functions specified in this proposal and will not procure any functions through a competitive bid.

Appendix A - Technical Documentation

1 The EnerNOC Solution

EnerNOC's full-service solution is built on non-proprietary, open-architecture, scalable, and economical technology. This platform is used to design, customize, and quickly deploy a variety of energy management solutions that deliver reliable and economical results. EnerNOC's solution has three main components:

- **The EnerNOC *Network Operations Center*, or NOC, our centralized communication infrastructure where we manage and store data, and from which we are remotely connected to all our customers sites;**
- **Remote *EnerNOC Site Servers* (ESS) and *BMS Gateways*, advanced metering and communications nodes located at each end-user site, and that collect local data from meters and building controls systems;**
- ***PowerTrak*®, EnerNOC's proprietary web-based energy management platform, hosted at the NOC and available to any users with an Internet connection.**

1.1 The Network Operations Center (NOC)

Much like a utility control center, the NOC combines advanced software, internet communications, and highly-skilled professionals to collect and present end-user energy consumption and process data, initiate remote commands, and continuously monitor the status of remote sites. The NOC connects to each site through a communications node called the EnerNOC Site Server, or ESS.

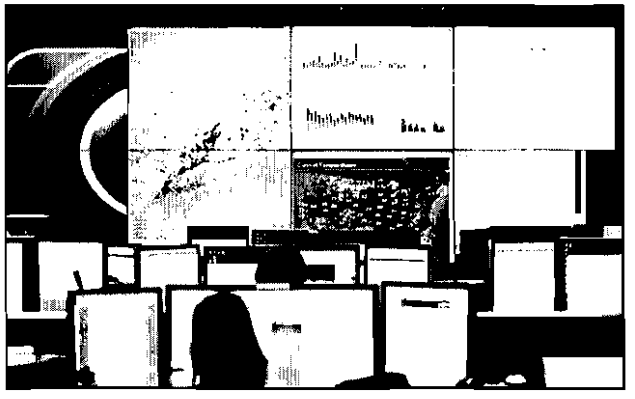

Figure 1 - EnerNOC Network Operations Center

The NOC utilizes a comprehensive security infrastructure, including firewalls, intrusion detection systems, and encryption for transmissions over the Internet. The NOC, illustrated in Figure 1, is staffed around the clock, 365 days a year.

1.2 The EnerNOC Site Servers and BMS Gateways

EnerNOC Site Servers

The ESS serves as a gateway to connect the NOC with a variety of data collection systems and equipment at end-use customer sites. The ESS is typically installed in the electrical room at a customer's site. It is connected to the site's local network, and it includes a Web service software application which enables the secure, hi-directional transfer of data across firewalls and over the Internet. In some instances, EnerNOC may need to install multiple ESS's per building.

All meters involved in this implementation will be connected to the ESS via pulse block connections or via Modbus protocol. The ESS will collect and store all data captured by the meters, and will make that data available, in near real-time, to EnerNOC's Network Operations Center via PowerTrak.

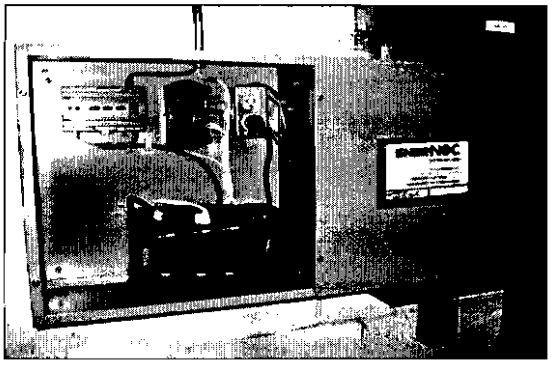

Figure 2 - ESS Gateway

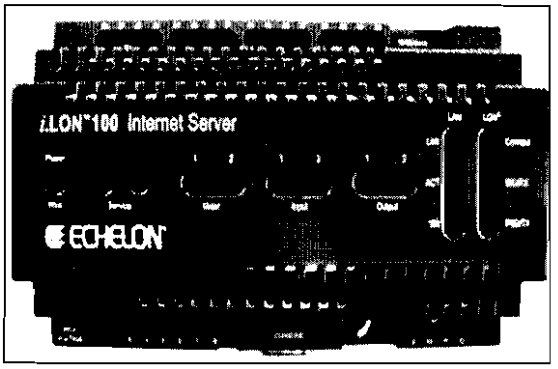

Figure 3 - Echelon iLon

This universal connectivity allows us to leverage a customer's existing infrastructure investment, lowering our overall cost of enablement and making data available to corporate networks and the Internet through industry standard communication protocols. Figure 2 and Figure 3 illustrate the installation of an ESS at a customer site.

BMS Gateways

If data from a building management system (BMS) is required, then a BMS Gateway will also be installed at each location, and will be connected to the local Intranet. This gateway will collect BMS point information via a standard open protocol called BACnet/IP. The Gateway will typically be located at the campus control room where the BMS workstation is located.

1.3 PowerTrak

PowerTrak is a Web-based enterprise energy management software platform used for power measurement, load control and energy analysis. Powertrak is built on Linux, Java and Oracle technologies, and operates an open Web services architecture. PowerTrak handles many vital

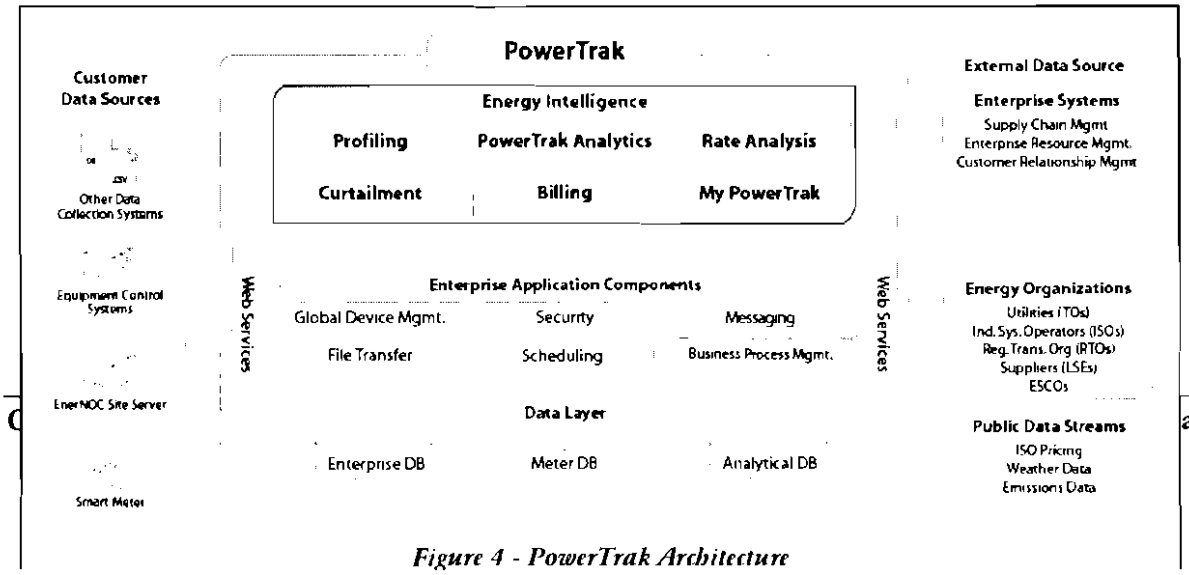

Figure 4 - PowerTrak Architecture

data acquisition tasks. PowerTrak is a hosted application, meaning that it requires no installation of any physical hardware or software. Users with access to an Internet connection have access to PowerTrak. The diagram in Figure 4 provides an overview of the PowerTrak system architecture.

PowerTrak collects facility consumption data on a 1-minute, 5-minute, 15-minute and hourly basis, and integrates that data with real-time, historical, and forecasted market variables. PowerTrak can be used to measure, manage, benchmark, and optimize end-use customers' energy consumption and facility operations. In particular, PowerTrak supports the following business processes:

- Analyzing energy consumption patterns;
- Forecasting energy demand;
- Measure the real-time performance of sites during demand response events;
- Continuously monitoring building management equipment to optimize system operations;
- Model rates and tariffs to turn energy data into cost data;
- Creating energy scorecards to benchmark similar facilities.

In addition, PowerTrak enables us to track each end-use customer's greenhouse gas emissions by mapping their energy consumption with the generation fuel mix in their location (e.g., coal, nuclear, natural gas, and fuel oil).

1.4 PowerTrak Data Layer

The PowerTrak data layer is a relational database that is designed for query, analysis and transaction processing. It contains historical energy data and data from other sources. It separates analysis workload from transaction workload and enables us to consolidate data from several sources. These records include customer demographics, interval energy information (e.g. 1-minute, 5-minute, 15-minute), building management system data, weather data, emissions data, aggregated summary data, and pricing data.

1.5 PowerTrak Data Warehousing and Scalability Capabilities

The PowerTrak application is built on Linux, JAVA and Oracle technologies. We are using Oracle RAC (Real Application Clusters) as the data warehouse. As we scale to ten's of thousands of points, Oracle RAC enables the deployment of a single database across a cluster of servers, which is the foundation for grid computing. This strategy offers the following advantages:

We can expand capacity by simply adding low-cost commodity hardware (e.g. servers and disk arrays to our cluster on demand);

No PowerTrak application changes are necessary;

The application does not have to be taken offline, providing 24/7 availability for continuous uptime for database applications.

PowerTrak is a tiered Service Oriented Architecture. The Presentation Tier provides browser-based (HTML, AJAX or RSS) user interfaces or a service interface for any business process using SOAP, as well as Java calls. The Middle Tier implements business processes using application server, Business Process Workflow (BPEL or JBI) and Enterprise Application Integration (EAI) technologies. The Enterprise Tier provides access to data, services and security.

1.6 PowerTrak Functional Capabilities

PowerTrak offers extensive energy management and analysis capabilities. A general overview of these capabilities is provided below, organized by functional area.

Meter Aggregation

Using a tree-based hierarchical structure the user can assign metering/monitoring devices to a group and view aggregated reports on the virtual/aggregated group. These groups can represent geographical regions, business units, utility territories, etc.

Energy Profiling

Energy Profiling displays various types of energy data, and provides the capability to merge, overlay, and compare it with other key data streams such as energy pricing, weather, and energy budgets. In addition, data summarization features allow users to understand the implications of facility activities over defined intervals. Multiple facilities and data streams can be easily compared using a powerful, graphical user interface.

Bulk Data Export

Bulk Data Export allows the user to export detailed energy interval data for a user-specified period of time for any meter or set of meters, in aggregate or individually, from PowerTrak into a .csv (comma separated value) file. various file. This data can be used for many purposes, including detailed analysis, third-party commodity procurement negotiation, etc.

Alerts and Alarms

PowerTrak's alerting and alarming capabilities allow users to set static thresholds for any incoming data sources (e.g., temperature, kW, kWh, therms, GPM, etc.). Notification can be configured to deliver emails and pages. Notification types are user defined and can include certain information, including time, alarm type, and actual monitored data value at time of alarm. All alerts and alarms are delivered in real-time to ensure a prompt resolution.

External Data Feeds

PowerTrak integrates publicly-available data streams such as energy market real-time prices, weather data (e.g., wet-bulb temp, humidity, atmospheric pressure), and other subscription-based data streams as users request. This data can be used to normalize commodity data (e.g., electricity usage per degree day) across facilities and provide insight into energy usage.

Forecasting

PowerTrak provides a powerful forecasting tool that allows users to forecast any commodity consumption and demand against past consumption using sophisticated stochastic and historic variables. Forecasts can also be created for actual bills, based on a combination of user-defined tariffs and consumption data, which provide monthly and annual plans.

Tariff Builder

The Tariff Builder allows users to replicate utility tariffs (e.g., gas bill, electric bill) in order to generate shadow bills, forecasted bills, and to track against actual bills received. Because PowerTrak captures actual utility meter interval data in real-time, the data is identical to what the utility captures. However, the utility may not always bill correctly and this functionality provides powerful fact checking functionality. Additionally, the Tariff Builder provides a bill presentment functionality that enables the generation, viewing, and exporting of estimated billing information.

Reporting

Reporting makes available a standard library of reports to centralize facility and customer data for benchmarking aud financial analysis. The following are a sample of available reports:

- Load Duration Curve
- Load Factor Peak Demand Variance
- Hourly Demand vs. Temp
- Building Rankings by Usage per Sq. Ft
- Daily Min/Max Demand Chart
- Billing Report
- Emissions Footprint
- Usage vs. Baseliue

Cognos ReportNet

Cognos ReportNet is one of the most advanced business intelligence reporting applications available. PowerTrak has integrated the full power of Cognos ReportNet into the system, allowing users to view powerful reports developed from any available data source in PowerTrak. Reports can be scheduled to run at user-defined times and be distributed to user-defined groups and individuals.

Emissions Reporting

PowerTrak calculates a facility's "emissions footprint" by capturing regional power generation emissions statistics, as reported directly from the Environmental Protection Agency. Using a facility's State, Utility and real-time energy cousumption, PowerTrak is able to provide detailed particulate emissions profiles from the power consumed by the facility.

Data Capture and Storage

PowerTrak stores data for a minimum of three years. Customers can choose to archive data after this time frame or simply pay for continued data storage at a predetermined price.

Appendix B - Technical Work Paper

EnerNOC, Inc.

Monitoring Based Commissioning (MBCx)

August 1, 2008

1 At a Glance Summary

Measure Name	Monitoring Based Commissioning (MBCx)
Savings Impacts Common Units	Customer
Customer Base Case Description	Existing building condition
Code Base Case Description	Same as Customer Base Case
Costs Common Units	Customer
ASHRAE Climate Zone	10B, 11B, 12B, 13A, 14A, 15, 16
Building Type	Educational, Commercial Property, Government
Building Vintage	1978 – 2004
Measure Equipment Cost ($/unit)	Not Applicable
Measure Incremental Cost ($/unit)	Not Applicable
Measure Installed Cost ($/unit)	Varies, see "Measure Installed Cost" column in next table
Effective Useful Life (EUL) in years	5 years
Program Type	Retrofit
Time of Use (TOU) AC Adjustment	0%
Important Comments	Measures, energy savings, and demand reduction are highly building and project specific. Although there are certain "standard" types of equipment and system configurations, HVAC and lighting systems in larger buildings are unique and "custom" for a specific building, with a specific occupancy, schedule, orientation, climate zone, etc.

Measure Name	Customer Annual Electric Savings (kWh/unit)	Customer Peak Electric Demand Reduction (kW/unit)	Customer Annual Therms Savings (Thm/unit)	Measure Installed Cost ($/unit)
Monitoring Based Commissioning	893,000	92	30,000	$83,230

Table of Contents

General Measure and Baseline Data

1.1 Measure Description and Background

Monitoring Based Commissioning is a relatively new energy efficiency application. Broadly speaking, it refers to the combination of retro-commissioning and continuous commissioning & verification activities, coupled with ongoing, technology-based monitoring to ensure persistence of savings. Selected facilities are analyzed to identify and implement cost-effective retro-commissioning activities that typically require little or no capital investment. During the implementation phase, monitoring technology is installed at each facility to capture energy usage data from interval meters, as well as to interface with building control or energy management systems (BCS/EMS). This data is then used to create benchmarks for optimal building operations, and also to continuously track building operation and performance. Since all buildings invariably drift away from optimal operations, the ongoing monitoring ensures that building managers are alerted to any issues as they arise, and can then take appropriate remedial action on a timely basis.

EnerNOC has developed a unique and powerful approach to Monitoring Based Commissioning. We have pioneered this approach with some of our existing customers, and have been able to achieve significant energy savings. Our Monitoring Based Commissioning approach is as follows:

- EnerNOC will install the appropriate meters at all customer sites to collect electric and gas information on a campus/master meter-level, as well as electric and gas data at appropriate building or facilities, and BTU consumption for CHW and HW systems, also for select buildings. EnerNOC will also interface with the relevant points in the Building Management Systems (BCS) on these sites.

- The information will be collected in near real-time at user-adjustable sample rates, and warehoused at our Network Operations Center (NOC) via our PowerTrak® application. Any user with access to the Internet, and with the proper credentials, will be able to view both meter and BCS data using a simple browser interface.

- EnerNOC will establish benchmarks for all buildings monitored using data published by the International Facility Management Association or other appropriate sources. Once the benchmarks are established and calibrated, EnerNOC will compare building usage to benchmarks to identify potential areas of energy savings.

- The energy savings from MBCx is comprised of the aggregated savings from multiple measures. These measures are identified from anomalies or faults visible through the host facility BCS system. Since the BCS system is mostly controlling and monitoring facility HVAC systems the measures are typically identified in these end-use categories.

The following is a list of end-use systems and measures that are most commonly addressed by MBCx:

EnerNOC- Typical MBCx Measures*	
General Fault Detection and Diagnostics (FDD)	Setpoint Error Tracking Sensor range checking Operating parameter out of range Pinned or flatlined sensor Actual vs. Intended Schedule Analysis Equipment Manual Override Detection Excessive Equipment Cycling
Zones	Setpoint Analysis Heating Setback Cooling Setforward Air Starvation Analysis Zone Comfort Analysis Indoor Air Quality Analysis
Air Handling Units	Economizer Operation Simultaneous Heating and Cooling Excessive or inadequate ventilation Demand Ventilation Air starvation Static pressure analysis Schedule Heating/Cooling Coil Efficiency Leaking Valve Optimum Start/Stop Analysis Air Filter Analysis- Dirty Filter
Terminal Units	Variable Air Volume Analysis Zone Reheat VAV Box Damper Modulation
Cooling Plant	Chiller Performance analysis - kW/Ton Optimum Chilled Water Supply Temperature Optimum staging Optimum Condenser Water Supply Temperature Cooling Tower Fan Efficiency Low/High Temperature Differential Analysis Optimum Flow analysis Optimum Pump Utilization Optimum Thermal Storage Utilization
Heating Plant	Boiler Sequencing Optimization Boiler Air Preheat Boiler Combustion Controls Boiler Economizer Boiler Combustion Efficiency Boiler Burners Performance Boiler Blowdown Boiler Efficiency Optimum Pump Utilization

* *Varies depending on point sufficiency and anomaly detection*

1.2 Codes and Standards Requirements Analysis

The measures described here are not governed by codes and standards since they generally only involve adjustments to existing equipment. ASHRAE has a guideline for Commissioning but not for Retro-commissioning or Monitoring Based Commissioning. Examples of typical MBCx measures may include economizer control adjustments; excessive equipment runtime set-points vs. actual variations, VAV-Box hunting, heating/cooling valve hunting, chilled water temperature reset schedule modifications, pumps, flow adjustments, simultaneous heating and cooling, etc.

1.3 EM&V, Market Potential, and Other Studies

The most recent study on the evaluation, measurement and verification relevant to this measure was done by Brown, Anderson and Harris, 2007[1]. That study reviewed the energy savings results of the 2004-05 MBCx pilot program for UC/CSU/IOU. The median savings of 10% of the baseline source energy was cited for this program. The authors also concluded that colder climates tended to have slightly lower savings than higher or more humid climates.

1.4 Base Cases and Measure Effective Useful Lives

Since MBCx can be applied to a wide variety of building components and systems, and because of the wide range of potential measures, it is difficult to establish a common measure effective useful life (EUL). In general, the maximum measure life for an MBCx measure cannot exceed the life of the equipment or system undergoing improvement.

The literature cites a wide range of measure life estimates. In the paper by LBNL and SMUD on "An Evaluation of Savings and Measure Persistence from Retro-commissioning of Large Commercial Building", 2004[2], measures tended to retain 80% of their initial energy saving into the fourth year. Since the MBCx program is intended to continuously monitor the facilities for a three year period, this should delay the onset of diminished savings until after the Monitoring aspect is discontinued. Continuous or on-going monitoring is intended to maintain saving performance since any changes to the 'improvements' will be identified and addressed, thus minimizing the impact of inevitable drift. For the purpose of this Work Paper, the EUL will be set for five years.

2 Calculation Methods

2.1 Energy Savings Estimation Methodologies

As part of the MBCx measure, calculations for each indentified measure will be made. This measure specific or "bottom-up" approach builds on the traditional retro-commissioning approach by isolating specific measures or opportunities within building systems (central plant, air distribution, terminal devices) or sub-systems (chillers, air handlers, sensors and valves etc). Each opportunity is identified through fault detection (FD) using powerful automatic filters and visualization schemes to identify faults and optimization opportunities. Once an opportunity is identified, it is flagged for further evaluation, including validation, possible diagnostic and remediation. Energy savings are calculated on a stand-alone basis along with cost savings.

Since equipment is being continuously monitored a combination of engineering computations and continuous measurement of proxies for energy use is utilized as the base case. With this method, dynamic parameters, such as flow, temperatures, speeds, etc. will be measured directly and supplied to engineering equipment models which are developed around actual field conditions. Industry standard methodology, such as ASHRAE Standards is used to annualize energy consumption and savings. The BIN method, combined with Typical Meteorological Year (TMY3 data is now available and will be used for this program) data is most often used to determine the annual energy consumption or savings associated with recommendations identified through the MBCx process. As seasonal and annual consumption histories are complete, actual system energy consumption can be derived directly from the accumulation of the streaming data from the host facility.

Even when the Owner has not chosen the package of measures to implement yet, accounting for interactions is important because this simple payback calculation must be sufficiently accurate to determine which measures will be implemented and allow the Program to correctly allocate incentive payments. After measures are implemented, 'Updated Annual Savings' are calculated for the Implementation Summary Table including interactions of the selected group of measures.

For consistency between estimated and verified savings, MBCx deploys a measure calculation and verification approach using two industry standard calculation and verification methods. These are derived from the International Performance Measurement and Verification (IPMVP) where Options (B and C) are used to bring confluence between energy savings estimates communicated to the customer for implementation (Option B), and overall program performance delivered to SCE (Option C). The following summarizes the MBCx calculation and verification approach:

The savings for the MBCx program are expected to be in the 10% range. According the IPMVP this is the threshold given for the effective use of Option C: Whole Building Monitoring. In this savings range, factors such as occupancy schedules, production, and weather, and unaffected loads such as plug loads, can make it difficult to isolate the true measure impact. However, because the MBCx measures affect the whole building and often interact with other measures, the Option C approach is desirable, provided it can be combined with an effective mechanism for isolating external factors. Wherever the Option C approach introduces significant noise, The

MBCx program uses Option B to document and fill in for factors that interfere with the accurate use of Option C.

The plan can be summarized as follows:

- Option B, the combination of engineering computations and continuous measurement of energy proxies, will be utilized to determine the ongoing savings estimates to the customer.

- Option C, whole building metering, will be used to true-up the savings after the completion of measure implementation.

- Parameters monitored in the Option B approach will be used for mitigating external factors that affect energy consumption, and which are outside of the scope of the implemented measures. This includes the monitoring of system operating factors during, before, and after the Option C energy baseline is developed.

- A comparison between the "bottom-up" Option B results will be compared to the "top-down" Option C results. The Option C baseline and post-installation energy consumption will remain the primary performance criteria in EnerNOC's M&V approach, but whenever static or noise factors interfere, Option B results will be used to supplement measure isolated results for performance verification.

In this program the aggregated Option B results will be considered equivalent to the Option C results whenever the two options are within ±10% confluence.

A complete list of findings, derived for an actual customer, can be found in Appendix A, which is the source of the data presented in the various summary tables. The following are example of savings calculations for various findings typical of the MBCx measure. They are highlighted in yellow in the complete list of findings.

Example 1: AHU running continuously

An air-handler fan was found to be operating continuously during the month of April regardless of occupancy and programmed schedule. Using the general filter and parameter out of range (POOR) aspect of PowerTrak®, this air handler was flagged as violating it's scheduled rules and was investigated by analysts to verify that it was not a false positive and determine what the savings would be based on actual off-scheduled performance. The air-handler is equipped with a variable speed drive, so the average speed during the off-hours time period was used to calculate savings potential from turning off the unit during un-occupied hours.

Energy Savings are evaluated as follows:

$$kWh_{savings} = kW_{fan} \times (Hours_{pre} - Hours_{post})$$

The power draw of the air-handler fan motor was based on drive monitored output rather than using its nameplate rating since the motor was not running at peak capacity during the off-hours. Figure 1 shows the measurements for this measure:

AHU-3 Motor Size	25-hp
Power Reading from Drive	
kW_{max}	15.54-kW
$kW_{avg\text{-}offHrs}$	6.33-kW

	Existing Schedule		Proposed Schedule	
	Weekdays	Weekend	Weekdays	Weekend
StartTime	00:00	00:00	08:00	08:00
Stop Time	23:59	23:59	21:00	21:00
Hours	24	24	13	13
Days	260	104	260	104
Total Hours:	6236	2494	3380	1352

Figure 1 Fan motor Power Measurement (Example 1 Calculation)

Inserting the Figure 1 numbers into the savings equation, Figure 2 shows the following savings:

		Existing			Proposed			Savings	
		kW	Hours	kWh	kW	Hours	kWh	kWh savings	% of Savings
Summer	on-peak								
	off-peak	6.33-kW	1683	10,653	6.33-kW	0	0	10,653	41.9%
Winter	on-peak								
	off-peak	6.33-kW	2332	14,762	6.33-kW	0	0	14,762	58.1%
Totals			4015	25,415		0	0	25,415	100.0%

Figure 2 Measurement Savings (Example 1 Calculation)

Since the new schedule does not turn the fan motor off during the peak demand period, there are no demand reduction associated with particular measure.

Example 2: Economizer not modulating / fixed at maximum position

Using the general filter and parameter out of range (POOR) aspect of PowerTrak®, this air handler was flagged as violating it's economizer rules, mixed air temperature too high, and was investigated by analysis to verify that it was not a false positive and then determine what the savings would be based on intended operational performance.

With the Outside air damper stuck at 100% open, too much OA is used during all but the temperature Bins between the SAT of 55°F and the RAT of 75°F where 100% OA would be the norm. Figure 3 below shows the Bin temperature and Hours of occurrence at various 4-hour time intervals. This allows for a better match to actual occupancy usage than the standard three, eight-hour shifts. The bin data is based on the TMY2-8760 weather data used in EnergyPlus. Since TMY3 weather data is now available, the new 4-hour time intervals will be populated using this newest weather format. The calculations in the example used TMY2 since that was all that was available at the time. The technique shown will not change, only the source of the weather data will.

Annual											
	OBSERVATION HOUR GRP										
BIN Temp	0 TO 4	4 TO 8	8 TO 12	12 TO 16	16 TO 20	20 TO 24	Free Clng/Htng	Un-Occupied Hours	Un-Occupied Avg Temp	Occupied Hours	Occupied Avg Temp
112.5											
107.5											
102.5				1							
97.5			1	12	1						
92.5			8	34	12						
87.5			41	80	34						
82.5		6	90	140	89	12					
77.5	18	37	126	119	100	49		39.5	77.9	970.5	82.0
72.5	56	62	104	95	102	83	Free Clng/Htng				
67.5	111	121	112	99	134	129					
62.5	161	156	142	127	151	197					
57.5	146	169	113	100	105	134					
52.5	170	130	109	113	91	118					
47.5	90	80	68	65	82	89					
42.5	99	110	96	92	111	108					
37.5	144	120	120	126	128	155					
32.5	156	134	111	109	116	108					
27.5	74	93	76	57	77	84					
22.5	77	79	55	44	52	68					
17.5	68	69	42	24	37	67					
12.5	45	28	18	15	21	28					
7.5	21	39	19	8	15	18					
2.5	13	15	7		2	10					
-2.5	11	11	2			3					
-7.5		1									
-12.5											
-17.5											
-22.5											
-27.5											
-32.5								1423	34.3	3419	35.5
Average OAT when MAT at min OAT of 25% would be less than 55°F										37.5	-0.8

Grey is Un-Occupied

White is Occupied

57.5°F to 72.5°F is free cooling/heating at 100% OAT

Figure 3 Hours and Avg OAT at 100% OA and at 25% OA (Example 2 Calculation)

The minimum economizer outside air fraction should be at 25% percent but is currently at 100%. The post-retrofit economizer will control the amount of outside air from the 25% minimum, when MAT is less than SAT or OAT is greater than RAT or otherwise be at 100%.

The savings will be as follows:

Existing

Eq1= [CFM x 1.1 x ΔT x Hrs] / (100,000 x 80%)
Eq2= SAT - OAT = ΔT (when OAT is less than 55F)

Heating Usage during Occupied Period

AVG CFM	ΔT	Hours - Heating Occ- Hours	Heating Therms	Existing Heating Cost
25,000	31.52	3,418.50	37,035.02	$25,924.52

SAT	OAT	ΔT
67.00	35.48	31.52

Proposed

Eq1= [CFM x 1.1 x ΔT x Hrs] / (100,000 x 80%)
Eq2= SAT - OAT = ΔT (when OAT is less than 55F)

Heating Usage during Occupied Penod

AVG CFM	ΔT	Hours - Heating Occ- Hours	Heating Therms	Proposed Heating Cost
20,000	1.20	37.50	12.37	$8.66

SAT	OAT	RAT	MAT	ΔT
55.00	-0.80	72.00	53.80	1.20

Existing

Eq3= [CFM x 1.08 x ΔT x Hrs] / (12,000 x 0.8-kW/ton)
Eq2= OAT - SAT = ΔT (when OAT is greater than 74F)

Cooling Usage during Occupied Period

AVG CFM	ΔT	Hours - Heating Occ- Hours	kWh Cooling	Existing Cost
25,000	26.97	970.50	47,108.25	$7,537.32

OAT	RAT	SAT	ΔT
81.97	75.00	55.00	26.97

Proposed

Eq3= [CFM x 1.08 x ΔT x Hrs] / (12,000 x 0.8-kW/ton)
Eq2= MAT - SAT = ΔT (when OAT is greater than 74F)

Cooling Usage during Occupied Period

AVG CFM	ΔT	Hours - Heating Occ- Hours	kWh	Proposed Cooling Cost
20,000	21.05	970 50	29,410.83	$4,705.73

OAT	RAT	MAT	SAT	ΔT
81.97	75.00	76.05	55 00	21 05

Existing

Eq4= [kW x Hrs] when OAT is less than 55F
At full speed due to too high and SAT, Actual Data

Existing Fan Operation

kW	Hours - Heating Occupied	kWh Saved	Fan Cost Savings
15.54	4,389.00	68,212.38	$10,913.98

Proposed

Eq4= [kW x Hrs] when OAT is less than 55F
Assumes an 80% speed as an avg with a lower SAT

Proposed Fan Operation

kW	Hours - Heating Occupied	kWh Saved	Fan Cost Savings
9.30	4,389.00	40,829.13	$6,532.66

Savings

Exisitng Cost		Proposed Cost		Avoided Cost		Therms		Energy	
Heating	$25,924.52	Heating	$8.66	Heating	$25,915.86	Existing	37,035.02	Existing	115,320.63
Cooling	$7,537.32	Cooling	$4,705.73	Cooling	$2,831.59	Proposed	12.37	Proposed	70,239 96
Fan	$10,913.98	Fan	$6,532 66	Fan	$4,381.32	Avoided	37,022.65	Avoided	45,080.66
				Total	**$33,128.76**				

Average cost: $0.16/kWh and $0.70/Therm

Peak and Demand Savings

		MAT			ΔT				
Month	Max Temp	RAT	At 100%	At 25%	DAT	At 100%	At 25%	Diff	kW
May	87.5	75.0	87.5	78.13	55.0	32.5	23.1	9.4	26.37
Jun	92.5	75.0	92.5	79.38	55.0	37.5	24.4	13.1	36.91
Jul	97.5	75.0	97.5	80.63	55.0	42.5	25.6	16.9	47.46
Aug	102.5	75.0	102.5	81.88	55.0	47.5	26.9	20.6	58.01
Sep	92.5	75.0	92.5	79.38	55.0	37.5	24.4	13.1	36.91
							Avergae Demand Reduction		41.13

Uses Eq 3 and 25,000-cfm in both cases assuming that full speed is needed under peak conditions each month.

Figure 4 Electric and Thermal Savings from Fixing OA Damper (Example 2 Calculation)

Example 3: Building Load factor too high for building class at this site

Not all the buildings on a campus are connected to the BCS, but analyzing the interval meter data, a relative assessment of performance can be determined. In this example, one building designated as a classroom building consistently had a load factor of over 70% when all other classroom buildings at this site ranged between LFs of 50% and 60%. After review of the building's intended operation by scheduled building 'open' hours, it was determined that this building should have a lower load factor. By calculating the energy wasted by not being able to schedule lights and HVAC equipment off, the customer decided to expand the campus DDC controls into this space. The load factor/profile after implementation clearly shows the building performing to estimate. Continuous monitoring will flag the building if the load factor creeps above a 'high' threshold.

As can be seen in Figure 5 below, the Load Factor for November was 78% while in December, after implementing the BCS controls, the Load Factor dropped to 59%. To calculate annual savings, the actual previous 12-month usage was adjusted to the new load factor of 60%. Since all energy savings are off-hours, no demand savings were calculated.

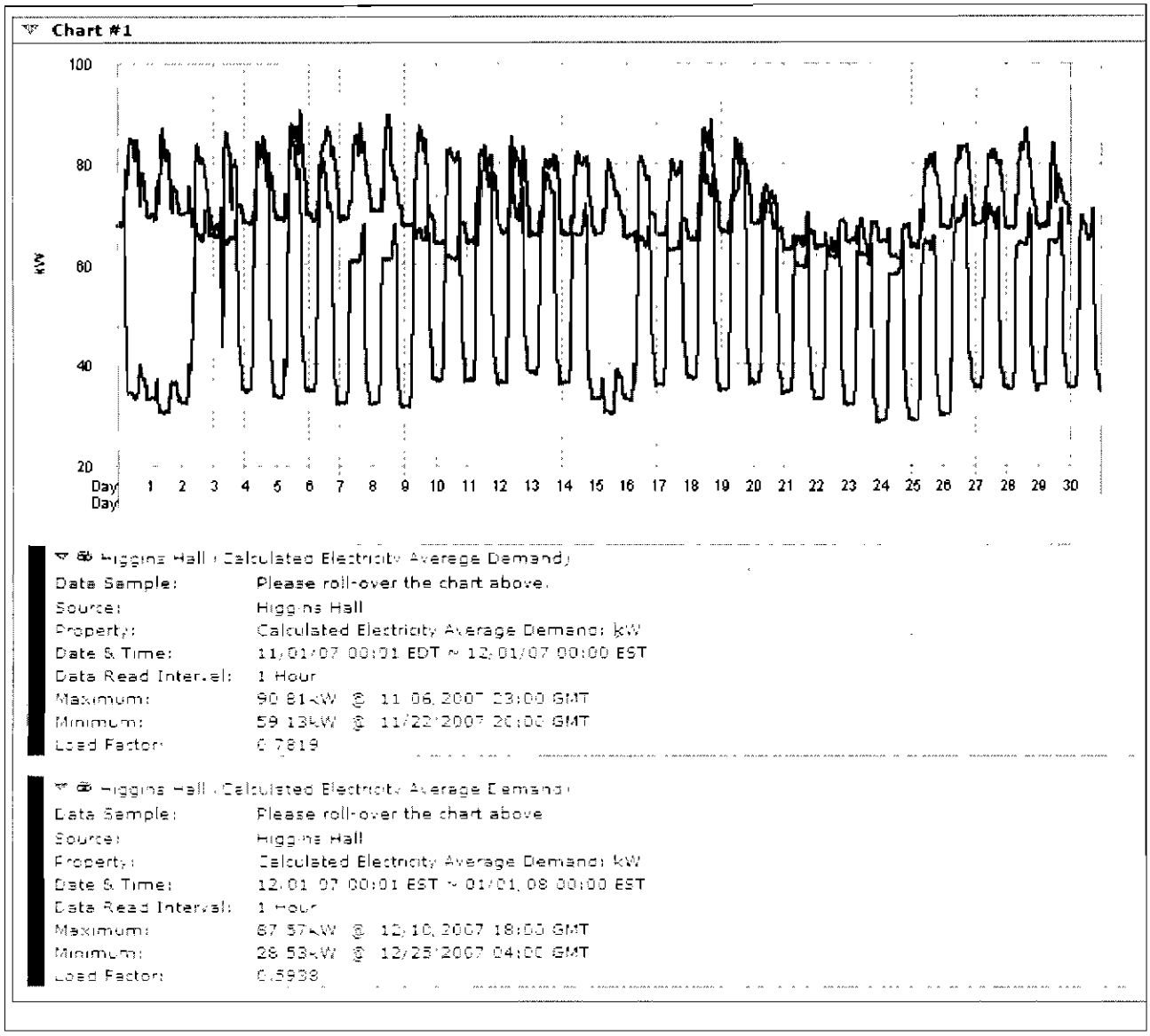

Figure 5 Load Factor too high/install BCS controls (Examplc 3 Calculation)

	Days	Actual kWh	Pk-kW	LF	New-LF	Proposed kWh	Reduction kWh
Dec-06	31	50,371	84.87	79.8%	60.0%	37,886	12,485
Jan-07	28	51,315	93.96	81.3%	60.0%	37,885	13,431
Feb-07	31	48,610	89.64	72.9%	60.0%	40,015	8 595
Mar-07	30	52,314	88.47	82.1%	60.0%	38,219	14,095
Apr-07	31	51,521	107.37	64.5%	60.0%	47,930	3,591
May-07	30	55,399	100.26	76.7%	60.0%	43,312	12,087
Jun-07	31	46,138	81.54	76.1%	60.0%	36,399	9,739
Jul-07	31	49,708	83.97	79.6%	60.0%	37,484	12,223
Aug-07	30	85,462	168.93	70.3%	60.0%	72,978	12,484
Sep-07	31	72,460	170.00	57.3%	57.3%	72,460	0
Oct-07	30	46,734	153.45	42.3%	42.3%	46,734	0
Nov-07	31	51,571	90.81	76.3%	60.0%	40,538	11,033
							109,763

After BMS installation

	Days	Actual kWh	Pk-kW	LF
Dec-07	31	39,016	87.57	59.9%

The above were examples of the techniques use to establish annualized savings for each finding that allows the customer to rank order implementation. Table 3 represents a roll-up of the aggregated measure impact of MBCx. The full list of measure comprising MBCx from an actual customer site can be found in the Appendix.

Table 2 Example of Annual Energy Savings Summary

Examples of Finding typical of the MBCx Measure	ASHRAE Climate Zone	Unit Definition	Gross Unit Saved	Gross kW Reduced	Affected Building Area	Gross Unit/ square foot
Monitoring Based Commissioning	12a	kWh	893,000	92	1,039,869	0.859
	12a	Therms	30,000	0	1,039,869	0.0289

2.2 Demand Reduction Estimation Methodologies

For the MBCx Program, demand reduction is defined as the reduction in the building's maximum demand during the peak demand period, i.e., average of 9 am to 5 pm during weekdays. All reductions in peak demand are reported in the Findings Workbook and supported by calculations or modeling.

For example, changing the set-points of an air-side economizer will probably not result in a peak demand reduction since it would only impact energy use during non-peak periods when the outdoor air temperature is well below peak temperatures. Changing the fan static pressure setting, fan speed limiting or space temperature reset will have an impact during the demand period. Savings can be documented based on regression or by the prevalent Demand Response

program Baseline technique, while continuous monitoring of the BCS will ensure that IAQ stays within the acceptable norm albeit at the higher end during such time periods.

In 2007, the measures completed in our example most of the projects only saved energy during part-load conditions, and therefore, did not impact the peak demand. There are a few measures, such as the OA-damper stuck at 100% and other SAT/MAT set-point changes that will save peak demand and will be documented/calculated as shown in the example based on the TYM2 Bin data (TMY3 has only recently been available) for the appropriate time frame and average for the season.

3 Base Case and Measure Costs

3.1 Base Case Costs

Since the base case is the "as-is" condition of the building, there are no costs associated with the base case.

3.2 Measure Costs

The forecast cost basis for the MBCx Program is $0.51/sf based upon the paper by K. Brown, M. Anderson and J. Harris, 2007. In this study, the scope includes review the 13 buildings that participate in the MBCx pilot program during 2004-05 and calculates average cost and savings based on actual cost and savings per site as self reported. The focus on MBCx is low-cost operational and maintenance improvements rather than equipment replacement, but can include upgrades to existing equipment like expanding BCS DDC control. MBCx includes control programming, scheduling changes, control settings and set-point improvements, and some small material costs like the addition of critical sensors, BTU meters, and gas meters. It doesn't include such items as chillers, lighting, and motor replacements.

In this Brown et.al. study, the average MBCx cost for all of the buildings of different types was $0.51/sf. However, the MBCx costs vary dramatically with the objectives of the effort, the specific scope of services, and the size of the building. As noted in prior sections, the determination of the cost for MBCx projects will be made on a case-by-case basis.

For the College/University project completed in 2007, the total installed cost was $83,230. Note that the affected building area varied by measure. The Air Handler measures were limited to the area that each systems serves, while the Whole Building Control measure used the gross square footage and no other measures applied to that building. On aggregate this resulted in a measure cost of $0.080/square foot. Note that the costs per square foot are substantially lower than the forecasted cost. There are a number of possible reasons that include:

- The measures identified at the site were the most cost effective of a much larger pool of projects (selection of the "lowest hanging fruit" measures).
- The College-University is in a much different climate zone (CTZ 15-equivalent) than the projects in the Brown study (more energy savings due to higher overall energy use).

The measures were able to make use of in-house labor/parts which could be significantly less cost than outsourcing for the types of measures implemented Table 3 summarizes the measure savings and costs for 2007:

Table 3 Measure Cost Summary

Measure Name	Gross Therms Saved	Gross kWh Saved	Gross kW Reduced	Affected Building Area	Cost	Cost per Sq Ft
Monitoring Based Commissioning	30,000	893,00	92	1,039,869	83,230	0.080

Major equipment maintenance items that result in energy savings and have a greater tendency to persist are considered eligible measures if they are performed due to, or in conjunction with, the MBCx work. If major maintenance items that have long term persistence are found, such as fixing leaking or failed valves, actuator or damper operation, or leaks causing low refrigerant charge, is identified by the MBCx Provider, these should be included in the *Master List of Findings*.

Also, while testing, adjusting, and balancing (TAB) are not considered part of the scope of MBCx, it may be part of a larger scope of work negotiated with the Owner. In these cases, the MBCx Provider should record savings associated with the TAB work following these requirements:

- The TAB work is done because of the MBCx Program and would not otherwise be done.
- The TAB work corrects a deficiency and results in energy savings.

The Program may include limited controls enhancements such as variable frequency drives installed on existing motors to replace variable-pitch vane axial fan controls, occupancy sensors to permit advanced control of existing systems, and additional capabilities added to existing energy management systems. These may be eligible under the Program, if they meet the following qualifications:

- The measure must enhance or restore the operation of an existing piece of equipment or a system.
- The measure must have a simple payback of no more than four years.
- The cost of the measure must be no more than 10% of the cost of the existing system that it enhances, as estimated using the most recent version of the RS Means Building Construction Cost Data.

Note that the costs described here are the measure implementation costs, not the costs of installing the monitoring equipment associated with enabling sites for MBCx. These costs are considered to be outside of the measure costs, and are estimated to amount to about $25,000 per customer.

3.3 Incremental and Full Measure Costs

Since there is generally no base case costs, the measure costs would be equivalent to the installation costs of the MBCx measures.

Appendix

The appendix contains, on the next page, a table of all findings at a customer site which comprise the measure specific and overall MBCx program savings and costs.

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College-University Monthly Scorecard

Report Parameters

Start Date: January 1, 2007

End Date: December 31, 2007

Number of Findings Identufued: 43

Building	System Type	System	Description	Recommendation	Annual Avoided Cost	Annual Avoided Therms	Annual Avoided kWh	Peak Avoided kW	Est. Implementation Cost
Science Building	AHU	AHU-3 C Wing	Units operating off Schedule	Put system in Auto.	$11,130	659	66,681	0	$470 00
Science Building	AHU	AHU-7 Common Area	Units operating off Schedule	Put system in Auto	$22,640	1,395	135,397	0	$470 00
Science Build ng	AHU	AHU-7 Common Area	static pressure setting is highe than needed	Reduce sp setting by 20%	$22,110	0	138,190	6	$470 00
L brary	Hot Water	HX	20°F-60°F OA to 140°F - 200°F reset schedule. At 45°F OAT, 161°F HWS and 157°F HWR Value is too high Don't need water that hot.	Change control range to 0°F-60°F OA and 110°F-190°F HWS	$270	380	0		$470.00
Library	AHU	AHU-3	Fan speed is always 100%. Can not get to 1 " set point. Low ZN temp is 71°F+. OAD is 100%. If 51°F OA, why is DAT over 67°F. Do dampers function properly?	Fix OAD and reduce DAT setpoint.	$17,000	13,986	45,081	41	$7,800.00
Library	AHU	AHU-2	AHU-2 DAT setpoint goes up to 90°F at night between 10pm and 6am Htg valve actually opens to 18.3% on average to maintain that setting	Either disable heating valve at night, or change night setpoint value to equal day setpoint value	$780	1,114	0	0	$2,600.00
Library	VAV-Boxes	VAV03	On most day, the box goes to 100% damper and 1400-CFM late in the day.	Verify VAV damper controls are operating correctly	$80	64	240	0	$660 00
Student Center	VAV-Boxes	Corridor01	VAV box goes to a very high flow (1500-CFM) making space very cold 61°F, (with 71°F as its setpoint).	Fix VAV box so that it modulates correctly	$90	69	260	0	$660.00
Student Center	VAV-Boxes	MtngRm01	Mtg Room 01's CFM goes well above max CFM of 500-CFM (~900-CFM at peak).	Reset damper so that the air is limited to the designed max cfm	$100	79	300	0	$660 00

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College-University Monthly Scorecard

Report Parameters

Start Date: January 1, 2007

End Date: December 31, 2007

Number of Findings Identufued: 43

Building	System Type	System	Description	Recommendation	Annual Avoided Cost	Annual Avoided Therms	Annual Avoided kWh	Peak Avoided kW	Est. Implementation Cost
Student Center	VAV-Boxes	MtngRm02	Mtg Rm 02's air flow is always maxed out	Verify VAV damper controls are operating correctly.	$60	42	160	0	$660.00
Student Center	VAV-Boxes	MtngRm05	Mtg Rm 5's air flow is always maxed out	Verify VAV damper controls are operating correctly	$50	36	135	0	$660.00
Student Center	AHU	AHU-3	Unit is currently operating off Schedule	Put system in Auto.	$3,910	0	24,414	0	$0.00
Student Center	AHU	AHU-1	Calling for Cooling w/Chiller off	Disable Chilled Water Valve while chiller is off	$160	0	1,018	0	$470.00
Stucent Center	AHU	AHU-2	Calling for Cooling w/Chiller off	Disable Chilled Water Valve while chiller is off.	$60	0	370	0	$470.00
Student Center	Hot Water	HX	20°F-60°F OA to 140°F - 200°F reset schedule At 45°F OAT, 161°F HWS and 157°F HWR Value is too high Don't need water that hot	Change control range to 0°F-60°F OA and 110°F-190°F HWS.	$850	1,209	0	0	$470.00
Classroom-1	AHU	All	This building is a classroom facility and should not be operating from 2300 to 0600	Check Controls to ensure that AHU equipment is being shut-off during unoccupied periods.	$40,880	0	255,500	0	$13,000.00
Library	AHU	AHU-1	AHU-1 DAT setpoint goes up to 90°F at night between 11pm and 6am. Htg valve actually opens to 3 5% on average to maintain that setting	Either disable heating valve at night, or change night setpoint value to equal day setpoint value.	$290	410	0	0	$470.00
Library	AHU	AHU-4	AHU-4 DAT setpoint goes up to 90°F at night between 11pm and 6am. Htg valve actually opens to 8.2% on average to maintain that setting.	Either disable heating valve at night, or change night setpoint value to equal day setpoint value.	$700	998	0	0	$470.00

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College-University Monthly Scorecard

Report Parameters

Start Date: January 1, 2007

End Date: December 31, 2007

Number of Findings Identufued: 43

Building	System Type	System	Description	Recommendation	Annual Avoided Cost	Annual Avoided Therms	Annual Avoided kWh	Peak Avoided kW	Est. Implementation Cost
Library	AHU	AHU-5	AHU-5 DAT setpoint goes up to 90°F at night between 11pm and 6am Htg valve actually opens to 9.7% on average, to maintain that setting.	Either disable heating valve at night, or change night setpoint value to equal day setpoint value.	$830	1,180	0	0	$0.00
Library	Hot Water	HX	The steam meter reads -148 MBtuH when flow/use should be 0	Recalibrate meter. No energy savings are predicted, but readings are suspect until meter works properly.	$0	0	0	0	$5,200 00
Classroom-2	AHU	AHU-3	The CO2 Sensor is reading between 5-ppm and 110-ppm for the month These values are too low.	Recalibrate sensor. No energy savings are predicted, readings are suspect until sensor works properly	$0	0	0	0	$2,080 00
Student Center	AHU	AHU-5	The status for this unit is showing the unit to be on continuously while the speed indicates that the unit is turing off on schedule	Recalibrate the status sensor. No energy savings are predicted, readings are suspect until sensor works properly.	$0	0	0	0	$880 00
Science Building	Chiller	Chiller	The gpm and ΔT readings at the Chiller and secondary loop oflen show supply temperatures greater than return temperatures when there is substantial flow.	Calibrate main and secondary loop temperature and flow sensors.	$0	0	0	0	$880 00
Student Center	Chiller	Chiller	The Chiller oflen show the ΔT between the supply temperatures and the return temperatures to be, at best, 5°F and on average ~2 8°F.	The chiller controls should be check to make sure it is unloading correctly A 4°F rise in ΔT would save 8% energy use	$4,530	0	28,290	30	$3,120.00

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College-University Monthly Scorecard

Report Parameters

Start Date January 1, 2007

End Date December 31, 2007

Number of Findings Identufued: 43

Building	System Type	System	Description	Recommendation	Annual Avoided Cost	Annual Avoided Therms	Annual Avoided kWh	Peak Avoided kW	Est. Implementation Cost
Library	AHU	AHU-1	Mixed air temperature does not vary as much as other units, averaging about 2°F higher.	Verify that damper, setpoint and sensor are working correctly	$490	0	3,063	0	$660 00
Student Center	AHU	AHU-2	Mixed air temperature does not vary as much as other units, averaging about 2°F higher.	Verify that damper, setpoint and sensor are working correctly	$0	0	0	0	$660 00
Student Center	AHU	AHU-3	The MAT and DAT "Actual" reading do not vary Point may not be mapped correctly in the BMS	Recalibrate the status sensor No energy savings are predicted, readings are suspect until sensor works properly	$0	0	0	0	$660 00
Classroom-2	Chiller	Chiller	The Chiller often show the ΔT between the supply temperatures and the return temperatures to be, at best, ~6°F and on average 3°F	The chiller controls should be check to make sure it is unloading correctly. A 4°F rise in ΔT would save 8% energy use	$2,300	0	14,400	15	$3,120.00
Student Center	AHU	AHU-1	On Oct 27th, the schedule definition for 'on' was switched from 0 to 1, but the control logic for the AHU was not changed and promptly went "off". At the same time scheduled time frame of operation was altered The unit was overridden to be "on" after	Complete the control logic so that the unit is following the intended occupancy schedule	$2,920	1,645	11,075	0	$0.00
Student Center	AHU	AHU-2	Same as above	Same as above.	$4,300	2,036	17,989	0	$0 00
Student Center	AHU	AHU-4	Same as above	Same as above.	$4,300	2,036	17,989	0	$0.00
Student Center	AHU	AHU-5	Same as above.	Same as above.	$4,300	2,036	17,989	0	$0.00

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College-University Monthly Scorecard

Report Parameters

Start Date: January 1, 2007
End Date December 31, 2007

Number of Findings Identufued: 43

Building	System Type	System	Description	Recommendation	Annual Avoided Cost	Annual Avoided Therms	Annual Avoided kWh	Peak Avoided kW	Est. Implementation Cost
Student Center	AHU	AHU-4	Parameter out of range issue Static Pressure is close to 30 inH20	Recalibrate the status sensor No energy savings are predicted, readings are suspect until sensor works properly	$0	0	0	0	$660.00
Student Center	AHU	AHU-5	Parameter out of range issue: Static Pressure is ranging between +/- 70 inH20	Recalibrate the status sensor. No energy savings are predicted, readings are suspect until sensor works properly	$0	0	0	0	$660.00
Library	VAV-Boxes	VAV Boxes: 14, 25, 50, 56, 75, 77, 88, 91, 92	VAV Box Hunting Flow and Damper Positions vary more than ±20% for several 5-min intervals	Find route cause and repair Hunting can cuase early equip failure. Potential Comfort/Energy waste issue	$0	0	0	0	$660.00
Classroom-2	VAV-Boxes	VAV Boxes: 14, 26, 29, 30, 32, 34	VAV Box Hunting. Flow and Damper Positions vary more than ±20% for several 5-min intervals.	Find route cause and repair. Hunting can cuase early equip failure. Potential Comfort/Energy waste issue	$0	0	0	0	$1,770.00
Student Center	VAV-Boxes	VAV Boxes Corridor-1, Director Off, MtngRm-5	VAV Box Hunting. Flow and Damper Positions vary more than ±20% for several 5-min intervals	Find route cause and repair Hunting can cuase early equip failure Potential Comfort/Energy waste issue.	$0	0	0	0	$880.00
Library	VAV-Boxes	VAV Boxes 37, 39, 41, 43	VAV Box flow is hunting, but damper position is not.	Find route cause and repair Could be faulty Damper or Flow Sensor Hunting can lead to early equipment failure. A potential comfort issue.	$0	0	0	0	$880.00

ENERNOC
get more from energy

College-University Monthly Scorecard

Report Parameters

Start Date: January 1, 2007
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Number of Findings Identufued: 43

Building	System Type	System	Description	Recommendation	Annual Avoided Cost	Annual Avoided Therms	Annual Avoided kWh	Peak Avoided kW	Est. Implementation Cost
Library	VAV-Boxes	VAV Boxes 57, 63	VAV Box flow always reads 0-cfm	Find route cause and repair. Could be faulty Flow Sensor Hunting can lead to early equipment failure. A potential comfort issue	$0	0	0	0	$880 00
Haas Library	VAV-Boxes	VAV Boxes 53, 57, 63	VAV Box damper position is hunting, but flow is not	Find route cause and repair Could be faulty Damper or Flow Sensor Hunting can lead to early equipment failure A potential comfort/energy waste issue	$0	0	0	0	$880.00
Library	VAV-Boxes	VAV Boxes Corridor-1, DirectorOff, InfoDesk, Library, Lounge, MtngRm-2, Off-3, OpenWorkArea, PrepArea, Pub, StorageRm	VAV Box Actual Space temperature is more than ±3°F of VAV Box Setpoint	Find Route Cause Analysis. Overcooling/underheating when 3°F lower and Undercooling/overheating when 3°F higher	$1,250	633	5,030	0	$1,770 00
Classroom-3	Meter	hourly kW	The building hourly load profile had a Load Factor of 74% even though it is a classroom building and not 'open' at night.	Install time-clocks or implement other control strategies that allow for the building to be in un-occupied mode from 0:00 to 06:00 to reduce the LF to 60%.	$17,560	0	109,763	0	$26,000 00
				Total Avoided Cost	**$163,940**	**30,006**	**893,334**	**92**	**$83,230**

Of Total Electric for Site with Opportunity IDs 11.3%

4 References

[1] K. Brown, M. Anderson and J. Harris, "How Monitoring Based Commissioning Contributes to Energy Efficiency for Commercial Buildings", January 2007, June 2003, American Council for an Energy-Efficient Economy (Adobe Acrobat File: http://www.ucop.edu/ciee/mbcx/documents/MBCx_ACEEE_2006_revised_9jan07.pdf).

[2] N. Bourassa, M. Piette, and N. Motegi, "An Evaluation of Savings and Measure Persistence from Retrocommissioning of Large Commercial Buildings", 2004 (Adobe Acrobat File: 860310.pdf found at http://www.osti.gov/bridge/servlets/purl/860310-Q60uUq/860310.PDF)

2 *Sample EnerNOC Monitoring Based Commissioning Report*

The following pages contain a sample report detailing the information that EnerNOC provides to its MBCx customers on a monthly basis. Note that the reports provide information on the overall energy picture, along with specific recommendations for measures. These reports form the cornerstone of the MBCx approach. They provide the necessary visibility to the customer on all of their energy cost drivers, and provide recommendations for continuing to reduce energy usage and ensuring persistence of savings. Please note that EnerNOC has obtained permission from the customer to use the data and reports shown below.

Redacted ScoreCard

APPENDIX C. ENSAVE, INC. PROPOSAL

ATTACHMENT A - PON No. 1259

PROPOSAL CHECKLIST (MANDATORY)

Proposal Title: New York Agricultural Energy Efficiency Program		Due Date: 8/7/08	
Primary Contact (Prime Contractor): Craig Metz		Title: Chief Executive Officer	
Company: EnSave, Inc.		Phone: 802-434-1822	Fax: 802-434-7011
		e-mail: craigm@ensave.com	
Address: 65 Millet St, Suite 105	City: Richmond	State or Province: VT	Zip: 05477
Secondary Contact: Amelia Gulkis		Title: Program Development Manager	
Company: EnSave, Inc.		Phone: 802-434-1826	Fax: 802-434-7011
		e-mail: ameliag@ensave.com	
Address: 65 Millet St, Suite 105	City: Richmond	State or Province: VT	Zip: 05477

THE PRIME CONTRACTOR MUST SIGN THIS FORM BELOW and ANSWER THE FOLLOWING QUESTIONS:

Do you accept all Terms & Conditions in the Sample Agreement? (if no, explain on separate pg) ✓ Yes __ No

Have you been indicted/convicted for a felony within the past 5 years? (if yes, explain on separate pg) __ Yes ✓ No

Are you a Minority or Women-Owned Business Enterprise? __ Yes ✓ No

Does your proposal contain Minority or Women-Owned Business enterprises as subcontractors? __ Yes ✓ No

Are you submitting the required number of copies? (See proposal instructions.) ✓ Yes __ No

Is other public funding pending/awarded on this and/or very similar topic (prior and/or competing proposals)? __ Yes ✓ No

(if yes, explain on separate page)

AUTHORIZED SIGNATURE & CERTIFICATION

I certify that the above information, and all information submitted in connection with State Finance Law §139-j and §139-k, is complete, true, and accurate, and that the proposal requirements noted have been completed and are enclosed. I affirm that I understand and will comply with NYSERDA's procedures under §139-j(3) and §139-j(6)(b) of the State Finance Law. I understand that this proposal may be disqualified if the solicitation requirements are not met. I the undersigned am authorized to commit my organization to this proposal.

Signature: [signature]	Name: Craig Metz
Title: Chief Executive Officer	Organization: EnSave, Inc.
Phone: 802-434-1822	

NOTE: This completed form **MUST** be signed and attached to the front of all copies of your proposal.

Disclosure of Prior Findings of Non-Responsibility Form

(Mandatory)

Name of Individual or Entity seeking to enter the procurement contract: En Save, Inc.		
Address: 65 Millet Street, Suite 105, Richmond, VT 05477		
Date: August 6, 2008		
Solicitation or Agreement Number: PON 1259: Request for Independent Program Administrators Name and Title of Person Submitting this Form: Craig Metz, Chief Executive Officer		
Has any Governmental Entity made a finding of non-responsibility regarding the Individual or Entity seeking to enter the Procurement Contract in the last four years? (Please indicate with an "X")		Yes
	X	No
Was the basis for the finding of non-responsibility due to a violation of §139-j of the State Finance Law? (Please indicate with an "X")		Yes
	X	No
Was the basis for the finding of non-responsibility due to the intentional provision of false or incomplete information to a Governmental Entity? (Please indicate with an "X")		Yes
	X	No
If you answered yes to any of the above questions, please provide details regarding the finding of non-responsibility below.		
Government Agency or Authority:		
Date of Finding of Non-responsibility:		
Basis of Finding of Non-responsibility: (Add additional pages as necessary)		
Has any Governmental Entity or other governmental agency terminated or withheld a Procurement Contract with the above-named Individual or Entity due to the intentional provision of false or incomplete information? (Please indicate with an "X")		Yes
	X	No
If you answered yes, please provide details below.		
Government Agency or Authority:		
Date of Termination or Withholding of Contract:		

Offerer certifies that all information provided to NYSERDA with respect to State Finance Law §139-k is complete, true, and accurate.

By: _____ Date: 08-06-08

Signature

Name: Craig Metz Title: Chief Executive Officer

EnSave

Proposal for:

New York Agricultural Energy Efficiency Program

Submitted to:

New York State Energy Research & Development Authority
17 Columbia Circle
Albany, NY 12203-6399

Request for Independent Program Administrators
Energy Efficiency Portfolio Standard
Program Opportunity Notice 1259

August 7, 2008

Submitted by:
EnSave, Inc.
65 Millet Street, Suite 105
Richmond, VT 05477
(802) 434-3792
www.ensave.com

TABLE OF CONTENTS

1. Program Description

Executive Summary

EnSave, Inc. (EnSave) herein proposes the New York Agricultural Energy Efficiency Program ("Program"). This program will deliver energy savings to New York's agricultural sector, through the verified installation of energy efficiency measures on the farm site. We will promote the opportunity to 35,000 New York farms, and will enroll approximately 800 New York farms over the three year program period.

We will deliver energy savings to a key sector of New York's rural economy while leveraging additional opportunities for savings. We will maximize available technical assistance through NYSERDA's FlexTech, NYSEG, and National Grid's economic development, and federal funding such as the United States Department of Agriculture's Rural Energy for America Program.

EnSave will market the program, enroll participants, manage the installation process, and pay rebates. Through this process we will deliver approximately 16.5 million kWh, 2,900 kW, and 788,672 therms of gas savings. The net present value of the electric benefits is $9.3 million and the net present value of the gas benefit is $547,000.

EnSave will deliver this program by working closely with energy efficient equipment manufacturers (upstream market actors), equipment dealers who sell energy efficient equipment (midstream market actors), as well as the extended agricultural community. The agricultural community is comprised of organizations such as the New York Farm Bureau, New York Department of Agriculture, Cornell Cooperative Extension, Conservation Districts, Resource Conservation & Development Councils, and other organizations that advocate for farmers.

This work will utilize EnSave's successful track record of delivering farm energy efficiency programs to NYSERDA and other clients throughout the United Sates. EnSave delivered 10 million kWh to 572 New York farms in 1999-2003 through the New York Variable Speed Drive Farm Program[1]; supported NYSERDA's Smart Equipment Choices program in 2002-2003 by helping over 300 New York dairy farms install plate coolers, saving over 6 million kWh; and provided energy audits to 75 dairies in 2004-2005 through the Dairy Development Energy Program. This prior success shows that farms are eager participants in energy efficiency programs, if given the right opportunity.

New York is a leader among U.S. states in the production of several commodities, and within the top ten states in gross sales of milk, vegetables, and cotton. Agriculture is a $3 billion industry in New York in the sales of commodities alone.[2] Many other New York small businesses,

[1] Please see Attachment A for a case study of this program.
[2] United States Department of Agriculture Census of Agriculture, 2002.

including equipment dealers, electricians, feed sellers, and other supporting businesses are dependent upon the agricultural sector for their success. Thus, when farms are empowered to reduce energy consumption and become more sustainable, the beneficial effects are felt throughout the rural community.

PROGRAM DELIVERY

1. Planning and Development

This program utilizes a program design that EnSave has deployed successfully in the past; therefore, there will be minimal ramp-up time before we can begin capturing energy savings from the installation of energy efficient equipment. Anticipating a program start date of January 1, 2009, we anticipate overseeing the first equipment installations within 90 days from contract signing.

In the planning stage of the program, we will meet with NYSERDA and the DPS to agree to specific program timelines, incremental goals, and other metrics. EnSave will also create the program administration documents, including:

- Application form
- Introductory letters to manufacturers, equipment dealers, agricultural community
- Program Acceptance Letter
- "Sorry letter" for applicants who do not qualify
- Equipment Installation Form
- General program brochure/flyer
- Other marketing materials or program administration documents as necessary

We will also procure lists of equipment manufacturers, equipment dealers, the extended agricultural community, and farmers to be used for mailings and phone calls. EnSave has access to many of these lists already through its prior work in New York. These past program participants represent a group of progressive farmers who have already made an investment in energy efficiency. These farmers are good prospects to install additional measures because they are already familiar with EnSave and with participating in an energy efficiency program. Therefore, we will conduct a special "fast track" marketing campaign recognizing these farmers for their previous efforts.

EnSave will leverage the support of New York's agricultural community, comprised of organizations such as the Farm Bureau, Resource Conservation & Development Councils, Conservation Districts, and other organizations that support New York agriculture. EnSave will work closely with these groups to disseminate program information, ensuring all New York farmers are aware of the program and how to participate. These groups will help spread

information through newsletters, meetings, and networking with individual farms. This approach will ensure wise use of program funds by reaching potential participants in the state without conducting an expensive mailing campaign to all 35,000 New York farms.

EnSave has partnerships with both the National Association of Resource Conservation and Development Councils and the National Association of Conservation Districts. These partnerships allow EnSave to help these organizations bring energy efficiency into the array of conservation services they bring to the rural community. As part of our partnership with these organizations, EnSave will work with New York's resource conservation and development councils and conservation districts to involve them in the promotion of the program, and in supporting farms with applications to USDA Rural Development's Rural Energy for America Program (REAP).

REAP provides low interest loans and grants on a competitive basis for farms and rural small businesses who install energy efficiency or renewable energy systems. EnSave has completed over 20 energy audits as mandatory supporting documentation for applicants to this program. EnSave's familiarity with this program can help New York farms access more of these federal funds.

While the Agricultural Energy Efficiency Program does not cover all fuels used on the farm, EnSave will capture energy efficiency information on all fuel types for farms that go through the USDA's REAP. EnSave will also create a list of farms who are interested in renewable energy, and will refer them to renewable incentives available through NYSERDA or other sources.

Deliverable	Due Date
Program begins	January 1, 2009
All parties attend kick-off meeting	January 15, 2009
EnSave submits draft program documents for review	January 30, 2009
NYSERDA issues document approval	February 15, 2009
Obtain lists of agricultural producers	January 30, 2009

2. Marketing

We will design a clear, concise, engaging marketing piece (brochure) promoting the availability of rebates for energy efficient farm equipment. The brochure will explain the details of the program, and how farmers can participate. We will also create a press release to distribute to agricultural publications in order to promote the program.

EnSave's marketing strategy will leverage and work with three key stakeholders to reach the farmer: equipment manufacturers, equipment dealers, and the agricultural community. We plan

to leverage these other organizations by having them include program information in their newsletters and mailings; providing program information for dissemination at meetings and events; and having these partners encourage farmers to apply for the program. This enables EnSave to distribute program information to a wide section of New York's farms without relying on expensive mass mailings, and also builds local support for the program when local organizations have ownership of some program elements.

This marketing strategy has been implemented successfully in over a dozen of EnSave's other farm energy efficiency programs.

Equipment Manufacturers

The first group that will be contacted through marketing is the manufacturers of energy efficient equipment. These will be manufacturers of all the major measure categories used in the program, such as lighting, HVAC, motors, and dairy measures. EnSave will send them a letter followed by a phone call to inform them of the program and request contact information for their sales representatives and dealer network. We will also request their support through other means, such as offering an additional discount on energy efficient equipment in order to encourage more installations, or by sending a mailing to their distributors notifying them of the program.

Equipment Dealers

EnSave will then market the program to dealers, sending them a letter explaining the program and how it will benefit their customers as well as their business, followed by a phone call to further explain the program and ensure they understand how the program can benefit their farm customers. These dealers are critical partners in a program, because they are the first ones farmers will turn to when seeking advice about which equipment to purchase. Evaluations of EnSave's prior agricultural energy efficiency programs have shown that dealers are responsible for up to 70% of the applications farmer submit to the program.

EnSave will keep in continual contact with the dealers throughout the program in order to build relationships, track progress, and answer questions. A strong relationship with dealers helps ensure success of the program. EnSave has established strong working relationships with equipment dealers through its previous farm energy efficiency programs in New York, and we will continue to build these relationships.

Agricultural Community

Concurrent to dealer notification, EnSave will inform the agricultural community of the program by sending them a program announcement. EnSave will work with these groups to reach farmers by encouraging them to include program information in their mailings, newsletters, and meeting agendas. This will help bring the program message to farmers statewide, and will support the

mission of these organizations by saving their members money and making them more sustainable. As a side benefit to the program, as these organizations inform their members about energy efficiency, they will be learning about the wise use of energy themselves, thus helping to spread energy efficiency education throughout the rural community.

Farmers

EnSave has already worked with several hundred New York farmers through its previous NYSERDA programs. EnSave will contact these farms to promote new measures and other funding opportunities they can access (such as other NYSERDA programs, utility economic development funds and REAP).

EnSave will also obtain lists of other farmers by name, address, phone, and type of production. We will lease these lists from an agricultural list broker firm such as FarmMarketID.

Our direct marketing to farmers will focus on targeted subsets of farmers (such as dairies, large energy users, and past EnSave program participants). In order to reach as many of the 35,000 farmers in the state as possible, we will work with and leverage manufacturers, dealers, and the agricultural community to distribute information.

Our program representatives will be responsible for making phone calls to farmers and informing them of the program. These representatives will enroll farmers, and work with them through their entire installation process to ensure they are able to navigate the process.

Marketing Strategies

Our direct mail, outreach, event attendance, and web site will take the following forms:

- Direct mail to manufacturers, dealers, agricultural community (four per year)
- Ongoing outreach calls (phone and personal visits) to manufacturers, dealers, agricultural community, and farmers (ongoing)
- Attend farm shows, state fairs, and other appropriate events with a farm audience (four per year)
- Program web site updated regularly with news, press releases, and success stories

Deliverable	Due Date
Conduct fast track marketing campaign to past participant	Febnuary 28, 2009
Introductory mailings to manufacturers, dealers, agricultural community	February 28, 2009
Phone outreach to manufacturers, dealers, agricultural community	February 28, 2009; ongoing throughout program
Update EnSave web site with program information	January 31, 2009
Attend events	4 times per year

3. Customer enrollment

The program application form will be available both in paper and electronic form. It can be downloaded and printed from EnSave's web site, filled out as an interactive PDF online, or filled out in paper form. The application form will record the farmer's name, address, farm type, utility company, and other identifying information. The application will also require the farmer to fill out the type of equipment to be replaced and other information about electricity usage (such as pounds of milk sold per year, for dairies) that enable EnSave to determine energy savings. The application will also include all eligibility rules of the program and require the farmer to agree that he/or she is eligible for the program. Applicants will indicate an estimated installation date, which must be within120 days of the application signature date. The application will clearly state that funds will be held for 120 days following the application date, and if an installation is not completed they must reapply.

Upon EnSave's receipt of the farmer's signed application form, we will review the application and follow up by phone with any questions.

In order to be eligible for the program, farmers must:

- Be a farmer in New York state, as defined by NAICS codes 111 (crop production), and 112 (animal production).
- Not have received a rebate through system benefit charge funds for the same measure (to prevent double-dipping)
- Pay in to the system benefit charge
- Meet the equipment specifications of the program (to be supplied to NYSERDA during contract negotiation)

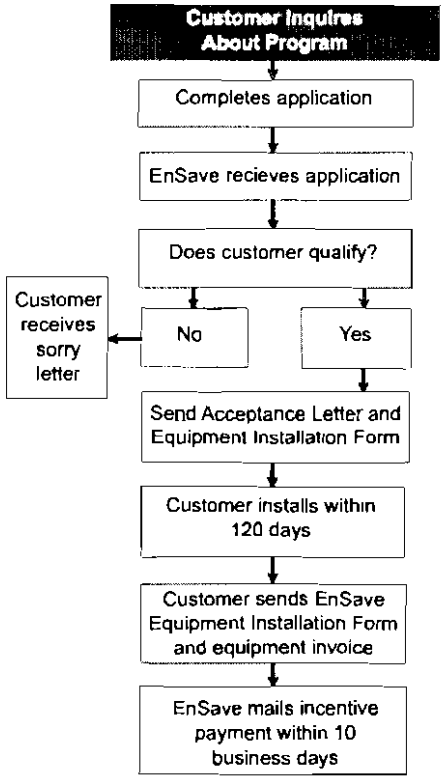
Farmers will be encouraged to call EnSave prior to applying to discuss their potential project, and allow EnSave to determine energy savings and the rebate amount over the phone. This

allows the farmer to ask questions about the program and receive the support needed to enroll them.

After EnSave receives a successful application, we will send the farmer a Program Acceptance Letter stating they will receive a rebate provided they install the equipment within 120 days from the application date, and submit the equipment invoice and equipment installation form. This Acceptance Letter will serve as proof that the participant has been accepted. The farmer will not receive an Acceptance Letter until everything in their application has been checked.

When farmers install, they will send EnSave an equipment installation form attesting that the equipment is installed, as well as a copy of the equipment invoice. After EnSave receives these documents, we will send the farmer a rebate check. All rebates will be based upon the calculated energy savings of the project(s).

For any projects selected for measurement and verification (M&V), EnSave will work with the M&V contractor to provide contact information for farms as well as any supporting program information needed for them to complete their evaluation.



Deliverable	Due Date
EnSave receives application, reviews application and answers any farmer questions	March 1, 2009 and ongoing
EnSave sends program acceptance letter detailing next steps to receive rebate, include copy of equipment installation form	March 5, 2009 and ongoing
Farmer installs	March 10, 2009 and ongoing
Farmer submits equipment installation form and copy of equipment invoice	March 20, 2009 and ongoing
EnSave issues rebate check	March 31, 2009 and ongoing

4. Installation documentation and tracking

EnSave will maintain an internal tracking system to track various metrics. Fields will likely include:

1. Contact information (name, title, full address, phone, email, fax, cell phone)
2. Type of agriculture
3. Number of livestock/acres/square footage
4. Date of contract/agreement to install measure (information verification form received)
5. Date of beginning of installation process
6. Installation completion date (installation verification form received)
7. Installation contractor
8. Installation location: street location, town, zip code, building (milking parlor, barn, shed)
9. Project or work order #
10. Energy delivery utility
11. Measure type (lighting, HVAC, motor drive, etc.
12. Annualized energy savings
13. Measure life (years)
14. Total measure installed cost
15. Incremental measure cost
16. Rebate payment amount
17. Project completion date

This tracking system will allow EnSave to manage program metrics and adjust the program schedule or activities in response to the pace, size, and location of installations. We will use this data to generate reports to NYSERDA and will also provide it to the M&V contractor who will be evaluating the program.

Deliverable	Due Date
EnSave tracks pertinent data	March 1, 2009 and ongoing
EnSave submits data to M&V contractor	As requested by M&V contractor
EnSave submits data to NYSERDA	Quarterly

5. Rebate payment

EnSave will issue rebate payments to farmers within ten business days of receiving all completed paperwork. EnSave will invoice NYSERDA monthly for reimbursement of rebate costs. Rebate payments will be

- $0.08 per kWh saved for all electric measures except lighting
- $0.05 per kWh saved for lighting
- $0.14 per therm saved for gas measures

These rebates are higher than NYSERDA's general

Deliverable	Due Date
EnSave issues rebate check	March 31, 2009 and ongoing

6. Reporting & Invoicing

EnSave will provide NYSERDA with quarterly reports, year-end annual reports, and a final program report. We will maintain a tracking system, which will track the number and status of applicants, cost of installations, energy and demand savings, and rebate payments. We will include a public version of each report, removing farmer names and identifying information. NYSERDA and/or the DPS can then post this public version.

The quarterly reports will contain the following elements, plus any additional metrics desired by either NYSERDA or the DPS.

1. Overview of marketing and outreach activities
2. Tally of total applicants for the quarter
3. Tally of accepted applicants
3. Summary of information verification forms received (pending installations)
4. Summary of installations completed
5. Summary of installations verified
6. Rebates paid
7. Planned activities in next quarter
8. Budget summary

EnSave will also invoice NYSERDA monthly for funds spent in the previous month.

Deliverable	Due Date
EnSave submits invoices to NYSERDA	By 10th of each month for activities completed in previous month
EnSave submits quarterly reports to NYSERDA	Quarterly
EnSave submits year-end annual reports	January 2010; January 2011; January 2012
EnSave submits final program report	February, 2012

7. Ramp Down and Shut Down

EnSave will ensure that all upstream and midstream stakeholders (manufacturers, dealers, agricultural community) as well as farmers are aware of the December 1, 2011 application deadline, and the December 15, 2011 installation deadline. We will do this by featuring this date on the application form and equipment installation form.

On November 1, 2011, we will send a mailing to all dealers, and post information on our web site that the application deadline is December 1, 2011. Also on November 1, we will send certified letters to all dealers and all farmers with pending installations (have been accepted but have not yet installed) that they will need to install and submit installation paperwork by December 15, 2011 in order to receive a rebate payment.

Deliverable	Due Date
Notify manufacturers, dealers, and agricultural community of December 1, 2011 application deadline	November 1, 2011
Post program application deadline notice on EnSave web site	November 1, 2011
Send certified letter to all farmers who have been approved to install but have not yet installed of need to submit installation documentation by December 15, 2011	November 1, 2011
Program closes for applications	December 1, 2011
Program closes for installations	December 15, 2011
EnSave sends final rebate checks to farmers	December 31, 2011
Program closes	December 31, 2011

PROGRAM MEASURES

Measures to be included in this program will encompass ventilation, lighting, dairy, irrigation, and motors. Below, we have provided a list of all measures. We will provide equipment

specifications for all measures during the contract negotiations with NYSERDA. More detail is provided in the Selection Criteria section on page 23.

Measure Name
20" - 26" energy efficient Low Volume High Speed Exhaust or Circulation Fans - RETROFIT
36" energy efficient Low Volume High Speed Exhaust or Circulation Fans - RETROFIT
48" energy efficient Low Volume High Speed Exhaust or Circulation Fans - RETROFIT
50" - 60" energy efficient Low Volume High Speed Exhaust or Circulation Fans - RETROFIT
20" - 26" energy efficient Low Volume High Speed Exhaust or Circulation Fans - NEW
36" energy efficient Low Volume High Speed Exhaust or Circulation Fans - NEW
48" energy efficient Low Volume High Speed Exhaust or Circulation Fans - NEW
50" - 60" energy efficient Low Volume High Speed Exhaust or Circulation Fans - NEW
4 High Volume Low Speed Fans 16 Ft Diameter*
Well Pump Variable Speed Drive (VSD)**
Sprinkler to Drip-Irrigation
Low Pressure Impact Sprinkler Nozzles (permanent)
Low Pressure Impact Sprinkler Nozzles (portable)
Screw-in Compact Fluorescent Lamp, 5 - 13 watts
Screw-in Compact Fluorescent Lamp, 14-26 watts
Screw-in Compact Fluorescent Lamp, >=27watts
T-8 or T-5 Lamp and Electronic Ballast - 4 foot (T12 replacement only)
HID Fixture, Interior Pulse Start 251 - 400 watts mercury vapor basecase
HID Fixture, Exterior Pulse Start > 176 watts incandescent basecase
Photocell
Timeclock
Milk Precoolers
Milk Transfer Pump Variable Speed Drive
Milking Vacuum Pump Variable Speed Drive
Compressor Heat Recovery Units (electric water heaters only)
Scroll Compressors for Bulk Tanks
Premium Efficiency Motor 1 HP
Premium Efficiency Motor 1.5 HP
Premium Efficiency Motor 2 HP
Premium Efficiency Motor 3 HP
Premium Efficiency Motor 5 HP
Premium Efficiency Motor - 7.5 HP
Premium Efficiency Motor - 10 HP
Premium Efficiency Motor - 15 HP
Premium Efficiency Motor - 20 HP
Premium Efficiency Motor - 25 HP
Premium Efficiency Motor - 30 HP
Premium Efficiency Motor - 40 HP

Premium Efficiency Motor - 50 HP
Premium Efficiency Motor - 60 HP
Premium Efficiency Motor - 75 HP
Premium Efficiency Motor - 100 HP
Premium Efficiency Motor - 125 HP
Premium Efficiency Motor - 150 HP
Premium Efficiency Motor - 200 HP
Custom - Lighting
Custom - Motors, Other Equip.
Custom - Irrigation
Custom - AC&R Controls
Custom - AC & Refrigeration, Compressors
Storage Water Heaters (LRG >75 MBTUH)
Storage Water Heaters (SML <= 75 MBTUH)
Tank Insulation - Low Temperature Applic. (SF) 2 in
Tank Insulation - Low Temperature Applic. (SF) 1 in
Tank Insulation - High Temperature Applic. (SF) 2 in
Tank Insulation - High Temperature Applic. (SF) 1 in
Pipe Insulation - Hot Water Applic. (LF) 2 in
Pipe Insulation - Hot Water Applic. (LF) 1 in
Pipe Insulation - Low Pressure Steam Applic. (LF) 2 in
Pipe Insulation - Low Pressure Steam Applic. (LF) 1 in
Greenhouse Heat Curtain

2. COMPANY BACKGROUND

Since 1991, EnSave has supported the American agricultural sector with innovative energy efficiency and pollution prevention solutions. EnSave provides agricultural producers and food processors with cost-effective ways to reduce operating costs while saving energy and reducing pollution.

EnSave's clients include state and federal energy and environmental agencies, investor-owned utilities, and rural electric cooperatives. EnSave implements its programs by developing relationships with equipment manufacturers, local equipment dealers and the local agricultural community. Ultimately, these programs promote economic investment in the rural economy and improve the quality of America's land, air, and water.

Company Contact Information:
EnSave, Inc.
65 Millet Street, Suite 105
Richmond, VT 05477
(802) 434-3792

Main Contact:
Craig Metz, Chief Executive Officer
Phone: (802) 434-1822
Fax: (802) 434-7011
craigm@ensave.com

Federal Employer Identification Number: 03-0358926

3. Company Experience and Qualifications

EnSave has delivered programs on behalf of several public clients including NYSERDA, the California Public Utilities Commission, Maryland Energy Administration, Michigan Public Service Commission, and the Texas State Energy Conservation Office. Additionally, we have worked with several agencies within the United States Department of Agriculture and the United States Environmental Protection Agency.

We design, implement, and administer energy efficiency and pollution prevention programs. Our tasks encompass designing program documents, marketing a program, enrolling participants, tracking participation, verifying installations, and reporting results. We work with equipment manufacturers, equipment dealers, and customers in order to successfully complete installations. We also work with the "extended agricultural community" in our agricultural programs- encompassing organizations such as the Farm Bureau, University Extension, and Conservation Districts. These stakeholders are trusted advisors to farmers. EnSave works with them to bring program information to their members. In order for an agricultural program to be successful, it must have grassroots support.

Our demonstrated experience will deliver a clear message to all New York farmers, and will ensure installation of energy efficiency measures. We will build upon the success of the program to enroll additional partners and leverage more funding. In particular, our familiarity with the United States Department of Agriculture's Rural Energy For America Program (REAP) will leverage state funds with competitive federal dollars available for energy efficiency installations on farms and rural small businesses.

EnSave has worked in eighteen states, and has delivered over a dozen incentive programs. Most of our programs are a "turnkey" design, where EnSave has designed the program and its eligibility requirements, developed and implemented a marketing plan, enrolled customers, enrolled trade allies, tracked and reported program results, and delivered rebate payments. Recent experience includes:

California Dairy Energy Efficiency Program (multiple similar programs), 2002-Present

This series of programs began in 2002-2003 by offering rebates on one technology to dairy farm customers of Pacific Gas & Electric and Southern California Edison. In 2004-2005, the program expanded to include multiple technologies. In 2006-2008, the program expanded the technologies further still and focused its efforts on Pacific Gas & Electric dairy customers. EnSave has exceeded the program goal for the current program and is negotiating a continuation of its contract for 2009-2011.

EnSave designed the program marketing campaign, provided program information to equipment manufacturers, equipment dealers, members of the extended agricultural community, and over 1,500 dairy customers. EnSave oversaw installation of energy efficiency measures, performed initial verification of installation, and reported results to the client. Since 2002, the program has saved over 12.5 million kilowatt hours for these customers.

Reference:
Tim Drew, Energy Division Representative
California Public Utilities Commission
505 Van Ness Avenue
San Francisco, CA 94102
(415) 703- 5618
zap@cpuc.ca.gov

New York Variable Speed Drive Farm Program, 1999-2003

EnSave worked with NYSERDA to deliver the Variable Speed Drive Farm Program to 572 dairy farmers in New York State. EnSave designed the program marketing campaign, provided program information to equipment manufacturers, equipment dealers, members of the extended agricultural community, and over 6,500 dairy farmers. EnSave oversaw installation of the energy efficiency measure, performed initial verification of installation, and reported results to the client.

Reference:
Jessica Zweig, Project Manager
NYSERDA
17 Columbia Circle
Albany, NY 12203
(866) 697-3732, ext. 3346
jlz@nyserda.org

Maryland Farm Energy Site Assessment Program, 2006-Present

EnSave designed this program to deliver energy audits and rebates to agricultural producers in Maryland. The first phase completed 25 audits; the second phase will complete 50 audits. EnSave also designed the rebate program to distribute $50,000 worth of rebates for customers. EnSave partnered with Maryland Natural Resources Conservation Service, the Maryland Energy Administration, the Maryland Department of Agriculture, Maryland Eastern Shore and Western Maryland Resource Conservation and Development Councils, USDA Rural Development, Washington County Soil Conservation District, and the Maryland Agriculture and Resource Based Industry Development Corporation (MARBIDCO), an economic development organization. This partnership enabled program participants to receive additional financial assistance to facilitate installations. EnSave also actively promoted USDA Rural Development's Renewable Energy & Energy Efficiency program, which offers additional financial assistance to program participants.

Reference:
Chris Rice, Program Manager
Maryland Energy Administration
1623 Forest Drive, Suite 300
Annapolis, MD 21403
(410) 260-7207
Crice@energy.state.md.us

4. RESUMES OF KEY PROJECT PERSONNEL

For quick reference, we have provided a table of all personnel to be involved in this program. We have provided a brief description of key staff experience, and have attached full resumes for key staff as Attachment B.

EnSave has secured office space at the Plaza Office Center in Albany, NY. Upon proposal approval, EnSave will activate the lease. The New York office will be fully staffed with one or more EnSave employees in order to facilitate communication with NYSERDA, DPS, and New York program partners. Other staff will be based in EnSave's Richmond, Vermont office and will be available for travel to New York.

Name/Title	Role
Key Staff	
Edward Sengle, Program Manager	Mr. Sengle will manage day-to-day operations of the program and will be NYSERDA's primary contact person.
Illari Vihinen, Energy Engineer	Mr. Vihinen will be in charge of all engineering and technical services. He will be the liaison

	with NYSERDA and DPS staff regarding measure cost savings, calculations, and total resource cost.
Kyle Clark, Program Representative	Mr. Clark will contact farmers to encourage them to participate in the program. Once enrolled, he will work closely with farmers and equipment dealers to ensure installations are completed.
Corey Conant, Program Representative	Mr. Conant will contact farmers to encourage them to participate in the program. Once enrolled, he will work closely with farmers and equipment dealers to ensure installations are completed.
Katherine Williams, Marketing Coordinator	Ms. Williams will produce all marketing materials and coordinate with NYSERDA's marketing and public affairs staff on media releases, and other joint marketing activities.
Bruce Jones, Finance Manager	Mr. Jones will handle tracking all program finances including accounts receivable, accounts payable, and payment of rebates. He will monthly provide invoices to NYSERDA.
Other Program Staff	
Amelia Gulkis, Program Development Manager	Ms. Gulkis will oversee the start-up phase of this project and will transition the project to full implementation.
Craig Metz, CEO	Mr. Metz will oversee overall implementation of the contract and supervision of all staff.
Lynn Knight, Government and Special Projects Coordinator	Ms. Knight will work closely with the extended agricultural community and government entities to gather support and additional funds to support the program.

Edward Sengle, Program Manager

Mr. Sengle will oversee day-to-day program activities and will act as liaison to NYSERDA and DPS staff. He will be responsible for overall program implementation, tracking, reporting, and managing EnSave's assigned program staff. He has managed comprehensive energy efficiency programs, including EnSave's Ag Efficiency Plus and Dairy Energy Efficiency Program for California customers, and the Texas Agricultural Technical Assistance Program.

Mr. Sengle's career focus has been energy conservation, renewable generation, and green technologies. He is experienced in wind energy system production, assembly and servicing; bio-aerosol testing and filtration; semiconductor manufacturing and characterization, and HVAC design.

Most recently, Mr. Sengle was a project manager for Northern Power Systems, responsible for overseeing wind generation projects. He has over twenty five years' experience as a mechanical engineer, including fourteen years as an engineer for IBM. He holds a B.S. in Mechanical Engineering from Lehigh University and has completed graduate coursework in mechanical engineering.

Illari Vihinen, PE, Energy Engineer

Mr. Vihinen will provide documentation of all measure energy savings for the program, including providing work papers and engineering calculations as needed. He will work with NYSERDA, DPS, and the utilities as necessary to provide cost/benefit analyses, technical documentation, and other materials.

Before coming to EnSave, Mr. Vihinen was a Hydroelectric Operator at Spruce Mountain Design, operating and maintaining two hydroelectric plants. Mr. Vihinen has managed several multi-million dollar R&D and product development programs involving wind and power electronics, directed resource planning and budgeting, and served as an ISO 9001-2000 auditor. He has prior engineering and management experience with GE Industrial Systems and as a Captain and Combustion Research Engineer in the United States Air Force.

Mr. Vihinen holds a B.S. in Mechanical Engineering from Cornell University and a M.S. in Mechanical Engineering from Clarkson University. He was awarded Professional Engineering License for Mechanical Engineering in 2000.

Corey Conant and Kyle Clark, Program Administrators

The administrators will field customer queries, represent the program at events, and be the primary contact people from the customer perspective.

Program administrators are customer service experts, able to guide participants through the steps needed to complete projects. They will file and track all program paperwork for each customer, and submit continually follow up with farmers to ensure installations take place. They will also conduct outreach calls to equipment manufacturers, equipment dealers, and the extended agricultural community.

Mr. Conant has been a program representative and energy auditor for EnSave since 2005. He has delivered program information and enrolled customers in incentive programs for six different

incentive programs with very different rules and eligibility guidelines. He has extensive sales and customer support experience. Mr. Conant attended the University of Vermont and currently attends Bridgewater State College.

Mr. Clark has been a program representative for EnSave since 2007. He has also assisted with the design and use of EnSave's energy auditing tool. In his role as program administrator, he has worked on two large energy efficiency incentive programs, responsible for maintaining an active account base of about 200 customers and twenty five equipment dealers. He holds a B.S. in Natural Resources Planning from the University of Vermont and is a Certified Agricultural Irrigation Specialist.

Katherine Williams, Marketing Coordinator

Ms. Williams will design all program marketing materials and application materials using Adobe Creative Suite, and will oversee the printing and distribution of all pieces. She will also be the webmaster of the program web site, and will implement program advertising. She will produce press releases in collaboration with NYSERDA, and coordinate media coverage of the program.

Ms. Williams has produced advertisements, marketing mailings, brochures, and press releases for numerous energy efficiency incentive programs, and has a successful track record of securing press attention. Prior to EnSave, Ms. Williams held positions of increasing responsibility in the marketing field, including seven years with a major trade publisher. She holds a B.A. from the College of New Rochelle.

Bruce Jones, Finance Manager

Mr. Jones will produce invoices and track program finances using QuickBooks accounting software. He will work closely with EnSave's program manager to produce quarterly financial reports and monthly invoices. As EnSave's finance manager, Mr. Jones is responsible for all company financial functions including budgeting, forecasting, cash flow analysis, accounts payable, and accounts receivable. Mr. Jones has twenty six years' experience in accounting and financial management. He holds a B.A. from Johnson State College and an M.B.A. from Babson College.

5. Budget

EnSave's budget for this three-year program is $2,972,940, with the majority to be paid on a performance basis. We propose a hybrid payment structure, where we are paid 25% of total non-incentive costs on time and materials and the remaining 75% based on kWh and therms saved. We request a performance payment of $0.16 per kWh saved and $0.30 per therm saved.

This payment structure will reimburse EnSave on a time and materials basis for funds expended prior to capturing energy savings, and will also pay for fixed costs such as travel, printing, and other materials. Once the first customer has installed equipment and documented the installation, we will invoice based on the performance payment, so we are paid only on documented energy savings. In this model, NYSERDA and DPS will ensure judicious use of public funds by only paying for documented energy savings.

Table 1: Program Budget

Category	2009	2010	2011	Total Program Cost
Administration	$203,315	$158,147	$158,147	$519,608
Marketing	$191,094	$143,789	$142,839	$477,721
Direct Implementation	$173,842	$173,842	$173,842	$521,526
EM&V	$53,312	$48,689	$48,641	$150,643
Rebates (based on kWh savings)	$397,676	$397,676	$397,656	$1,193,029
Rebates (based on therm savings)	$36,474	$36,474	$37,466	$110,414
Total program cost 2009-2011	$1,055,713	$958,616	$958,611	$2,972,940

Table 2: kWh/kW Savings

Total Electric Program Cost	$2,729,787
Total Gross kWh Savings	16,545,827
Total Net kWh	11,582,583
Total Gross kW Savings	2,900
Total Net kW	2,031
Payment per kWh Saved	$0.16
Rebate (per kWh) paid to participant at:	
Lighting	$0.05
Other	$0.08

Table 3: Therm Savings

Total Gas Program Cost	$243,153
Total Gross Therm Savings	788,672
Payment per Therm Saved	$0.31

Rebate (per Therm) paid to participant at:	$0.14

Table 4: Hybrid Payment

Total Program Cost	$2,972,940
Minus Rebates	$1,303,443
Program Costs: includes administration, marketing, direct implementation, EM&V	**$1,669,497**
Time and material payment based on EnSave's Labor Rates (25% of program cost) (See Table 3. EnSave Labor Rates)	$417,374
Subtotal	$1,252,123
Performance Payment to EnSave: EnSave will be paid $0.16 per kWh saved (See Table 1. kWh) and $0.30 per Therm saved (See Table 2. Therm)	**$1,252,123**

Table 3. EnSave Labor Rates

Labor Category	**2009**	**2010**	**2011**
Senior Associate I	$182	$191	$201
Senior Associate II	$155	$163	$171
Associate I	$105	$110	$116
Associate II	$90	$95	$99
Program Administrator	$80	$84	$88

SELECTION CRITERIA (APPENDIX A, SECTION A OF PON 1259)

The DPS order stipulates that independent program administrators "should use best efforts to include the information required in Appendix 3 (Narrative Considerations section of this proposal).[3]" In the narrative documentation section below, EnSave has answered the questions based on information provided by the NYSERDA and the DPS. As acknowledged in the DPS order, independent program administrators may update the proposal within the 90-day period applicable to NYSERDA and the utilities, and can update the proposal with information required in Appendix 3 "to the extent the proponent is capable of developing the information.[4]"

[3] New York Department of Public Service, Case 07-M-0548- Proceeding on Motion of the Commission Regarding an Energy Efficiency Portfolio Standard; Order Establishing Energy Efficiency Portfolio Standard and Approving Programs, June 23, 2008, page 59.
[4] Ibid.

EnSave plans to update the Narrative Considerations section if DPS, NYSERDA, and/or the utilities provide us with information that enables us to complete the analysis.

We have provided Attachment C: DPS Tool, which addresses all of the questions below. We have also provided, in electronic format only, a Weighted Average Calculations Workbook spreadsheet. This is a spreadsheet of individual measures used to create the weighted average measure for gas, and the weighted average measure for electric.

1. TOTAL RESOURCE COST BENEFIT-COST RATIO
We have calculated TRC B/C ratio for electricity, gas, shown in Attachment C: DPS Tool. Peggie Neville from NYSERDA said we do not need to provide TRCs for each measure.

2. ELECTRIC RATE IMPACT
Electric rate impact can be calculated from GWh, MW saved, as shown in the tool based on Long Run Avoided Costs (LRACs) we were provided with by Harvey Tress from the DPS. We do not have the specific DPS and utility information required to calculate the exact change in $/kWh or $/kW for utilities. This could be provided between August 7 and September 23 by NYSERDA or utilities.

3. ELECTRIC RATE IMPACT PER MWH SAVED
See response 2.

4. ELECTRIC RATE IMPACT PER MW SAVED
See response 2.

5. MWH SAVED IN 2015
We have calculated MWhs saved up through 2015.

6. MW OF COINCIDENT NYISO PEAK SAVED IN 2015
We have calculated MW of coincident NYISO peak saved in 2015.

7. PEAK COINCIDENCE FACTOR OF MWH SAVED IN 2015
We do not have the specific DPS and utility information required to calculate the peak coincidence factor of MWh saved in 2015 for utilities. This could be provided between August 7 and September 23 by NYSERDA or utilities.

8. TOTAL RESOURCE COST TEST'S BENEFIT-COST RATIO, WITH CARBON EXTERNALITY ADDED, ASSUMING A CARBON VALUE OF $15 PER TON (TRC +C)
We have calculated the TRC with Carbon Externality Added.

9. NUMBER OF PARTICIPANTS AS A PERCENTAGE OF THE NUMBER OF CUSTOMERS IN THE CLASS AS OF 2015

We can calculate this assuming the weighted average of end use life for all measures to estimate how many are still in effect in 2015.

10. Gas Rate Impact

We do not have the specific DPS and utility information required to calculate the Gas Rate Impact for utilities. This could be provided between August 7 and September 23 by NYSERDA or utilities.

11. Gas Rate Impact per MBTU Saved, Levelized Over the Years Through 2015

We do not have the specific DPS and utility information required to calculate the Gas Rate Impact per MBTU for utilities. This could be provided between August 7 and September 23 by NYSERDA or utilities.

Selection Criteria (Appendix A, Section B of PON 1259)

1. Electric Rate Impact as of Year 2015

We do not have the specific DPS and utility information required to calculate the Electric Rate Impact as of year 2015 for utilities. This could be provided between August 7 and September 23 by NYSERDA or utilities.

2. Gas Rate Impact as of the Year 2015

We do not have the specific DPS and utility information required to calculate the Gas Rate Impact as of year 2015 for utilities. This could be provided between August 7 and September 23 by NYSERDA or utilities.

3. Narrative Considerations

Demand Reduction and System Benefits

EnSave does not have access to data on peak load and system load factor, and the impact on T&D system needs. EnSave looks forward to working with NYSERDA and DPS to supply these metrics during the negotiation phase of the project, if EnSave is able to obtain the information.

Evaluation

On July 31, 2008, EnSave obtained a draft guidance document from the Office of Energy Efficiency and Environment. The guidance document provided a general recommendation for how programs overall will be evaluated.[5]

[5] "Evaluation Plan Guidance for EEPS program administrators", July 30, 2008, received by EnSave from Karen Tuczinski, Energy Efficiency Program Implementation Section, Office of Energy Efficiency and Environment, July 31, 2008.

EnSave has calculated 5% of the total program cost to be used for M&V. We recommend that NYSERDA or DPS develop an RFP to select a third-party, independent evaluator following the guidelines suggested by the DPS on page 2 of the guidance document:

Components of the Evaluation Plan

- Program summary, including goals and objectives.
- Evaluation goals and priorities (program theory and logic model, if appropriate).
- Process evaluation methodology -- Process evaluation assesses program design, delivery, and implementation. It is also used to identify opportunities for program improvement and tracking program progress
- Impact evaluation methodology -- Impact evaluation quantifies energy and demand savings and identifies of other potential impacts, as appropriate (e.g., environmental benefits). This component should delineate the information to be reported including energy savings (e.g., MWh, kW, therms), the appropriate measurement and verification approach, and how various attribution factors, such a free rider and spillover measurement, will be a addressed.[6]
- Net to gross analysis -- Net to gross analysis is represented as a ratio designed to compare the gross savings of a program to the energy savings actually attributable to the program. Energy savings are estimated after adjusting for factors such as measurement error, measure installation quality, user behavior, and the actions program participants and non-participants would have taken absent the program (e.g., free ridership and spillover). The path proposed to arrive at net savings should be discussed.
- Benefit cost analysis -- establishes the ratio of the value of the program benefits and program costs. At a minimum, the results should be reported using the total resource cost test. To facilitate accurate benefit cost tests, impact results should be estimated for the time periods the savings occurred. For example, residential lighting use tends to peak on weekday evenings and not on system peak, which tends to be weekday afternoons.

[6] "Spillover" refers to the energy savings associated with energy efficient equipment installed by consumers who were influenced by an energy efficiency program, but without direct financial or technical assistance from the program. Spillover includes additional actions taken by a program participant as well as actions undertaken by non-participants who have been influenced by the program. Sometimes spillover is referred to as "free-drivership" or as "market effects." These market effects may be current or may occur after a program ends. When market effects occur after a program ends, they are referred to as "momentum" effects or as "post-program market effects."

[6] "Free-ridership" refers to the percentage of savings attributed to customers who participate in an energy efficiency program but would have, at least to some degree, installed the same measure(s) on their own if the program had not been available.

- Sampling strategies and sample design.
- Data reliability standards (e.g., precision and confidence level for customer surveys, measurement and verification).
- Steps to identify and mitigate threats to data reliability (e.g., systematic error, random error) and uncertainty (e.g., assumptions, adjustments to data).
- Data collection and management process (e.g., what data will be collected and in what format?)
- Timeline for major evaluation milestones.
- Evaluation report format.
- Evaluation budget. The budget established by the EEPS Order is for evaluation funding of up to 5 percent of a program administrator's total program budget. The budgets for individual programs may be more or less than 5 percent.
- Roles and responsibilities (i.e., who does what?).
- Format and timing of periodic program progress reports (both evaluation results and routine program data (e.g., measures, installed, dollars spent).
- Policy describing how the program administration function will be organizationally separated from the evaluation function.
- Other relevant issues (This will vary depending on the program.).

We recommend the RFP be sent to qualified M&V contractors for responses. EnSave will make all program data (all farmer installation information and savings calculations) available to the M&V contractor to ensure program integrity.

The DPS also forwarded EnSave the comments of TecMarket Works's memo *Review of the Evaluation Plan Guidance for EEPS Program Administrators*. TecMarket Works has been hired by DPS to assist in the development of the evaluation plan. The memo states: "The plan as it is now structured requires that the utilities, NYSERDA, and the implementation contractor construct a 'detailed plan' for evaluating their program. *This places the same organizations that are offering the programs in the position of developing the detailed plans for how their performance will be assessed. This approach can establish a conflict between having an approach that provides objective unbiased results vs. an approach that may not be as unbiased.*

If this aspect of the plan remains, it will be important for the evaluation plans to be carefully reviewed by evaluation experts to make sure they are unbiased (italics added)."

EnSave does not consult on program evaluation, and its understanding of program evaluation is that of a participant in the evaluation process rather than an evaluator. Our understanding is that of an educated member of the energy efficiency industry, of which there are many subject matter experts. Because it appears DPS is considering the separation of the administration and evaluation functions, we believe that the full development of an M&V plan is best left to a discussion between the Office of Energy Efficiency and Environment, NYSERDA, and/or independent program evaluation contractors.

Market Segment Need

New York's agricultural sector (made up of about 37,500 farms) has a strong demand for more agriculture-specific energy efficiency programs. After the end of our Dairy Development Energy Program, we heard numerous requests from equipment dealers and farmers who wanted the program to continue. Since 2004, New York farmers have not had an agriculture-specific rebate program, but the need remains. Today, as fuel prices continue to rise, the pressure has only increased for farmers. While they are eligible to participate in NYSERDA's Enhanced Commercial/ Industrial Performance Program and other programs offered through NYSERDA and the utilities, few actually complete this process. This is because farms are not likely to know about energy efficiency programs unless the information is brought directly to them.

Existing energy efficiency programs are well suited to commercial and industrial businesses that have staff people devoted to facilities management and process improvement. Even if commercial or industrial businesses do not investigate these programs in house, they are courted by energy services companies (ESCOs) that specialize in commercial and industrial projects.

In contrast, most of New York's farms are family owned operations with limited time and hired help. Farmers are business people and acutely aware of the need to manage operating costs, but most of their concern lies with managing the traditional inputs of feed, fertilizer, and large equipment. Farmers need to be educated about energy efficiency opportunities in order to incorporate the wise use of energy into their decision making.

NYSERDA, National Grid, and NYSEG all offer some form of energy efficiency assistance to farmers. As described in greater detail in the Coordination section below, farmers have a potential to save energy that extends beyond their historically low participation in these programs.

Tables 1 and 2 below estimate the number of predominant farm types and the number of farms to participate in the program within NYSEG or National Grid's service territories. EnSave used USDA National Agricultural Statistical Service (NASS)[7] data and adjusted the expected participation rate based on the following assumptions:

- Equal geographic distribution of farms in each county;
- Percent of the county covered by NYSEG or National Grid service[8]; and
- EnSave's previous success enrolling various farm types in energy efficiency programs.

Table 1 provides the total number of farms estimated to be within the service areas.

Table 1. Number of Farms in NYSEG or National Grid Service Areas (2002 NASS)

NY NYSEG and Nat. Grid Service Area	Beef	Milk	Hogs and pigs	Sheep and lambs	Layers	Broilers	Green-houses	Other	Total Farms
Total:	6,140	6,958	1,448	2,288	2,522	417	2,374	12,536	**34,700**

There are a total of about 35,000 farms in the respective service areas.

Table 2 provides an estimate of the number of farms that could be expected to enroll in an agricultural energy efficiency program within the service territories.

Table 2. Estimated Number of Farms Serviced (adjusted by assumed participation rate)

NY NYSEG and Nat. Grid Service Area	Beef	Milk	Hogs and pigs	Sheep and lambs	Layers	Broilers	Green-houses	Other	Total Farms
Total:	123	397	56	16	45	17	27	119	**800**

EnSave estimates that a total of 800 farms will be served through this program. About half of these operations will be dairies.

Table 3 illustrates the projected kWh and Therm savings for the program. EnSave estimates a total savings of 16.5 million kWh of electricity and 788,672 Therms of natural gas. This is based

[7] NASS state and county level farm data can be found at: http://www.nass.usda.gov/
[8] National Grid service area map was located at:
http://www.nationalgridus.com/niagaramohawk/about_us/serviceterr_map.asp
NYSEG service area map was located at: http://www.nyseg.com/OurCompany/servicearea.html

upon EnSave's experience and expected average savings of about 20,625 kWh per farm and 25,000 Therms per greenhouse.

The majority of energy savings are expected to be found on dairy operations.

Table 3. Estimated Program annual kWh Savings (expressed in Therms for Greenhouses)

NY NYSEG and Nat. Grid Service Area	Beef (kWh)	Milk (kWh)	Hogs and pigs (kWh)	Sheep and lambs (kWh)	Layers (kWh)	Broiler (kWh)s	Other Farms (kWh)	Total Farms[1] (kWh)	Green-houses (Therms)[2]
Total:	155,360	12,571,802	1,778,008	19,962	576,567	1,039,527	358,794	**16,500,000**	*7,892,382*

[1] Total Farms expressed in kWh. Does not include Therms savings due to estimated savings in Greenhouse natural gas use

[2] Greenhouse energy savings expressed in Therms due to estimated natural gas savings

Coordination

Coordination with Utilities

EnSave has spoken with Economic Development representatives of both NYSEG and National Grid. We have reviewed each utility's economic development offerings. NYSEG offers "up to $100,000 per project for smaller farms toward electric related infrastructure improvements on either NYSEG-owned or customer-owned (as directed by NYSEG) equipment. Each project must involve capital investment of at least $50,000 and have a monthly incremental electric demand after capital investment of at least 25 kilowatts." As applicable, we are prepared to work with NYSEG's program for those farms who meet those requirements.

National Grid has a Dairy Industry Productivity Program for their dairy customers, which offers grants of up to $5,000 in concert with incentives available through NYSERDA or other entities, not to exceed 75% of the total project cost. EnSave worked with this program in its 2004-2005 Dairy Development Energy Program, which provided energy audits, measure rebates, and integration with National Grid's economic development incentives. EnSave helped 49 farmers fill access $231,790 in incentives from National Grid's program in 2004-2005.

Currently, National Grid's and NYSEG's programs offer incentives after the installation has occurred. EnSave will inform farmers of the opportunity to receive additional incentives, and will provide National Grid and NYSEG contact information and applications to those farmers

who are interested in applying. EnSave will report the number of referrals to the utility programs in its quarterly reports to NYSERDA.

EnSave requested farm customer participation from both NYSEG and National Grid's economic development staff. As of August 7, 2008 EnSave has not heard from either utility so we can only assume that farm participation is low.

Coordination with NYSERDA

EnSave has a long history of working successfully with NYSERDA to deliver energy efficiency to New York's agricultural sector. EnSave delivered 10 million kWh to 572 New York farms in 1999-2003 through the New York Variable Speed Drive Farm Program; supported NYSERDA's Smart Equipment Choices program in 2002-2003 by helping over 300 New York dairy farms install plate coolers, saving over 6 million kWh; and provided energy audits to 75 dairies in 2004-2005 through the Dairy Development Energy Program.

Currently, New York's farmers are able to receive free energy audits through NYSERDA's FlexTech program. EnSave will coordinate with FlexTech contractors to provide energy audits to those farmers who could benefit from them. We will encourage applicants to our program to consider an energy audit if:

a) They are a particularly large or complex operation that would likely benefit from uncovering additional energy savings opportunities through an audit

b) They are hesitant to move forward with installing a project without knowing more about other opportunities, which an audit would describe

Conversely, EnSave will work with FlexTech contractors serving agriculture to encourage their customers to apply for the Agricultural Energy Efficiency Program's rebates.

NYSERDA also offers incentives for farm renewable energy generation, such as small wind, solar, and methane digesters. EnSave will inform program participants of these NYSERDA opportunities and refer participants to the appropriate contact person at NYSERDA. We also plan to meet regularly with NYSERDA to discuss the status of agricultural participation in programs. These meetings will also identify ways to further integrate our respective efforts in order to provide the best possible assistance to the farmer.

Co-Benefits

Environmental Justice

Within the NYSEG and National Grid service area, EnSave will work with the appropriate agricultural service organizations to ensure that all customers are provided the opportunity for service, regardless of race, gender, ethnicity, or racial characteristics.

Environmental Benefits

This program's reduction in overall energy use will result in air quality benefits. The following estimates were developed with use of EPA's Power Profiler web tool[9], which estimates air quality benefits based on utility fuel mix. Table 4 illustrates the total expected SOx, NOx, and CO_2 impacts that would be expected to be avoided through the program's participating farms energy savings.

Table 4. Estimated Program Environmental Impacts (tons/year)

NY NYSEG and Nat. Grid Service Area	SOx (Tons)	NOx (Tons)	CO_2 (Tons)
Total:	34.41	8.19	6,718.27

Overall, we expect that the reductions in agricultural electricity use would achieve reduced power plant emissions of over 34 tons of SO_x, 8 tons of NO_x, and over 6.7 thousand tons of CO_2.

Expected Program Impact on the New York Economy

EnSave used IMPLAN®[10] to estimate the impact of the collective agricultural reduction in energy use (savings in $) upon New York's economy. IMPLAN® is an economic impact modeling system used to create Social Accounting Matrices and account for multiplier effects of the program on New York's economy. The common use of IMPLAN® is to estimate the magnitude and distribution of economic impacts for a project.

The 16.5 million kWh and 788,672 thousand therms of estimated energy savings will amount to $3.4 million in savings to agricultural producers. It is assumed that 30% of these savings will go towards taxes and increased savings, resulting in the remaining 70% (about $2.4 million) that will be directly spent in the New York economy. The $2.4 million in increased spending will

[9] EPA's Power Profiler can be found at: http://www.epa.gov/cleanenergy/energy-and-you/how-clean.html

[10] IMPLAN® is developed and maintained by the Minnesota IMPLAN Group and is recognized as the leader in economic impact modeling. More information on IMPLAN and its use can be found at: http://www.implan.com/

result in both indirect (business to business) and induced (household to the economy) multiplier effects amounting to a total of $3.1 million.

As a result of this program, the savings in energy would result in increased farm household spending. Increased spending in other economic sectors would likely result in over 15 new jobs in New York state.

Portfolio Benefits

This program design is complementary to EnSave's other programs that it administers. As of August 7, 2008, EnSave operates the following agricultural energy efficiency programs, all of which share some elements with the proposed Agricultural Energy Efficiency Program.

- California Dairy Energy Efficiency Program: Measure incentive program for Pacific Gas & Electric Company's dairy customers
- Maryland Farm Energy Audit Program: Energy audit and incentive program for agricultural producers in Maryland
- Texas Agricultural Technical Assistance Program: Energy audit and technical assistance program for all agricultural producers in Texas

As stated above in the Coordination section, EnSave is prepared to work with NYSERDA's technical assistance programs for agriculture, as well as the utilities' economic development programs.

Depth of Savings

We will continually follow up with customers enrolled in the program in order to identify lost opportunities for energy savings. Our marketing approach also individually targets each potential participant, ensuring they are given every opportunity to understand the program's offerings and take advantage of them.

Our experience has shown that most farmers install energy efficiency projects piecemeal rather than taking a whole-farm approach to energy efficiency. This is due to cash flow concerns, seasonality of equipment purchases, and the need to prioritize projects. We will revisit all measure installers throughout the program to maximize the number of measures implemented per customer contact.

Underserved Markets

Agricultural customers have not traditionally participated in energy efficiency programs, largely due to their lack of awareness of such programs. Through a comprehensive marketing campaign that engages manufacturers, dealers, and the agricultural community, we will ensure farmers understand the available opportunities.

Commitment

This program will require a brief ramp-up time in order to prepare the program. Assuming a January 1, 2009 start date for the contract, we anticipate capturing our first customer kWh savings within 90 days. Due to our prior experience delivering similar programs to NYSERDA, we already have relationships with key New York equipment manufacturers, equipment dealers, and members of the extended agricultural community. This network will ensure we will be able to "hit the ground running" with a high level of trust and commitment from program stakeholders.

Our time-tested marketing and outreach approach (described in further detail in the "Customer Outreach" section below) will keep EnSave staff in regular contact with farmers, their equipment dealers, and opinion leaders for the farm. This regular contact will continually encourage the installation of as many cost-effective measures as possible for each farm site.

Customer Ontreach

We will identify customers in several ways:

- Using EnSave's list of past program participants (approximately 650 farms).
- Obtaining publicly available lists of farms (such as the list of New York dairy farms maintained by the New York Department of Health).
- Leasing lists of farmers through a list broker such as FarmMarket ID.

Once we obtain these lists, we will provide them to NYSEG and National Grid for comparison with their own customer lists. For those farms that are also customers, we will obtain annual electric and gas usage. This will enable EnSave to determine the largest energy users among New York farms, and prioritize these ones that have a potential for significant energy savings. In obtaining information about NYSEG and National Grid customers, we will ensure that data will be kept confidential, and will only be used for this program.

We will encourage customer participation through the manufacturers, equipment dealers, and agricultural community, who will augment EnSave's efforts working directly with farmers.

Below, we discuss the role each of these organizations will play in the customer outreach process.

Equipment Manufacturers

The first group that will be contacted through marketing is the manufacturers of energy efficient equipment. These will be manufacturers of all the major measure categories used in the program, such as lighting, HVAC, motors, and dairy measures. EnSave will send them a letter followed by a phone call to inform them of the program and request contact information for their sales representatives and dealer network. We will also request their support through other means, such as offering an additional discount on energy efficient equipment in order to encourage more installations, or by sending a mailing to their distributors notifying them of the program.

Equipment Dealers

EnSave will then market the program to dealers, sending them a letter explaining the program and how it will benefit their customers as well as their business, followed by a phone call to further explain the program and ensure they understand how the program can benefit their farm customers. These dealers are critical partners in a program, because they are the first ones farmers will turn to when seeking advice about which equipment to purchase. Evaluations of EnSave's prior agricultural energy efficiency programs have shown that dealers are responsible for up to 70% of the applications farmer submit to the program.

EnSave will keep in continual contact with the dealers throughout the program in order to build relationships, track progress, and answer questions. A strong relationship with dealers helps ensure success of the program. EnSave has established strong working relationships with equipment dealers through its previous farm energy efficiency programs in New York, and we will continue to build these relationships.

Agricultural Community

Concurrent to dealer notification, EnSave will inform the agricultural community of the program by sending them a program announcement. EnSave will work with these groups to reach farmers by encouraging them to include program information in their mailings, newsletters, and meeting agendas. This will help bring the program message to farmers statewide, and will support the mission of these organizations by saving their members money and making them more sustainable. As a side benefit to the program, as these organizations inform their members about energy efficiency, they will be learning about the wise use of energy themselves, thus helping to spread energy efficiency education throughout the rural community.

Farmers

EnSave has already worked with several hundred New York farmers through its previous NYSERDA programs. EnSave will contact these farms to promote new measures and other funding opportunities they can access (such as other NYSERDA programs, utility economic development funds and REAP).

EnSave will also obtain lists of other farmers by name, address, phone, and type of production. We will lease these lists from an agricultural list broker firm such as FarmMarketID.

Our direct marketing to farmers will focus on targeted subsets of farmers (such as dairies, large energy users, and past EnSave program participants). In order to reach as many of the 37,500 farmers in the state as possible, we will work with and leverage manufacturers, dealers, and the agricultural community to distribute information.

Our program representatives will be responsible for making phone calls to farmers and informing them of the program. These representatives will enroll farmers, and work with them through their entire installation process to ensure they are able to navigate the process.

Collaborative Approach

EnSave is well aware of the need to bring community groups into the initial discussions of the program. EnSave has spoken with the New York Farm Bureau, the New York State Federation of Resource Conservation and Development Councils, New York Department of Agriculture and Markets, and representatives from NYSEG and National Grid's economic development staff.

Given the time constraints of the proposal period, not all organizations are able to secure board approval for a support letter. EnSave has spoken with the following entities about the program and hopes to secure formal letters of support from all of them within the next 45 days:

- New York State Department of Agriculture and Markets
- NYSEG
- National Grid
- Assemblyman David Koon, 135th Assembly District
- Assemblyman William Magee, 111th Assembly District

As Attachment D, please see the attached letters of support from:

- New York Federation of Resource Conservation & Development Area Councils
- Dairy Farmers of America
- National Association of Conservation Districts

The New York Farm Bureau will mail a letter of support directly to NYSERDA shortly.

Fuel Integration

This program will focus on both electric and natural gas measures. Most farm energy savings will be electric. However, farmers whose measures use both fuels will find the process seamless. Our application will include a place to record both electric and gas measures, and there will be no programmatic distinction between electric and gas measures except for the different calculations used to determine savings.

We anticipate a relatively small amount of gas savings (788,672 therms) because many rural areas do not yet have natural gas service, and because there are relatively few instances of gas equipment used on the farm.

Transparency

EnSave requests that its proposal and proposal documents remain confidential except for NYSERDA and DPS review, and for excerpts to be included in NYSERDA's comprehensive proposal to DPS.

Our quarterly reports will be available online for viewing by the general public as well as other program administrators.

Procurement

EnSave does not intend to have any subcontractors in this program. It will be responsible for all major functions of the program except for evaluation, measurement, and verification. This function will be handled by an independent third party, selected by the DPS.

EnSave New York State Variable Speed Drive Farm Program Case Study

Funding Source: New York State Energy Research and Development Authority (NYSERDA)

Program Duration: 1999 - 2003

Contact Amounts: $1,500,000

Geographical Location: Statewide

Program Type: Equipment replacement and new construction

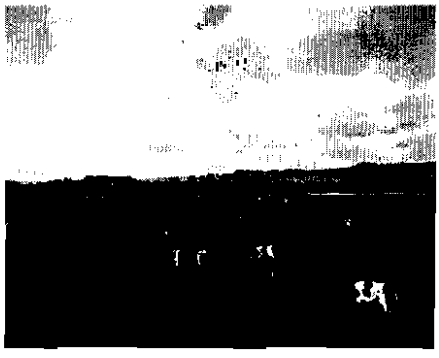
The objectives of this multi-year program were to save energy, reduce dairy producers' energy costs, and lower NO_x emissions. Through NYSERDA's Standard Performance Contract, EnSave offered cash incentives to dairy producers to install milking vacuum pump variable speed drives (VSDs), and encourage producers to work with their local equipment dealers to install the equipment.

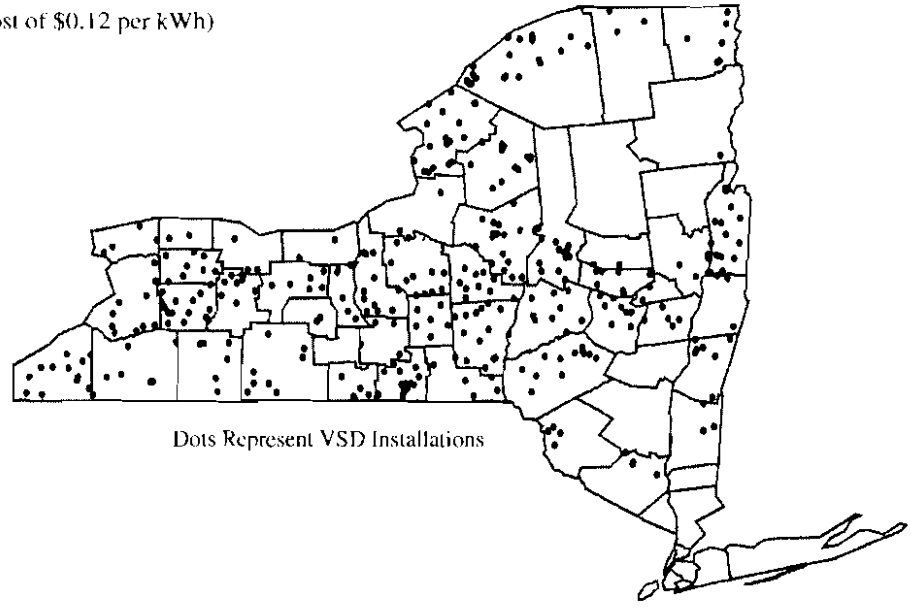
EnSave developed the program and educated 6,500 New York dairy producers about the benefits of a VSD and its energy use on the farm. EnSave marketed the program in conjunction with the local agricultural community including the Cornell Cooperative Extension, the New York Department of Agriculture, and the New York Farm Bureau to ensure that farmers learned about the program from familiar sources.

Five hundred and seventy-two producers participated in the program. Measurement and verification of the energy savings was conducted by Science Applications International Corporation (SAIC) of New York.

The Program saved 10 million kWh, avoided 2.92 tons of NO_x emissions, and delivered $1.2 million first year energy savings to participating dairy producers. Over the 15-year measure life of the VSD, these 572 dairy producers will save $18,000,000 in energy costs.

(Savings based on an average electricity cost of $0.12 per kWh)





Dots Represent VSD Installations

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EDWARD W. SENGLE

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SUMMARY

Engineer/Project Manager with proven ability to deliver quality products and projects on time and under budget. Career focus on energy conservation, renewable generation, and green technologies. Experienced in wind energy system production, assembly and servicing; bio-aerosol testing and filtration; semiconductor manufacturing and characterization; and HVAC design.

PROFESSIONAL EXPERIENCE

EnSave, Inc., Richmond, VT
Program Manager, 2007–current
- Manage energy efficiency programs for agricultural customers on behalf of electric utilities.
- Implement rebate and audit programs to achieve energy savings targets.
- Comply with extensive regulatory and reporting requirements.
- Implement multi-tiered marketing campaign.
- Manage staff, including the oversight of staff time allocation.
- Act as primary contact for client program manager.
- Manage workflow to comply with timelines and budget.

Energy Engineer, 2007
- Use manufacturer specifications, technical literature, and available research to assess and calculate energy usage and cost and other performance characteristics of agricultural and food processing equipment intended to benefit the respective sectors.
- Develop savings calculations for energy efficient equipment.
- Identify pollution prevention measures that create value for agricultural producers and food processors.
- Develop, maintain, and improve spreadsheet tools that calculate energy and cost savings, including AutoAudit™ and other internal tools.

Northern Power Systems, Waitsfield, VT
Project Manager, 2005–2007
Alaska Village Electric Cooperative Project ($4M):
- Managed the procurement, production, and shipment of 13-100 kW wind turbines to four remote Alaskan Villages; controlling revenue, margin, and cash-flow to corporate targets.
- Coordinated and scheduled the installation, commissioning, troubleshooting and service of turbines with partner construction firm in Alaska.

Distributed, Low Wind Speed Turbine Project ($3M):
- Directed a team of engineers, contractors, production technicians, and DOE scientists in the design, assembly, testing, and installation of a next-generation, permanent magnet wind turbine.
- On target to meet aggressive schedule and cost-of-energy objectives.

Triosyn Corp, Williston, VT
Engineering Manager, 2002–2005
- Led the development of a biocidal filter cartridge using a proprietary iodine-activated resin, for use in a personal air-purifying respirator, resulting in NIOSH and CE certification.
- Managed engineering group in development of novel processes to imbed resin in filtration media, including measurement of microbiological performance and quality control metrics.
- Designed Biosafety Laboratory and Testing Facility for the Air Force Research Laboratory, including HVAC, filtration, compressed air, and high purity water systems.

~continued ~

IBM Microelectronics Division, Essex Junction, VT

Program Manager, 2000–2002

- Managed multiple concurrent semiconductor wafer manufacturing programs representing $300M in yearly revenue.
- Directed teams from engineering, production, and quality assurance to enhance yield, meet supply requirements, guarantee product quality, and reduce costs.
- Led team of manufacturing and electrical test engineers in identifying primary defect types, designing and evaluating experiments, and implementing process changes to reduce defects by 65%.
- Identified root causes of potentially significant reliability problems, qualified and implemented process changes, minimized quality risk and shipment delays to customer.
- As recognized technical expert, expanded and taught 16-hour course on Semiconductor Fabrication Techniques to employees from engineering, manufacturing, sales, and marketing.

Lead Process Integrator, 1997–2000

- Led team of engineers and technicians in development of new wafer manufacturing process creating strategic new business opportunity representing $200M in global yearly revenue.
- Delivered process to manufacturing on schedule and under budget while incorporating numerous customer-driven specification changes and nonstandard product enhancements.
- Reduced manufacturing cycle time 35% by scrutinizing process flow, eliminating redundant operations, combining compatible operations, and implementing novel process improvements.
- Collaborated with engineering teams from production sites in France, Japan, and Taiwan to successfully install new manufacturing process in their facilities.

Process Team Leader, 1993–1997

- Directed engineering team to increase yield and reduce defects, cost, and cycle time within a group of process operations that formed initial transistor isolation.
- Developed, patented, and implemented a novel manufacturing process resulting in $1M in yearly savings and a 40% reduction in module cycle time.
- Led company wide team representing research, development, manufacturing, and design to foster innovation, resulting in numerous patent ideas and improved coordination of engineering resources.

Photolithography Engineer, 1988–1993

- Designed and implemented first electric monitor for measuring within-field linewidth variation in production; implemented tool/process changes reducing variability by 50%.
- Demonstrated manufacturing feasibility of novel optical process enhancement, resulting in process capabilities far exceeding state-of-the-art technology.

Eastman Kodak Company, Rochester, NY

Facilities Engineer, 1982–1986

- Designed and installed process support systems (air filtration and conditioning, high purity gases, corrosive exhaust, cooling water, drainage, fire safety, energy conservation) for photographic film, biological, and microelectronics research facilities.
- Implemented monitoring system for power plant including steam/refrigeration cogeneration cycle.

EDUCATION

BS Mechanical Engineering, Lehigh University, 1982
Graduate Studies in Controls Engineering, Rensselaer Polytechnic Institute, 1986–1987

PATENTS & PUBLICATIONS

Hold 4 US Patents in various areas of semiconductor manufacturing and design.
Authored numerous papers for internal publications, including *IBM Journal of Research and Development.*

ILLARI VIHINEN, PE

65 Millet Street, Suite 105, Richmond, VT 05477
illariv@ensave.com (800) 732-1399

Summary

Professional Engineer with a diverse background, bringing dedication, attention to detail and proven managerial experience to energy efficiency. Possesses proven leadership skills with a Six Sigma Black Belt, with experience in hydroelectrics, quality engineering and combustion engineering.

Experience

EnSave, Inc., Richmond, VT
Energy Engineer, 2007–Present
- Research and analyze end-use agricultural and food processing technologies
- Develop, verify and manage energy efficiency tools
- Manage EnSave's Evaluation, Measurement and Verification (EM&V) functions
- Determine energy savings from energy efficiency technologies
- Provide technical review of farm energy audits

Spruce Mountain Design, Montpelier and Winooski, VT
Hydroelectric Operator, 2007
- Responsible for operating & maintaining 2 hydroelectric plants (800 kW and 7.4MW)

Northern Power Systems, Waitsfield, VT
Program Manager, 2003–2007
- Managed $1M program to design/build/test drives; delivered 1st within 10 days of baseline
- Managed $1M program to design/build/test prototype converter; done within 5% of budget
- Managed $2M next-generation NW100 wind turbine program with GE, DOE, NREL
- Managed $1.4M of power electronic development programs (Microgrid, DER Switch)
- Directed resource planning, budgeting, and monthly status reports for $6M R&D portfolio
- Developed Resource Planning, Task Management Tools, Business Process Improvements
- Completed ISO 9001-2000 Training; 1/20 Internal Auditors for certification, improvement

GE Industrial Systems, Plainville, CT
Six Sigma Black Belt/Quality Engineer, 2000–2003
- Mentored 80+ GE Engineers worldwide to Six Sigma Green Belt Certifications
- Developed Maturity Index Metric for Measuring/Tracking Key Project Risks
- Designed Next-Generation Project Quality Scorecards with Flexible Hierarchy
- Created Kano Visualization Tool to Drive Sales, Market Share Growth in NPIs
- Launched web-based eQFD Tool to conduct QFDs anywhere, anytime online
- Instructor/Editor for Scorecards, GE DFSS Book of Knowledge, for MBBs
- Completed Six Sigma DMAIC, DFSS, and Design for Reliability Training

Air Force Research Laboratory, Dayton, OH
Combustion Research Engineer, Captain, USAF, 1996–2000
- Led AFRL/GEAE Trapped-Vortex Combustor Single-Cavity Team in testing revolutionary high performance, low emissions combustor concept
- Designed and built a counterflow burner based on a French design for studying flame-vortex interactions and turbulent combustion phenomena
- Initiated spray characterization studies of new fuel injector concepts with laser sheet visualization, PDPA, and photographic techniques
- Responsible for management of a $10M, 30-person R&D contract

Education

Master of Science, Mechanical Engineering, Clarkson University, Potsdam, NY, 1996
Bachelor of Science, Mechanical Engineering, Cornell University, Ithaca, NY, 1994

KYLE CLARK

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kylec@ensave.com (800) 732-1399

Summary

Highly motivated, organized and creative, with diverse background and life experience. Proven ability to motivate and work effectively, with a talent for analyzing problems and finding innovative solutions. Naturally gifted at computer science and information technology. Committed to personal and professional excellence. Extremely fast learner, always seeking new intellectual and leadership challenges.

Experience

EnSave, Inc.,
Program Representative, 2007–Present
- Perform energy audits for large agricultural operations
- Develop and streamline energy auditing tools
- Assist in the development of proposals
- Manage a large volumes of customer, dealer, and manufacturer accounts
- Research and present technical data for proposals and reports
- Conducts outgoing phone calls to enroll producers in an energy efficiency program
- Fields incoming phone calls from customers and clients about programs
- Uses energy efficiency calculators and other criteria to evaluate a producer's eligibility for a program

Chittenden County Regional Planning Commission
Geographic Information Systems (GIS) Intern, 2006
- Perform extensive database updates using Microsoft Access, Excel and SQL
- GPS data collection and data analysis
- Develop a more efficient strategy for annual database update

University of Vermont, Department of Natural Resources
Computer Lab Assistant, 2005–2006
- General software and hardware troubleshooting for university students
- Monitored and maintained functionality of computer lab

National Wildlife Federation
Volunteer Project Coordinator and GIS Consultant, 2006

Smartech and Associates, LP
Contracted Computer Technician, 2006

Dirtworks Organic Farming Supply
Shipping Manager and Customer Support, Summers of 2004 and 2005

University of Vermont, Center for Sustainable Agriculture
Data entry and Office Assistant, 2004

University of Vermont, National Park Studies Laboratory
Database Manager and Webmaster, 2003–2004

EDUCATION AND TRAINING

- Bachelor of Science in Natural Resource Planning, University of Vermont, 2006
- Certified Agricultural Irrigation Specialist, 2007

COREY J. CONANT

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coreyc@ensave.com (800) 732-1399

SUMMARY OF SKILLS

Possesses strong farm energy technical skills with experience in marketing, sales, and customer service as well as experience working on dairy farms, with a focus on customer enrollment for energy efficiency programs. Grasps nuances of complex programs and engage producer to move forward with a project, and has an extensive familiarity with farm operations and farm needs.

PROFESSIONAL EXPERIENCE

EnSave, Inc., Richmond, VT
Energy Auditor, 2006–Present
- Uses *AutoAudit*™ and other internal tools to develop narrative farm energy audit reports
- Works closely with engineering technical staff to ensure accuracy and consistency of written reports
- Liaises between technical staff and farmer in order to deliver information about energy efficiency
- Provides information and answers queries regarding program eligibility and rules
- Provides marketing and outreach services as needed for special projects

Program Administrator, 2005–2006
- Conducts outgoing phone calls to enroll producers in an energy efficiency program
- Fields incoming phone calls from customers and clients about programs
- Uses energy efficiency calculators and other criteria to evaluate a producer's eligibility for a program
- Provides program data for use in reports

The Cape Cod Winery, Falmouth, MA, 2005
- Maintain vineyard and equipment
- Sell wines and maintain distribution system with licensed liquor outlets

Paul Marquis Concrete / Kevin Youngman Construction, 2003–2004
- Flat work, decorative concrete stamping
- Framing, roofing, siding

Phish Dry Goods, Burlington, VT, 2001–2003
- Conduct outside phone sales
- Provide phone customer service to anyone with questions about products
- Process orders
- Provide support for shipping and receiving department

Conant's Riverside Farms, Richmond, VT
- Dairy farm laborer

EDUCATION

Environmental Studies, University of Vermont, 1999–2001

KATHERINE WILLIAMS

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katew@ensave.com (800) 732-1399

Summary

Highly experienced direct marketer, with expertise in design, implementation, management, and execution of promotions. Exceptionally organized, and has a proven ability to compose publishable press releases and articles.

Experience

EnSave, Inc.,
Marketing Coordinator, 2007–Present
- Provide marketing strategy and execution for two California energy efficiency incentive programs, including direct mail promotions, press releases, and advertising
- Complete marketing deliverable for Texas Agriculatural Technical Assistance Program, including brochure design and execution, mailing list collation, training materials, and forms and flyers
- Provide initial and on-going marketing support for Oregon pilot project
- Maintain EnSave, Inc. website
- Design and execute promotions, maintain company branding standards on all promotional and technical pieces
- Compose and disseminate press releases and articles for EnSave, Inc.
- Requires expertise in MicroSoft Office Suite, and Adobe Creative Suite, including InDesign, Photoshop, and Illustrator

Ashgate Publishing
Senior Marketing Coordinator, 2005–2007
- Prepare annual, quarterly, and monthly marketing plans
- Provide monthly, quarterly, and annual analysis of sales and marketing budgets
- Track and report on success rate of past promotions
- Advise commissioning editors on marketing and sales potential for forthcoming titles
- Provide feedback and input on subject line development for four lines

Marketing Coordinator, 2001–2005
- Drive marketing initiatives from campaign creation to execution
- Create catalogs and flyers for direct marketing campaigns, responsible for design, copy-editing, and vendor management
- Acquire pertinent mailing lists for direct mail promotions
- Represent company at academic trade shows and conferences
- Act as liaison to authors and editors
- Determine marketing placement strategies for new titles

Conference Coordinator/Marketing Assistant, 2000-2001
- Coordinate company's presence at academic trade shows and conference, responsible for arranging registration, travel, and shipping
- Create advertisements for placement in conference programs, and flyers for display at the conference
- Communicated Advanced Book Information (ABI) to customers, including library buyers and retailers
- Act as liaison to Library of Congress

State of Vermont Department of Social and Rehabilitation Services (SRS)
Project Assistant, Rural Domestic Violence and Child Abuse Project, 1997–2000
- Control, update, and insure accuracy of resource, personnel, budgetary, statistical and contractual records
- Design, review, and refine Project-related brochures, flyers, conference material, and information packets
- Provide administrative support for a team of four, including Project Director
- Liaise with statewide domestic violence and SRS offices

Administrative Assistant, 1999–2000
- Process foster parent applications, including the running of State background checks
- Enter information into departmental databases
- Provide temporary office support for Commissioner's Office and Residential Licensing Department

Jim Henson Productions
Public Relations Intern, 2006
- Provide adminstrative support for a staff of three
- Retrieve, distribute, and catalog press clippings
- Collate and distribute press and business packets

EDUCATION AND TRAINING

College of New Rochelle, NY
Bachelor of Arts, 2006
- Major: Psychology
- Minor: Communication Arts, specializing in Advertising
- Graduated *cum laude*, Honors Program degree, and member of Psychology Honors Society (*Psi Chi)*

BRUCE JONES

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brucej@ensave.com (800) 732-1399

Summary

Professional accountant and auditor with 26 years' experience in the private sector. Experienced manager, comfortable in both a Controller and Human Resources position.

Experience

EnSave, Inc.,
Finance Manager, 2007–Present
- Direct financial activities for EnSave, including:
  - Prepare and analyze monthly financial statements
  - Prepare and analyze EnSave's annual budget
  - Prepare and analyze EnSave's cash flow
  - Prepare and analyze project budgets
- Invoice and collection of Accounts Recievable
- Coordinate activies of EnSave's bookkeeper
- Coordinate quarterly and annual tax review and preparation with external accounting firm
- Oversee payroll and employee benefit administration
- Manage distribution and tracking of rebate payments to incentive program participants

Strategy Plus, Inc., and Chips & Bits, Inc
Controller/General Manager, 1995–2007
- Directed financial activities for both Strategy Plus, a magazine publisher, and Chips & Bits, an e-commerce retailer
- Intrumental in the evaluation, selection, and implementation of new accounting/e-commerce system
- Manage day-to-day operations of accounting, purchasing, customer service, and shipping departments
- Prepare budgets and all financial reports needed by senior management
- Analyze financial records to forecast future financial position and budget requirements
- Reconcile and balance accounts
- Coordinate internal and external audits of company records
- Responsible for staff of 4

Mount Mansfield Resort
Accounting Manager, 1994–1995
- Apply principles of accounting to analyze financial information and prepare financial reports
- Prepare balance sheet, profit and loss statement and other reports to summarize current and projected company financial position
- Coordinate daily audit of all revenue areas
- Allocate and post details of business transactions to ledger accounts
- Compile and analyze financial information to prepare entries to accounts, such as general ledger accounts, documenting business transactions
- Reconcile and balance accounts
- Coordinate internal and external audits of company records
- Responsible for hiring and supervising seasonal staff of 5

Sugarbush Ski Resort
Assistant Accounting Manager, 1988–1994
- Please see previous position for description

~continued ~

Shawmut Bank Holding Company
Manager, Financial Analysis, 1987–1988
- Apply principles of accounting to analyze past and present financial operations
- Document revenues and expenditures expected and submit to management
- Serve as liaison between senior management and operating division managers
- Advise management on matters such as effective use of resources and assumptions underlying budget forecasts related to interest margin, service income and controllable expense

Shawmut Bank, N.A.
Assistant Controller, 1983–1986
- Manage accounting department for the Shawmut Bank of Boston
- Direct supervisory responsibility for staff of 5
- Manage montly closing procedure to assure timely and accurate reporting of revenue
- Prepare and review senior management financial reporting package
- Prepare and review reports required by external regulatory agencies
- Coordinate internal and external audits of company records

Shawmut Corporation
Senior Auditor, 1981–1983
- Examine and analyze accounting records to determine financial status of establishment
- Prepare reports for management concerning scope of audit, financial conditions found
- Prepare financial reports concerning operating procedures
- Identify problems, diagnose causes and determine corrective actions
- Deliver oral and written presentations for management regarding audit findings and recommendations
- Supervise and coordinate activities of 2–3 staff auditors specializing in specific operations of both banking and non-banking subsidiaries undergoing audit

EDUCATION

Babson College, Wellesley MA
Master of Business Administration, 1987

Johnson State College, Johnson VT
Bachelor of Arts–Social Science, 1974

Attachment C

New York Agricultural Energy Efficiency Program
Benefit / Cost Summary

Electric

Present-Valued Benefits	9,291
Electricity	9,291
Natural Gas	0
Present-Valued Costs	2,347
Net Present Value (thousands 2007$)	6,945
Benefit/Cost Ratio	3.96

Gas

Present-Valued Benefits	547
Electricity	0
Natural Gas	547
Present-Valued Costs	201
Net Present Value (thousands 2007$)	346
Benefit/Cost Ratio	2.72

Electric & Gas

Present-Valued Benefits	9,839
Electricity	9,291
Natural Gas	547
Present-Valued Costs	2,548
Net Present Value (thousands 2007$)	7,290
Benefit/Cost Ratio	3.86

Attachment C

New York Agricultural Electric Efficiency Program

#	Item	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
1	Number of farms eligible	37,500	37,500	37,500	37,500	37,500	37,500	37,500	37,500	37,500	37,500	37,500	37,500	37,500	37,500	37,500	37,500	37,500	37,500	37,500	37,500	37,500	37,500	37,500
2	Participation rate	0.007	0.007	0.007	0.007	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	Program participation - annual	0	263	263	263	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	Annual number of electric upgrades per participant	21	21	21	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	Annual number of electric upgrades	0	5,513	5,513	5,513	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	kWh saved/electric upgrade net	0.0	696.9	696.9	696.9	696.9	696.9	696.9	696.9	696.9	696.9	696.9	696.9	696.9	696.9	696.9	696.9	696.9	696.9	696.9	696.9	696.9	696.9	696.9
7	Net to Gross Ratio electric	0.7																						
8	kWh saved total		3,843,751	3,843,751	3,843,751																			
9	Ratio of kW/kWh savings	Not needed for this program.																						
10	Peak diversity factor	0.75																						
11	kW saved/electric upgrade (summer peak), net	0.0916	0.0916	0.0916	0.0916	0.0916	0.0916	0.0916	0.0916	0.0916	0.0916	0.0916	0.0916	0.0916	0.0916	0.0916	0.0916	0.0916	0.0916	0.0916	0.0916	0.0916	0.0916	0.0916
12	therms saved/electric upgrade	N/A - not considering possible reduced cooling costs related to lighting upgrades																						
13	Direct program incremental operator costs/program year		$912,189	$912,189	$912,189																			
14	Direct program operator costs - electric upgrade		$165.48	$165.48	$165.48																			
15	Direct program operator costs - participant		$3,475.01	$3,475.01	$3,475.01																			
16	Cost per upgrade (weighted)		$260	$260	$260																			
17	Cost per participant		$5,460	$5,460	$5,460																			
18	Direct program operator costs - kWh		$0.24	$0.24	$0.24																			
19	Participant cost - kWh		$0.0014	$0.0014	$0.0014																			
20	Total program operator budget (thousands)		$912	$912	$912																			
21	Total program operator and participant budget (thousands)		$918	$918	$918																			
22	Incremental GWh saved from current year installations	0.000	3.842	3.842	3.842	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
23	Incremental MW saved from current year installations	0.000	0.505	0.505	0.505	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
24	Billion Btu saved from current year installations	N/A																						
25	Incremental GWh saved from current & prior year installat	0.000	3.842	7.684	11.525	11.525	11.525	11.525	11.525	11.525	11.525	11.525	11.525	11.525	11.525	11.525	7.684	3.842	0.000	0.000	0.000	0.000	0.000	0.000
26	Incremental MW saved from current & prior year installatio	0.000	0.505	1.010	1.515	1.515	1.515	1.515	1.515	1.515	1.515	1.515	1.515	1.515	1.515	1.515	1.010	0.505	0.000	0.000	0.000	0.000	0.000	0.000
27	Incre Billion Btu saved from current & prior year installati	N/A																						
28	MWh Saved in 2015	11.525																						
29	MW of Coincident NYISO Peak Saved in 2015	1.515																						
30	Weighted average measure life (years - electric)	15																						
31	Total Avoided Cost (thousands 2007$)	0.0	381.7	748.0	1101.0	1082.4	1069.8	1118.8	1121.9	1132.3	1143.0	1153.7	1164.5	1175.5	1186.6	798.5	403.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	Electricity	0.0	381.7	748.0	1101.0	1082.4	1069.8	1118.8	1121.9	1132.3	1143.0	1153.7	1164.5	1175.5	1186.6	798.5	403.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33	Natural Gas																							
34	Discounted Benefits (thousands 2007$)	0.0	332.9	633.0	888.7	828.1	797.7	769.1	733.0	698.3	669.2	640.2	612.5	586.1	560.7	357.2	171.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35	Electricity	0.0	332.9	633.0	888.7	828.1	797.7	769.1	733.0	698.3	669.2	640.2	612.5	586.1	560.7	357.2	171.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36	Natural Gas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37	Discounted Costs (thousands 2007$)	0.0	823.5	781.5	240.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38	Present Valued Benefits	9291.5																						
39	Electricity	9291.5																						
40	Natural Gas	0.0																						
41	Present Valued Costs	2346.7																						
42	Net Present Value (thousands 2007$)	6944.8																						
43	Benefit/Cost Ratio	3.96																						

 # Notes (tied to row numbers in left column)

1 Number of NASS farms

4 Derived from weighted average of electric measure installations (1 of 21 individual lights per farm)

5 Total of all individual measures installed annually

6 Derived from weighted average of electric measure savings from electric measure workbook

10 Standard load factor assumption

13 Electric portion of total budget = 92%

16 Derived from weighted average of measure participant cost from measure workbook

30 Derived from weighted average of measure Equipment Useful Life from measure workbook

Attachment C

New York Agricultural Energy Efficiency Program

#	Item	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	
1	Number of eligible farms		2,374	2,374	2,374	2,374	2,374	2,374	2,374	2,374	2,374	2,374	2,374	2,374	2,374	2,374	2,374	2,374	2,374	2,374	2,374	2,374	2,374	2,374	
2	Participation rate (% eligible who participate)		0.47%	0.47%	0.47%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
3	Program participation - annual		11	11	11																				
4	Annual number of gas upgrades per participant	-	1,253	1,253	1,253																				
5	Annual number of gas upgrades		13,921	13,921	13,921																				
6	Net therms saved - upgrade		18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	
7	Net therms saved/year	0	253,883	253,883	253,883	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	755,583
8	Direct program incremental operator costs - program year	0	$78,791	$78,791	$78,791	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
9	Direct program operator costs - gas upgrade	0	$5.66	$5.66	$5.66	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
10	Direct program operator costs / participant		$7,092	$7,092	$7,092																				
11	Cost per upgrade	0.0	$8.92	$8.92	$8.92																				
12	Cost per participant	0.0	$11,175	$11,175	$11,175	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
13	Direct program operator costs / Therm		$0.31	$0.31	$0.31																				
14	Participant cost / Therm		$0.04	$0.04	$0.04																				
15	Total program operator budget (thousands)		$79	$79	$79																				
16	Total program operator and participant budget (thousands)		$90	$90	$90																				
17	GWh saved from current year installations	N/A																							
18	MW saved from current year installations	N/A																							
19	Billion Btu saved from current year installations	0	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
20	GWh saved from current & prior year installations	N/A																							
21	MW saved from current & prior year installations	N/A																							
22	Billion Btu saved from current & prior year installations	0	2	5	7	7	7	7	7	7	7	7	7	7	7	7	7	5	2	0	0	0	0	0	
23	Weighted average measure life (years per MBtu - electric)	N/A																							
24	Weighted average measure life (years per MBtu - gas)	16																							
25	Total Avoided Cost (thousands 2007$)	0.0	22.0	41.4	59.4	58.4	56.6	57.4	56.3	56.2	56.1	56.2	56.7	56.2	55.7	57.0	58.8	60.4	41.1	20.8	0.0	0.0	0.0	0.0	
26	Electricity																								
27	Natural Gas	0.0	22.0	41.4	59.4	58.4	56.6	57.4	56.3	56.2	56.1	56.2	56.7	56.2	55.7	57.0	58.8	60.4	41.1	20.8	0.0	0.0	0.0	0.0	
28	Discounted Benefits (thousands 2007$)	0.0	19.8	35.1	47.9	44.7	42.5	39.5	36.7	34.7	32.8	31.2	29.8	28.0	26.3	25.6	24.9	24.3	15.7	7.5	0.0	0.0	0.0	0.0	
29	Electricity																								
30	Natural Gas	0.0	19.8	35.1	47.9	44.7	42.5	39.5	36.7	34.7	32.8	31.2	29.8	28.0	26.3	25.6	24.9	24.3	15.7	7.5	0.0	0.0	0.0	0.0	
31	Discounted Costs (thousands 2007$)	0.0	20.8	62.1	63.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
32	Present Valued Benefits	547.2																							
33	Electricity	0.0																							
34	Natural Gas	547.2																							
35	Present Valued Costs	201.5																							
36	Net Present Value (thousands 2007$)	345.7																							
37	Benefit/Cost Ratio	2.7																							

Notes tied to row numbers in left column:

1 Number of NYS farms utilizing natural gas

4 Derived from weighted average of electric measure installations (1 of 21 individual lights per farm)

5 Total of all individual measures installed annually

6 Derived from weighted average of gas measure savings from electric measure workbook

8 Gas portion of total budget = 8%

11 Derived from weighted average of measure participant cost from measure workbook

24 Derived from weighted average of measure Equipment Useful Life from measure workbook

Attachment D: Letters of Support

NEW YORK FEDERATION

Of Resource Conservation and Development Councils

Black River / St. Lawrence - Central New York - Finger Lakes - Greater Adirondack
Hudson Mohawk - Lake Plains - Lower Hudson-Long Island - Seneca Trail

Federation Officers
President: Judy L. Wendt Vice President: Ken Bush Secretary: Tom Goodwin
Treasurer: Sheelagh Baily

August 6, 2008

Craig Metz, CEO
EnSave, Inc.
65 Millet St. Suite 105
Richmond, VT 05477

RE: New York Agricultural Energy Efficiency Program

Dear Mr. Metz:

The New York Federation of Resource Conservation & Development Councils (NY RC&D) supports the proposal for the New York Agricultural Energy Efficiency Program (AEEP) proposal currently being submitted to NYSERDA by EnSave, Inc. The program would work with all agricultural customers who pay a system benefit charge to bring energy efficiency to local farms.

NY RC&D's role in the program will be to help support USDA's Rural Energy for America Program (REAP) by assisting in the packaging of grants. NY RC&D will also help to leverage the greater agricultural community by disseminating AEEP information to local producers and encouraging them to participate in the program.

The National Association of Resource Conservation and Development Councils has a national partnership with EnSave and has had the opportunity to work with them in other states. We look forward to developing a comprehensive program within New York State to assist its agricultural community with energy efficiency solutions.

This program will help with economic development, and bring both environmental and societal benefits to the New York State agricultural community. We look forward to being a part of this important program.

Sincerely,

Judy L. Wendt
President
New York Federation of Resource Conservation and Development Councils

Please address all questions regarding this support letter to:
Sharon Ruggi
93 Leavy Hallow Ln.
Hudson Falls, NY 12839
Telephone: 518-747-7384
E-mail: eandsruggi@verizon.net

Visit our Web Site: www.nyrcd.org

The mission of the NYRC&D Federation is to coordinate and support local, state, regional and national priorities for resource, conservation and development. All programs and assistance of the NYRC&D Federation are available without regard to race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status.

8 Newport Drive, Clifton Park, NY 12065 Phone (518) 506-3191 Fax (518) 828-0166

Dairy Farmers of America

August 4, 2008

Craig Metz, CEO
EnSave, Inc.
65 Millet Street, Suite 105
Richmond, VT 05477

RE: New York Agricultural Energy Efficiency Program

Dear Mr. Metz:

Dairy Farmers of America is pleased to support EnSave's proposal for the development of the New York Agricultural Energy Efficiency Program.

Dairy Farmers of America (DFA) is a dairy marketing cooperative that serves and is owned by more than 18,000 dairy farmers in 48 states. Our Northeast area Council (which includes New York) has 1,563 members and produces over 2.8 billion pounds of milk per year. DFA is one of the country's most diversified manufacturers of dairy products, food components and ingredients.

This program will help our New York members become more sustainable by reducing their energy costs. The program's cash incentives will also help make the initial investment in new equipment more affordable. We look forward to having this opportunity available to further support New York's dairy farmers.

Again, DFA supports EnSave's proposal. For questions please contact me at (816) 801-6698.

Sincerely,

Bruce Brinkmeyer

Bruce Brinkmeyer
Vice President, Member Services
Dairy Farmers of America

conserving natural resources *for our future*

National Association of Conservation Districts

Partnership Letter

The purpose of this letter is to define the terms of a partnership between the National Association of Conservation Districts (NACD) and EnSave, Inc. (EnSave). This partnership will be considered effective upon the signing of this letter by authorized representatives of both organizations.

The focus of the partnership is to develop programs that advance the conservation mission of each organization, with a focus on agricultural energy issues. The partnership will provide a framework for cooperation between EnSave and Conservation Districts throughout the United States. EnSave and NACD will encourage the exchange of information between the two national organizations through their respective delivery and outreach mechanisms.

Examples of activities developed could include:

- Provide energy audit services to agricultural producers within Conservation Districts
- Train and certify Conservation District staff or their designees to become on-farm energy audit data collection specialists
- Design and implement energy efficiency and other natural resource conservation projects
- Provide energy or natural resource-related technical assistance

The partnership between EnSave, NACD and individual Conservation Districts will support the organizations' common goals through the development and promotion of energy conservation, energy efficiency and resource conservation activities. Through these activities, both organizations will grow and continue to serve agricultural communities throughout the United States.

This partnership helps support each organization's involvement in the local agricultural community by working nationwide while recognizing the need for local, grassroots support for conservation activities.

The partnership does not restrict NACD or EnSave from participating in similar activities with other public or private agencies, organizations, and individuals.

This partnership shall not commit either NACD or EnSave to obligate or transfer any funds. Specific work projects or activities that involve the transfer of funds, services, or property among the organizations will require execution of separate agreements and will be contingent upon the availability of funds.

NATIONAL ASSOCIATION OF CONSERVATION DISTRICTS

Authorized Representative Date

Krysta Harden 02/08/2008

ENSAVE, INC.

Authorized Representative Date

Craig Metz 02/08/2008

National Headquarters
509 Capitol Court, NE, Washington, DC 20002
Phone: 202-547-6223 Fax: 202-547-6450
www.nacdnet.org