

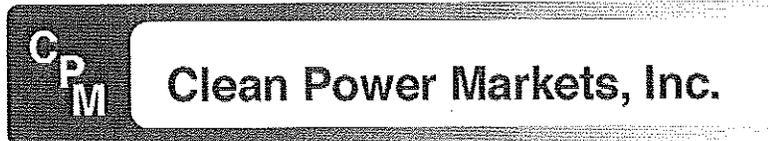
Response to Request for Proposal for
Alternative Energy Credit Program Administrator
Volume One – Technical Proposal

October 2, 2006

Submitted to:

Pennsylvania Public Utility Commission
Bureau of Conservation, Economics and Energy Planning
Commonwealth Keystone Building
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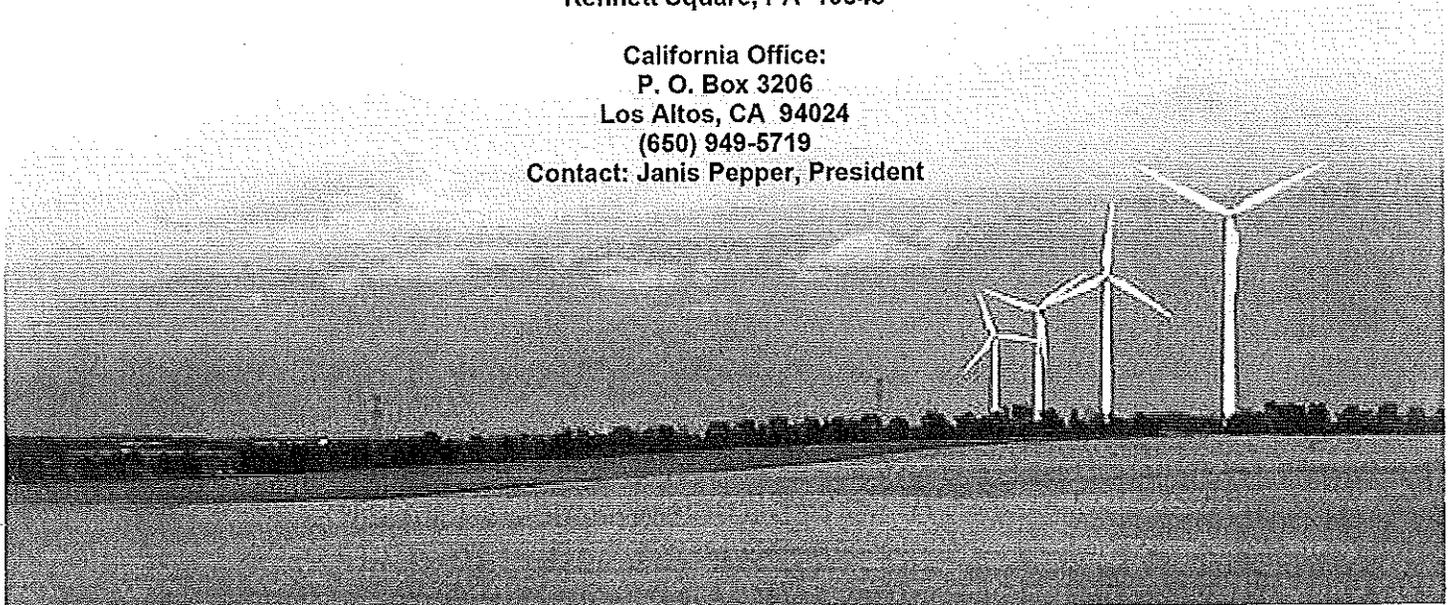


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VOLUME I: TECHNICAL PROPOSAL

Introduction and Background

On June 13, 2006, Clean Power Markets, Inc., the Vermont Energy Investment Corporation, Optimal Energy, and Enerwise Global Technologies (the "Project Team") responded to the Commission's Request for Qualifications ("RFQ") to serve as the Alternative Energy Credits Administrator. Because we submitted a timely and complete response to the RFQ, the Commission has invited us to respond to this Request for Proposal ("RFP"). Our response includes information submitted in the RFQ, with additional information to fully respond to the question posed in this RFP. This includes incorporating information in the Pennsylvania Public Utility Commission's ("Commission") proposed rulemaking *Implementation of the Alternative Energy Portfolio Standards Act of 2004*, Docket No. L-00060180 (Order entered July 25, 2006).

As of September 29, 2006, Clean Power Markets, Inc. and Enerwise Global Technologies reached agreement on a merger of the companies. Clean Power Markets will become a wholly owned subsidiary of Enerwise, with the final signing of the closing documents expected to occur on October 3, 2006. Because of the coinciding of this closing with the due date of this proposal, we are submitting this bid from Clean Power Markets, as a wholly owned subsidiary of Enerwise, and Enerwise will not be submitting a separate proposal. As part of this new structure, Clean Power Markets will operate as an independent subsidiary of Enerwise and, as such, will maintain separate books and records.

The corporate structure of the combination of Enerwise and Clean Power Markets will be made in a way that all necessary and appropriate internal separations are in place to insure the independence of the Administrator.

1. Objectives

The Request for Proposal for the Alternative Energy Credit Program Administrator, issued September 1, 2006 by the Bureau of Conservation, Economics, and Energy Planning of the Pennsylvania Public Utilities Commission, lists these functions as necessary for implementing the Alternative Energy Portfolio Standards Act of 2004 ("the Act"):

- The verification of electric distribution company ("EDC") and electric generation supplier ("EGS") compliance with the minimum portfolio requirements of the Act, and the reporting of compliance to the Commission.
- The review of applications for alternative energy system status.
- Certifying that only valid alternative energy credits are used for EDC and EGS compliance purposes.
- The verification of data provided by alternative energy systems, including customer-generators.

- Support services for customer-generators.
- The tracking and reporting of alternative energy credit prices to the Commission.
- The calculation of alternative compliance payment amounts for EDCs and EGSs.
- Providing various reports to the Commission and DEP documenting compliance with and costs associated with implementation of the Act

2. Nature and Scope of the Project.

As described in the RFQ and RFP documents, the Project Team has identified the specific responsibilities of the administrator to include:

Administer . . .

- processes to review and qualify alternative energy systems as meeting the requirements of the Alternative Energy Portfolio Standards (AEPS) program,
- these processes with the PA Department of Environmental Protection as regards meeting environmental requirements, and
- an alternative credits certification, tracking, and reporting program that verifies production data from all systems

Defend . . .

- decisions to accept or deny alternative energy system applications.

Verify , , ,

- EDC and EGS compliance with the Act through increased reliance on alternative energy sources, as measured by quantities of alternative energy credits
- alternative energy system's reliance on appropriate fuel sources and technologies
- data from behind the meter and demand side management/energy efficiency resources (which do not automatically report into PJM), as well as non-PJM resources

Confirm . . .

- that the same alternative energy is not being claimed for compliance in another state's portfolio requirements.

Aggregate . . .

- behind the meter and demand side management/energy efficiency resources for them to earn alternative energy credits

Report . . .

- on availability of alternative energy resources to meet AEPS requirements.

- on EDC and EGS compliance to the Commission at the end of each reporting year and the end of each true-up period.
- on alternative energy market status to the Pennsylvania General Assembly

Log . . .

- all activities in the program.

We note that the Act's requirements do not apply to rural electric cooperatives or municipally owned electric distribution companies.

Clean Power Markets, Inc. (CPM), a majority woman-owned Pennsylvania corporation, has assembled a team of professionals with the depth and breadth of experience to enable the Commission to meet its responsibilities as defined in the Act. In response to this Request for Proposal, we present a team that covers the full gamut of potential activities that the Commission has defined.

The team and the areas each will focus on are:

Team Member	Area of Focus
Clean Power Markets, Inc. ("CPM")	<ul style="list-style-type: none"> ○ Overall AEPS Program Administrator management ○ Alternative energy system qualification ○ Alternative energy credits tracking and verification ○ On site field verification for behind the meter resources
Enerwise Global Technologies ("Enerwise")	<ul style="list-style-type: none"> ○ Information technology systems ○ Demand side management/energy efficiency resources – measurement and verification ○ On-site field verification of DSM/EE resources
Vermont Energy Investment Corporation ("VEIC")	<ul style="list-style-type: none"> ○ Demand side management/energy efficiency resources – residential program ○ Maintain and update TRM - residential segment ○ Verification and monitoring plans – residential segment
Optimal Energy ("Optimal")	<ul style="list-style-type: none"> ○ Demand side management/energy efficiency resources – commercial and institutional programs ○ Maintain and update TRM – com'l, ind'l segment ○ Verification and monitoring plans – com'l, ind'l segment

CPM has experience in composing teams like this to meet the specific requirements of a project. CPM has worked with or bid with each of the team members on other projects in other jurisdictions. CPM will be the main point of contact for the Commission for administering this program, and CPM will manage the team members to provide a seamless professional staff to successfully run this program.

The CPM team understands that our role is to be a neutral and objective administrator of the AEPS program, and any decision that involves policy setting must be handled by the Commission. Our role is to administer the programs

according to the policies set by the Commission, but not to set policy or make a controversial interpretation of the policy.

With the inclusion of demand side management / energy efficiency (DSM/EE) resources in the AEPS, Pennsylvania is breaking new ground. The expertise that our team brings in designing, auditing, tracking, and administering DSM/EE programs in other states is available to help the Commission determine how best to structure the DSM/EE portion of the portfolio standard.

Additionally, with the high importance the Commission has placed on properly serving customer-generators, our team provides professionals with the experience and expertise to manage this exciting portion of the program, as evidenced by our successful and continued administration of the New Jersey Solar and Behind-the-Meter Renewable Energy Certificate Program.

3. Requirements.

The reporting year for Pennsylvania is the same as what we currently track in New Jersey, namely the twelve-month period running from June 1 to May 31. The Act's effective date was February 28, 2005 and EDC and EGS compliance is not required until two years from this date, or February 28, 2007. Therefore, we will begin tracking compliance starting February 28, 2007 for those two EDCs whose exemption expires on December 31, 2006. This will be UGI Utilities Inc. – Electric Division, and Pennsylvania Power Company.

The timeline for when we will start to track compliance in EDC service territories and the relative volume of load that each of these represents is shown in Table 1 below. EGSs that serve retail load in these service territories will be tracked following the same time schedule. The Commission indicates that the majority of the 42 licensed EGSs do not currently serve retail load, but this is expected to change with the expiration of the rate caps.

In order to determine the workload as the Administrator of this program, we used the 5 year projected growth rate as given in the Electric Power Outlook for Pennsylvania, 2005-2010 and applied that rate for each of the EDCs through 2012. Table 2 shows the projected electricity sales for each of the 11 EDCs for the calendar years 2006 through 2012.

The number of Alternative Energy Credits, where 1 credit = 1 MWh, that each EDC accrues for each compliance year, starting with the effective date of the Act, February 25, 2007, as required for each EDC is shown in Table 3. The calculations shown are based on a compliance year that runs from June 1 to May 31 (e.g. compliance in Reporting Year 2008 (RY 2008) runs from June 1, 2007 to May 31, 2008). The highlighted area shows when each EDC is required to demonstrate compliance based on when their exemption period ends.

Table 1: EDC Exemption, Compliance and Load Statistics

<u>EDC Service Territory</u>	<u>Exemption Expires</u>	<u>Compliance Begins</u>	<u>2005 Total Consumption (GWh)</u>	<u>% of PA Electric Load</u>
UGI Utilities Inc. – Electric Division	December 31, 2006	February 28, 2007	1,031	0.70%
Pennsylvania Power Company	December 31, 2006	February 28, 2007	4,666	3.17%
Pike County Power and Light	December 31, 2007	January 1, 2008	378	0.26%
Citizens Electric of Lewisburg	December 31, 2007	January 1, 2008	378	0.26%
Wellsboro Electric Company	December 31, 2007	January 1, 2008	378	0.26%
Duquesne Light Company	December 31, 2007	January 1, 2008	13,979	9.51%
PPL Electric Utilities, Inc.	December 31, 2009	January 1, 2010	38,323	26.06%
West Penn Power Company	December 31, 2010	January 1, 2011	20,787	14.13%
Pennsylvania Electric Company	December 31, 2010	January 1, 2011	14,236	9.68%
Metropolitan Edison Company	December 31, 2010	January 1, 2011	14,009	9.52%
PECO Energy Company	December 31, 2010	January 1, 2011	38,909	26.46%
Total			147,072	100.00%

Source: Electric Power Outlook for Pennsylvania, 2005-2010 for top 8 EDCs; PVNow/SEIA via PA DEP for 3 smaller EDCs.

**Table 2
EDC Projected Sales Growth**

EDC Service Territory	5 Year Projected Growth Rate	Projected 2006 (GWh)	Projected 2007 (GWh)	Projected 2008 (GWh)	Projected 2009 (GWh)	Projected 2010 (GWh)	Projected 2011 (GWh)	Projected 2012 (GWh)
UGI	3.00%	1,062	1,093	1,126	1,160	1,195	1,231	1,268
Penn Power	1.40%	4,732	4,798	4,865	4,933	5,002	5,072	5,143
Pike	1.50%	384	389	395	401	407	413	420
Citizens	1.50%	384	389	395	401	407	413	420
Wellsboro	1.50%	384	389	395	401	407	413	420
Duquesne	1.60%	14,203	14,430	14,661	14,896	15,134	15,376	15,622
PPL	1.40%	38,859	39,403	39,955	40,514	41,081	41,656	42,240
West Penn	1.30%	21,057	21,331	21,608	21,889	22,173	22,462	22,754
Penelec	1.00%	14,378	14,522	14,667	14,814	14,962	15,112	15,263
Met-Ed	1.30%	14,191	14,375	14,562	14,751	14,943	15,137	15,334
PECO	2.00%	39,687	40,480	41,290	42,116	42,958	43,817	44,694
TOTAL	1.5273%	149,318	151,601	153,920	156,276	158,670	161,103	163,575

Source: Electric Power Outlook for Pennsylvania 2005 - 2010 for top 8 EDCs
 PVNow/SEIA via PA DEP for 3 smaller EDCs; Total Growth Rate is Weighted Rate

**Table 3
Estimated EDC AEPS Compliance Requirements by Reporting Year**

EDC Service Territory	Date Compliance Begins	Amount in RY 2007	Amount in RY 2008	Amount in RY 2009	Amount in RY 2010	Amount in RY 2011	Amount in RY 2012
UGI	February 28, 2007	273,362	1,107,118	1,140,331	1,174,541	1,209,777	1,246,071
Penn Power	February 28, 2007	1,199,441	4,825,752	4,893,313	4,961,819	5,031,284	5,101,722
Pike	January 1, 2008	97,356	391,859	397,737	403,703	409,758	415,905
Citizens	January 1, 2008	97,356	391,859	397,737	403,703	409,758	415,905
Wellsboro	January 1, 2008	97,356	391,859	397,737	403,703	409,758	415,905
Duquesne	January 1, 2008	3,607,547	14,526,388	14,758,610	14,994,951	15,234,870	15,478,628
PPL	January 1, 2010	9,850,767	39,632,921	40,187,782	40,750,411	41,320,917	41,899,410
West Penn	January 1, 2011	5,332,660	21,446,181	21,724,982	22,007,407	22,293,503	22,583,318
Penelec	January 1, 2011	3,630,478	14,582,420	14,728,244	14,875,527	15,024,282	15,174,525
Met-Ed	January 1, 2011	3,593,782	14,452,994	14,640,883	14,831,214	15,024,020	15,219,332
PECO	January 1, 2011	10,120,107	40,817,764	41,634,120	42,466,802	43,316,138	44,182,461
TOTAL Sales for Reporting Year		37,900,214	152,567,115	154,901,674	157,273,780	159,684,066	162,133,181
Example of Reporting Year Calculation: 6/1/07 to 5/31 08 is 7/12 of projected 2007 sales + 5/12 of projected 2008 sales							

Since Alternative Energy Credits can be banked for 2 years, it is possible that EDCs will start procuring credits 2 years before they are required to demonstrate compliance. The team will attempt to start some pre-verification and initial screening of credits during this period to spread out the verification work that will be necessary once all EDCs are required to demonstrate compliance in 2011.

Just as the EDC and EGS tracking work will start slowly and gradually increase, we are aware that the work with customer-generators will start slowly, but then may increase exponentially over the next 5 years due to the Tier 1 solar photovoltaic requirement. Our team's experience with the growing NJ solar program has us prepared to handle this potentially large increase in application processing, data verification, and overall customer support. Tables 4A and 4B below project what the potential Tier I, Tier II, and solar requirements will be based on the projected electricity sales growth described in the previous tables. These tables will be used as the basis for workload assumptions throughout the rest of this proposal.

Table 4A
Tier I, Tier II, and Solar MWh Requirements for Reporting Years
(assuming solar requirement remains a percentage of Tier I)

AEPS Requirement for Year	Time Period	Eligible Total Electric Sales	Tier I Rqmt	Tier I MWh	Solar PV Rqmt	Solar MWh	Tier II Rqmt	Tier II MWh
RY 1	2/28/07 - 5/31/07	37,900,214	1.5%	568,503	0.0013%	7,391	4.2%	1,591,809
RY 2	6/1/07 - 5/31/08	152,567,115	1.5%	2,288,507	0.0013%	29,751	4.2%	6,407,819
RY 3	6/1/08 - 5/31/09	154,901,674	2.0%	3,098,033	0.0013%	40,274	4.2%	6,505,870
RY 4	6/1/09 - 5/31/10	157,273,780	2.5%	3,931,844	0.0013%	51,114	4.2%	6,605,499
RY 5	6/1/10 - 5/31/11	159,684,066	3.0%	4,790,522	0.0203%	972,476	6.2%	9,900,412
RY 6	6/1/11 - 5/31/12	162,133,181	3.5%	5,674,661	0.0203%	1,151,956	6.2%	10,052,257

Assumes current rules that say solar PV requirement is % of Tier 1 requirement only.

Solar Capacity Projections

Year	Solar MWh	Solar kWh	Equivalent Solar Capacity (kW)*	# of Solar Systems at average 4 kW / system
RY 1	7,391	7,391	6.97	2
RY 2	29,751	29,751	28.07	7
RY 3	40,274	40,274	37.99	9
RY 4	51,114	51,114	48.22	12
RY 5	972,476	972,476	917.43	229
RY 6	1,151,956	1,151,956	1,086.75	272

* Assuming annual production of 1060 kWh/kW

Table 4B
Tier I, Tier II, and Solar MWh Requirements for Reporting Years
(assuming solar requirement becomes a percentage of total sales)

AEPS Requirement for Year	Time Period	Eligible Total Electric Sales	Tier I Rqmt	Tier I MWh	Solar PV Rqmt	Solar MWh	Tier II Rqmt	Tier II MWh
RY 1	2/28/07 - 5/31/07	37,900,214	1.5%	568,503	0.0013%	492,703	4.2%	1,591,809
RY 2	6/1/07 - 5/31/08	152,567,115	1.5%	2,288,507	0.0013%	1,983,372	4.2%	6,407,819
RY 3	6/1/08 - 5/31/09	154,901,674	2.0%	3,098,033	0.0013%	2,013,722	4.2%	6,505,870
RY 4	6/1/09 - 5/31/10	157,273,780	2.5%	3,931,844	0.0013%	2,044,559	4.2%	6,605,499
RY 5	6/1/10 - 5/31/11	159,684,066	3.0%	4,790,522	0.0203%	32,415,865	6.2%	9,900,412
RY 6	6/1/11 - 5/31/12	162,133,181	3.5%	5,674,661	0.0203%	32,913,036	6.2%	10,052,257

Assumes rules are changed such that solar PV requirement is against total electric sales, not just the Tier 1 Requirement

Solar Capacity Projections

Year	Solar MWh	Solar kWh	Equivalent Solar Capacity (kW)*	# of Solar Systems at average 4 kW / system
RY 1	492,703	492,703	464.81	116
RY 2	1,983,372	1,983,372	1,871.11	468
RY 3	2,013,722	2,013,722	1,899.74	475
RY 4	2,044,559	2,044,559	1,928.83	482
RY 5	32,415,865	32,415,865	30,581.01	7,645
RY 6	32,913,036	32,913,036	31,050.03	7,763

* Assuming annual production of 1060 kWh/kW

4. Tasks

A. Alternative Energy System Qualification.

The Commission and the Department of Environmental Protection (DEP) have qualified a number of alternative energy resources through the Commission's Interim Process for Qualification of Alternative Energy Systems¹. In-state facilities were assigned a unique Pennsylvania State Certification Number. Other facilities within the PJM control area that qualify for Pennsylvania's AEPS program are also listed on the spreadsheet developed for this Interim Process.

As administrator, CPM's approach will be consistent with, and guided by, the Resource Qualification Process Flow Chart, presented in Appendix C of the Request for Proposal document. As administrator, we will utilize the following protocol for reviewing applications that adheres to the process described in the proposed rulemaking order of July 25, 2006:

- Work with the Commission and DEP to manage the process initially started by them
- Set up an on-line web-based process for additional alternative energy systems to submit initial information
- Determine if the alternative energy system qualifies under Pennsylvania's program by following the steps outlined in Table 5 below².

CPM will operate the system that will be used to track the large generators, the customer-generators and demand side resources that have been qualified under the AEPS. We will work with Enerwise to develop the on-line reporting system, building off of existing systems that CPM currently operates, and will host the database on Enerwise's servers.

This will include an Administrator's database that tracks critical information on each PA-eligible facility that has been certified for compliance, and the status of each EDC and EGS that must comply with the requirements. This database will allow us to maintain all of the pertinent data related to the program in one place, and allow us to easily produce reports or quickly answer questions that Commission may have. It will also allow us to easily respond to questions from EDCs and EGSs, as well as PA-eligible AEPS facilities.

CPM, with technical support from Enerwise, will manage and lead the design, development, testing and installation of the Administrator's database to be used for tracking large generators, customer-generators, and efficiency and demand side management resources. This system will build directly upon the systems that

¹ Docket No. M-00051865, December 20, 2005, and January 26, 2006.

² As posed in Proposed Rulemaking Order on Implementation of the Alternative Energy Portfolio Standards Act of 2004, Docket No. L-00060180, Order Entered July 25, 2006.

CPM has developed and operated in the past for tracking and reporting in Wisconsin, New Jersey, and Connecticut. VEIC and Optimal will provide assistance and support to CPM regarding any adaptations for tracking energy efficiency and demand side resources.

Starting with the application that the Commission has already developed, we will determine if additional information should be collected at the time of applying for qualification. We will base this on examples from other state's programs, the information requirements we will need to verify production, and the data we will need to provide the necessary reports to the Commission, the legislature, and the public. There may be several different application forms developed based on the type and size of the alternative energy generator, as well as a specific list of items that the applicant will need to submit.

**Table 5
Steps to Qualify Facilities**

Step #	Step	Who	Timing
1	Application filed with administrator to qualify facility for alternative energy system status. Log date of receipt, and date of rejection or approval of application, noting reasons for rejection.	Alternative Energy System Owner	Day 0
1A	Is information complete?	Administrator	Day 3
1B	** If yes, go to step 2. If no, go to step 1C	Administrator	
1C	Send letter indicating incomplete information	Administrator	Day 5
2	Does facility satisfy geographic standard, consistent with 1648.4?	Administrator	Day 5
2A	** If yes, go to step 3. If no, go to Step 2B.	Administrator	Day 5
2B	* * Send letter indicating geographic standard not satisfied.	Administrator	Day 7
3	Does facility satisfy definitions at 1648.2 and applicable environmental standards? Certify questions to DEP.	Administrator	Day 7
4	Certification by DEP, including: - have necessary permits been obtained? - is facility guilty of major environmental violations? - does facility rely on one of the "alternative energy sources" identified in Section 1648.2 of the Act?	DEP	Day 14
4A	** If yes, go to step 6. If no per DEP, go to step 4B.	Administrator	Day 14
4B	* * Send letter indicating environmental standard not satisfied	Administrator	Day 15
5	Administrator qualifies facility for alternative energy systems status, assigns PA state certification number and informs applicant.	Administrator	Day 18
6	Administrator informs PJM-EIS of new qualified	Administrator	Day 18

	resource, process concluded		
7	Is administrator's decision appealed?	Alternative Energy System Owner	
7A	** If yes, go to step 8. If no, process concluded		
8	Commission reviews appeal and renders final decision on application	Commission	Involvement by Administrator ends, unless called by Commission to support decision.

Generation-Based Resources

In the Commission's interim process for qualifying alternative energy systems, the Commission issued a list of facilities that had submitted applications to the Commission and the Department of Environmental Protection to be qualified as alternative energy systems for Pennsylvania's program. The GATS system reports that there are 92 registered Pennsylvania-based renewable generators in the PJM-EIS system as of September 6, 2006, and a total of 224 registered in states covered by PJM. The Electric Power Outlook for Pennsylvania 2005 – 2010 lists 18 wind plants and 5 methane plants that are under study with planned operation dates by 2008. Thus the large majority of large generation facilities that the administrator will need to qualify in the early years of the program are likely to be small.

One phase of the work is to qualify generation-based resources. Clean Power Markets is uniquely qualified to administer this process, building on our experience with alternative energy and renewable programs in Wisconsin, New Jersey, California, and Connecticut. In all cases, our involvement in issuing renewable energy credits for use in complying with a state's portfolio standard initially requires that the resources qualify for that particular state's program. Working with the Commission and the DEP, we propose designing a process that is: 1) simple to use; 2) collects the relevant information needed to determine qualification; and 3) stores the information in a database that can be used for multiple reporting purposes.

Customer-Generator Resources

Our team is also uniquely qualified to administer the customer-generator application process. Our team members have experience processing application through Pennsylvania's SDF program for solar and other customer-generator resources. Additionally, CPM tracks over 1000 customer-generators in the New Jersey Solar Renewable Energy Certificate (NJ SREC) Program, and maintains a database of the relevant application information for that program.

The project team feels it is very important to collect as much information from behind the meter customer-generators during the application phase. Because the development of a robust customer-generator base in Pennsylvania is likely to occur, particularly with solar systems, setting up certain requirements at the outset of this program will provide assurance that quality systems will be installed that will perform properly for their owners and provide the maximum benefit to the state. Additionally, since solar credits are the only incentive available in the Pennsylvania market in those areas where SDF funds are unavailable, utilizing a similar level of detail in overseeing the installation of these systems will protect consumers and lead to maximum solar production.

The application process we propose here for customer-generators is modeled on the SDF's program. As part of the application process for behind the meter alternative energy systems, the customer-generator will need to provide general application information, the type of system (i.e., solar, wind, anaerobic digester, etc.), manufacturers' specifications of the equipment (to assure UL or equivalent for compliance), a wiring diagram, a site plan, copy of invoices for the installation (equipment and materials), a site assessment for alternative energy credit production (such as for solar PV or wind installations), and a photograph of the alternative energy credit meter.

For illustration, Appendix N shows the Sustainable Development Fund's Solar PV Grant Program application form and inspection/completion form – several elements of both forms would be combined into a single AEPS customer-generator application form. Modifications to this form might include adding a section where the customer-generator signs an attestation that they will not double-sell their credits, similar to what is required for New Jersey solar owners (Appendix O).

The customer-generator will need to provide the name of the EDC and electric account number with regard to their alternative energy system's interconnection. A revenue grade kWh meter must be installed between the generator output and the point of interconnection (e.g., backfeed breaker in the electric service panel); possibly two meters will need to be installed with battery-backup systems. These kWh meters will be used for determining the generation of alternative energy credits. The customer-generator must provide a clear photograph of this meter and its display and the indicate date of the photograph was taken, as part of their application submission; this will help verify and initiate the alternative energy system credit generation. The meter serial number should also be shown in the same photograph (this is often on the front of the meter below the meter display).

By the time that application is received by the AEPS administrator, the system must have already been approved for interconnection by the local EDC in order to qualify as an AEPS generating facility. The AEPS administrator can confirm the system type and the system capacity from the local EDC, since the interconnection application requires this information.

For solar PV systems, the AEPS administrator can provide some assistance to the customer-generator or installer with regard to wiring templates and solar site assessment software worksheets, as well as some guidance for complying with National Electric Code and interconnection standards.

The RFP requires that 10% of customer-generator applications be inspected before an application is approved. As Tables 4A and 4B show, the number of customer-generators that are required to meet the Act will vary greatly depending if the current rules are changed to have the solar component as a percentage of total electricity sales rather than Tier I requirements. In part E of this proposal, we propose a higher level of inspections in the first years of the program for the following reasons: 1) a relatively small number of systems are projected to be installed, and inspecting only 10% of these will result in little data to base future verification activities, and 2) setting firm guidelines through inspections of all systems, including those installed by new solar installation companies in the initial years of the program, will assure that certain guidelines are followed and quality systems are installed.

The project team can provide additional educational and marketing support to the Commission to encourage more solar installations. We have not budgeted time for such activities, but have the expertise and experience to add this to our tasks if the Commission so desires.

Demand-Side Management / Energy Efficiency Resources

The other phase of the work involves the operation and maintenance of the Administrator's database for efficiency and demand side resources. Daily CPM activities will include review of registration applicants and certification of eligibility. Information to be gathered, consistent with the Technical Reference Manual for energy efficiency resources will need to answer such questions as:

- Is the application from a retail customer, an EDC, an EGS, or an equipment / service provider?
 - Have multiple applications been submitted for the same project?
- What technology or load management practice is used?
- Is there adequate documentation on the DSM or EE measure and the approved metering device that is being used?
- What is the proposed evaluation plan for the Administrator to evaluate the effectiveness of DSM/EE measure?
- Will this be catalog approach or metered/custom measure?
 - If catalog, follow TRM process
 - If metered/custom, determine measurement and verification requirements
- Is an on-site inspection is necessary?

Clear procedures and processes for handling appeals of administrator decisions and aggregating newly qualified energy efficiency resources into an account in GATS will be developed and implemented as part of this group of activities. Enerwise, VEIC, and Optimal will provide technical and implementation support as required. Detailed assumptions behind the quantity of DSM/EE projects expected in this program are described in section E.3.

B. Certification of alternative energy credits.

Our team will develop a detailed plan for the verification and evaluation of qualified resources. This plan will address 1) transmission-interconnected large generation resources, 2) smaller behind the meter generation resources, and 3) demand side/energy efficiency resources, and will be developed with input and review from the Bureau of Conservation, Economics and Energy Planning. Our team will work closely with the Bureau of Conservation, Economics and Energy Planning during this and all phases of the work to ensure the systems we develop will meet the needs and objectives of the Commission.

Large Generators

Once an alternative energy system has been qualified under Pennsylvania's AEPS program, that resource can then be issued PA-eligible alternative energy credits. Those generation resources that were on the January 26, 2006 list (as described in the section A. above) that registered with PJM-GATS have been issued GATS certificates for 2005 generation. Those GATS certificates are designated PA-eligible alternative energy credits. As GATS-EIS reported, 1,359,566 PA Tier I certificates were issued, 27,394,787 PA Tier II certificates were issued, and 60 PA Solar certificates were issued for calendar year 2005

1. Delivery Requirement.

As the administrator of the PA AEPS program, CPM staff will work closely with the PJM-GATS registry to inform them of newly qualified PJM resources that can be issued PA-eligible GATS certificates. As facilities sign up with GATS and indicate that they are PA-eligible, GATS will confirm with the PA administrator that the facility can be listed as PA-eligible. As credits are issued, we will set up protocols to transfer information from PJM-GATS to the PA administrator's database to certify, track, and report on the number of PA-eligible certificates that have been issued to PA-eligible alternative energy systems. This information becomes very important in determining if there are sufficient resources to meet the AEPS requirements.

Alternative energy generation resources that are of large enough size to be monitored by the PJM control area will have their generation verified through PJM's process. PJM will be aware of those generators that export their electricity outside of PJM through NERC tags. As the administrator, we will meet with PJM and GATS-EIS to develop a protocol that de-certifies any PA-eligible certificates if the associated energy has been exported outside of PJM to any control area other than MISO. Other large alternative energy systems that are non-PJM resources (such as those in the MISO control area) will not have their generation verified through PJM. However, if a non-PJM generator delivers electricity into PJM, they will be registered in GATS as an import generator. If one of these generators is also qualified as PA-eligible, their certificates could be accepted for PA compliance. Again, we will work closely with MISO to develop a communication protocol to verify that the electricity associated with MISO resources that are PA-eligible is not exported out of MISO or PJM.

Customer-generators located in the PJM or MISO territory serve on-site loads or deliver excess electricity into the local distribution system. Therefore, as long as a customer-generator meets the location requirements, then the delivery requirement is automatically met. Similarly, with energy efficiency and demand side management resources, as long as the location requirement is met, then the delivery requirement is also met.

2. Double-counting requirement.

Preventing double-counting of alternative energy across multiple compliance and voluntary programs is of great concern and importance. CPM has been working with this issue for a number of years and is cognizant of the checks that must be made to prevent double-counting.

For GATS certificates: The GATS system allows EDCs to set up retail LSE sub-accounts for each state in which they operate. Those sub-accounts will be where the EDC transfers credits that will be used to qualify for compliance in those states. Thus Pennsylvania EDCs will have a retail LSE sub-account specifically for Pennsylvania. Any credits that EDC wants to use for Pennsylvania will be deposited in that account, and cannot be used for any other purpose. Since the administrator will have access to this account information in GATS, we will be able to certify that credits have been deposited into that EDCs sub-account for Pennsylvania, and then we will be able to further certify that the credits in that account are all from qualified PA-eligible facilities. We will be able to do this by evaluating the credits in the EDC's sub-account to determine the source and the RPS eligibility attached to each individual credit or batch of credits. We will also be able to get aggregate data through the state agency reports available in GATS.

For non-GATS certificates: For any credits that are claimed from outside of GATS, such as from generators in the MISO area that have also delivered their electricity into MISO, we will require that the EDC or EGS provide documentation that these certificates have not been claimed by any other entity or for any other purpose. We will work closely with MISO to set up a protocol to get information on the source of MISO-based electricity that is delivered to any Pennsylvania-based EDC or EGS.

Additionally, for non-GATS certificates, the Commission may want to consider including a requirement that participating alternative energy systems that are outside of GATS sign an attestation that they are selling their credits only once, and indicate if they have registered their facility in any other credits registry. This sets up a legal option to pursue damages if an alternative energy system is found to be double-selling its credits.

Additionally, customer-generators should be required to sign an attestation that they will not double-sell their credits. For the NJ SREC Program that CPM administers, credits are not issued to a participating customer-generator until a fully executed attestation has been received, that states the owner will not double-sell their credits.

Thus the steps we would take to avoid double-counting are:

- Have all participants sign an attestation that they will not double-sell their credits. Although this cannot prevent double-selling from occurring, it lets the seller know that we are watching.
- Work closely with GATS, NJSREC, NEGIS, and future credit registries in New York and in the Midwest (M-RETS) to make sure that credits are not being double-claimed in multiple jurisdictions to meet other state's portfolio requirements.
- Work closely with the other states to make sure that the same credits from the same generators are not being claimed in multiple jurisdictions.

3. Vintage Limitation.

Only credits awarded for generation that occurred on or after February 28, 2005, or conservation / energy efficiency measures that occurred on or after November 30, 2004 are eligible under Pennsylvania's Act. Since GATS certificates have not been created for generation before 2005, there is only a question if any of these certificates represent generation between January 1, 2005 and February 27, 2005. Since GATS certificates indicate the month and year of generation, any certificates created for 1/05 or 2/05 can be rejected if they are found in an EDC or EGSs GATS account.

Documentation from the EDCs and EGSs regarding non-GATS generation that is being claimed for 2005 will be required to certify that it meets the vintage limitation requirements. The documentation that might be required are copies of bilateral contracts from specific facilities that show the dates of delivery, with the associated production information for the time period.

C. Verification of EDC and EGS compliance with the portfolio standard requirements.

A key role of the administrator is to verify that EDCs and EGSs have complied with the portfolio standard requirement. This is done by calculating the aggregate retail electricity sales of an EDC or EGS against the quantity of credits purchased to comply with the Act. The reporting year for compliance runs from June 1 to May 31. At the end of the reporting year, we will review the certificates held in the EDC or EGSs account in GATS, plus add in any additional certificates the EDC or EGS is claiming that is not associated with GATS generators, to determine if they are compliant.

1. Timeliness of EDC and EGS sales data.

Because the July 20, 2006 regulations require EDCs to report sales data for all LSEs in their territory within 45 days of the conclusion of the reporting period. It will not be possible to obtain all of this information within 45 days of the end of the reporting period due to delays in reading meters and the regular schedule of PJM

settlements. Therefore, a protocol that allows a close approximation of an EDCs sales at the end of a reporting period (May 31) is necessary.

The July 20, 2006 rulemaking states in §75.31(f) that "EDCs shall provide monthly reports to the program administrator documenting total deliveries of electricity to all retail electric customers within their service territory. Separate totals shall be reported for each load serving entity active in the EDCs service territory. Reports shall be submitted to the program administrator within 45 days from the end of the month."³ Therefore, we would propose that 12 months worth of electric sales data, which would be reported by May 31 would be utilized. With the 45 day lag time in reporting, this would result in the use of retail sales data from April through March being used to determine compliance for a given reporting year. The March sales data would be reported to the administrator by May 15, thus giving the administrator 15 days to compile the information for all EDCs to make the end of reporting period report available on June 1. Recognizing that not all electric sales from the April through March period would be included because of possible delays in meter readings or GATS settlements, this will still be acceptable. As long as the data that is utilized each year is consistently representing a year's worth of electric sales, a relatively close determination can be made of the required number of credits required to meet the AEPS compliance. We will utilize the GATS functionality to determine if sufficient credits have been accrued thus far, as well as our other sources tracked in the Administrator's database for other credit sources.

A second report will be prepared at the end of the three-month true-up period, on September 1 that will provide updates on the number of credits that were acquired for compliance, still utilizing the same electricity sales data. Any compliance payments that are required can be determined at the end of the true-up period.

CPM will work with the Commission and DEP to determine the format required to report on EDC and EGS compliance at the end of each reporting period (May 31). Much of the information should be coming from GATS for large scale generation resources. Additional information on behind the meter and solar compliance can come from the database the Administrator maintains on every installation. Finally, information on DSM/EE measures claimed by each EDC and EGS can also be maintained on the Administrator's database.

The report provided at the end of each reporting period will allow each EDC and EGS to determine if additional credits need to be procured for Tier 1, Tier 2, or the solar share during the upcoming true-up period. The database that we will maintain for all resources will also allow each EDC and EGS, to know during the entire course of the year, the status of their credit balance.

³ Proposed Rulemaking Order on Implementation of the Alternative Energy Portfolio Standards Act of 2004, Docket No. L-00060180, Order Entered July 25, 2006.

CPM currently provides a report to the Public Service Commission of Wisconsin on compliance with the WI renewable portfolio standard each year. A detailed report, a copy of which is found in Appendix G, is prepared each year, and aggregated data is published on the public pages of the website, also shown in Appendix G. CPM also provides a report for each account holder in the New Jersey SREC program that shows the annual status of solar RECs in their account. Load-serving entities use the data from this report to prepare their compliance reports to the New Jersey Board of Public Utilities, and CPM provides a detailed report summarizing the status of each LSE's account for the NJBPU.

2. Geographic Scope Limitation.

The challenge of determining whether credits from outside Pennsylvania can be used to satisfy compliance has been made simpler in the most recent Commission ruling on geographic eligibility. For example, Pennsylvania Power Company, whose territory lies in the MISO control area is eligible to use credits PA-eligible credits associated with MISO generation or Pennsylvania generation. Any generation from PJM facilities located outside of Pennsylvania cannot be used. The Pike County Light & Power Company, which is not in PJM or MISO territory, is completely restricted to using credits from Pennsylvania-based facilities only. Thus for verifying compliance, each of these EDCs will set up GATS accounts, but the ability to use credits from any PA-eligible GATS generator is restricted for them. Pike County can only use credits from PA-eligible GATS generators that are located in Pennsylvania. Pennsylvania Power Company can only use credits from PA-eligible GATS generators that are located in Pennsylvania, or credits from PA-eligible MISO generators.

The GATS functionality will make it possible to ascertain that credits in these EDC accounts are from Pennsylvania generators only. Additional data will be required from MISO and the EDCs and EGSs in Pennsylvania Power Company's territory to determine compliance. As discussed previously, we will set up protocols with MISO to receive the information needed to properly verify the credits.

3. Banking Restrictions.

The Act allows EDCs and EGSs to bank credits that are purchased during their cost-recovery periods, and use those during the first two full reporting years after the expiration of their cost-recovery periods. Once the cost-recovery period has expired, the EDCs and EGSs can bank credits for up to two more reporting periods.

As the administrator, we will utilize the GATS functionality to determine whether the banking restrictions have been correctly followed. Since the GATS certificates will have a date associated with them, we will be able to determine if the certificates fall into the correct reporting year.

For non-GATS certificates, we will ask EDCs and EGSs to provide information on how long these credits have been banked. This might include bilateral contracts, and other paper trails that allow us to track the amount of time any credits have been banked.

D. Calculation of the level of alternative compliance payments for EDCs and EGSs

As the administrator, we will determine the level of alternative compliance payments for each EDC and EGS at the end of each true-up period. As described in C. 1. Above, this calculation will be based on the same electricity sales data as the initial determination made at the end of the reporting period on May 31.

This report will be similar in format to the report described in section above, but will be the final report on EDC and EGS compliance for that particular reporting year. Any shortfalls that were identified in the "end of reporting year" report should be satisfied in this report. If not, the report will identify the alternative compliance payments due from each non-compliant EDC or EGS. It has been determined in the Act that the alternative compliance payment will be \$45 times the number of alternative energy credits needed to comply, for non-solar credits.

As the Administrator, we will present data to the Commission on our calculation of the average market value of solar RECs sold during the reporting period in the PJM region. The alternative compliance payment will be 200% of this average market price times the number of alternative energy credits needed to comply with the solar requirement. We will conduct an analysis to determine what the alternative compliance payment should be for the solar RECs. As the administrator of the NJ SREC program, we have access to all of the prices for solar credits traded in New Jersey's compliance program. We will also utilize public sources, such as Evolution Markets, to determine the volume and prices of solar credits traded outside of New Jersey's compliance market, but still within PJM. We are currently instituting a bulletin board and transfer capabilities for New Jersey solar credits that are not sold in the compliance market; this will allow us to have accurate data on solar REC prices in New Jersey's voluntary market, and in other PJM states. We will calculate a weighted average if sufficient volume information is available to have a defensible price for Pennsylvania's solar alternative compliance payment.

If there is a challenge or appeal in either 1) the calculation of how many credits an EDC or EGS is lacking, or 2) the determination of the alternative compliance payment, we will have thorough documentation to back up our analyses. This will be used for testimony and documentation at any appeal hearing.

E. Verification of Alternative Energy System Status and Performance.

Verification of production or conservation is essential in providing integrity to the credits used for AEPS compliance. CPM and its team member have the experience and expertise to ensure that PA-eligible alternative energy systems are receiving credits only for the actual generation or conservation associated with them, and only when using the appropriate fuels and technologies allowed under the Act.

1. Large Generators.

Large generators interconnected to the PJM system (>10 MW in size) will have their production verified through PJM's market settlement system, and corresponding GATS certificates issued based on this verified production. Generators between 2 MW and 10 MW, they will not necessarily have their real-time data through PJM's market settlement system, but will report this information on a monthly basis. PJM will issue verified credits to this category of generators as well.

MISO generators will similarly have their production verified through the MISO market settlement system, but there is no certificate issuing body in existence at this time⁴. Thus, as the administrator, we will set up a protocol with MISO to obtain the revenue quality production information for any MISO-based PA-eligible generators in order to verify credits earned from those generators. We will also ask the generators to provide production information as well, and verify that the reported amounts are reasonable. In the administration of the Wisconsin RRC Program, CPM produces a "facility/audit report" which compares reported generation to expected generation, based on the facility size and capacity factor. When the reported generation exceeds what we expect the facility to produce, we investigate further. A similar approach can be employed here with non-PJM generators. Alternatively, MISO generators with remotely accessible meters and data recorders can opt to provide direct access to production output via POTS lines. Such data would be directly imported into the administrator's system for reporting.

Investigations of Large Facilities

The RFP specifies that 10 large alternative energy systems be thoroughly investigated each year, including at least one dual-fuel system. We will focus these inspections on facilities that are not registered with PJM, or with facilities that are importing electricity into PJM, as this is where the most uncertainty lies.

⁴ Renewable facilities certified in Wisconsin's RPS program are currently tracked by CPM in the WIRRC program. A Midwest-wide renewable certificate tracking program is expected to be operational by July 1, 2007, will replace the WIRRC program, and will include renewable facilities in Wisconsin, Minnesota, North and South Dakota, Iowa, Illinois and Manitoba. A portion of this area coincides with the MISO control area, and a portion does not.

The initial investigation will consist of contacting the appropriate state agency that might have certified these facilities. We would also calculate expected versus actual production for these facilities. We will compare FERC Form 1 reports that are filed by these generators with the information we receive from them. If the information does not seem to match appropriately, we will schedule a site visit to gather more detailed information.

For dual-fuel facilities, we will follow a similar protocol to that which has successfully worked in our Wisconsin project. For dual fuel facilities, we ask them to provide us with the production from each fuel on an annual basis. They also provide us, if required, with the quantity and BTU content of the renewable fuel so that we can determine what the fuel was capable of producing. We will plan to conduct a site visit with at least one dual-fuel facility, and may conduct more to make sure a consistent approach is being applied for all of these types of facilities, both within and outside Pennsylvania and the PJM control area.

2. Verifying Data for Customer-Generators

As the administrator for the New Jersey Solar and Behind the Meter Renewable Energy Certificate Program, CPM verifies the data for all behind the meter generation participating in the program. Until recently, this included only solar systems, but other behind the meter systems have been added that include small wind, anaerobic digesters, and landfill gas projects.

New Jersey's rules allow solar systems less than 10 kilowatts in size to be issued solar renewable energy credits (RECs) based on an engineering estimate. All systems 10 kilowatts and larger must report actual meter or inverter readings to be issued solar RECs. CPM uses the PV Watts⁵ program on the National Renewable Energy Laboratory's website to calculate the monthly projected production for the more than 1000 solar systems now registered in New Jersey's program.

To verify the production underlying the issuance of the solar RECs, CPM conducts an annual audit before the end of each Reporting Year on a sample of solar systems participating in the SREC program to determine 1) how closely the PV Watts estimates mirror the actual production of solar systems that are less than 10 kW in size; 2) how accurately meter readings are being reported for solar systems that are 10 kW and greater in size; and 3) how closely the actual meter readings for >10 kW systems mirror a PV Watts prediction. CPM provides the solar inspector with a statistically significant sample of solar systems for which meter / inverter readings are to be read and confirmed in order to conduct this audit. A one-page summary of CPM's Audit Process is found in Appendix A.

⁵ (3) http://rredc.nrel.gov/solar/codes_algs/PVWATTS/

In the spring of 2005, 36 systems had their meters or inverters read, with the result that the PV Watts calculations overestimated production by 9%. The results of the 2006 audit, in which 74 were analyzed, showed that the PV Watts calculations overestimated production by only 2%. The distribution around this value showed that 78% were within $\pm 20\%$ of the expected production.

The AEPS Act states, "All qualifying alternative energy systems must include a qualifying meter to record the cumulative electric production to verify the advanced energy credit value. Qualifying meters will be approved by the commission as defined in paragraph (4)." (Section 3. (e) (3)) The Commission can choose to require a separate AC meter for recording the AC output of each behind the meter system, or accept the AC readings from the inverters associated with these systems.

Verifying Data through Engineering Estimates and Separate Meters

CPM suggests that Pennsylvania require that all behind the meter system owners regularly report their cumulative and net kWh production. (This is the same approach we use in New Jersey but is required only for those behind the meter systems that are 10 kilowatts or larger.) The system owner will use the on-line reporting tool that CPM has designed and operates in New Jersey. A screen shot of this reporting tool is found in Appendix B. All system owners will be able to monitor their own production and alternative energy credits through this on-line system. Additionally, engineering estimates will be calculated to confirm that the reported production is consistent with the expected production.

We recommend utilizing the Solar Audit Assistance Tool that Mr. Celentano has developed for the PECO SDF Program⁶ for calculating the engineering estimates for solar projects throughout the state. This tool also uses PV Watts, as CPM uses in New Jersey, but adds in a "Pathfinder" reading to take into account the effects of shading on PV production. In order to provide a consistent approach across the state beyond the PECO service territory, we will have Mr. Celentano or Mr. Lehmicke conduct initial inspections of all systems and utilize this tool to calculate estimates for all Pennsylvania-based solar systems.

The Sustainable Development Fund recommended an approach using this tool, which they presented to the Commission and DEP in February of 2006, which is found in Appendix D. We agree with the approach suggested in this memo, but feel that it is possible and preferable that all solar system owners, not just those 10 kW and greater, report actual readings. We will work with the Commission in determining what type of production reading should be acceptable, such as a dedicated conventional utility-grade kWh meter as described in Appendix C, or the AC reading off of the inverter.

⁶ A description of the Solar PV Grant Fund that Mr. Celentano administers is found in Appendix C.

On-Site Inspections of New Customer-Generators

The RFP specifies that 10% of customer-generators that apply for alternative energy system status have an on-site inspection. Other solar and behind the meter systems that are installed in the state do not have a formal inspection process. Therefore, we recommend that the AEPS administrator conduct an initial inspection of any system that wishes to participate in the AEPS program and produce credits, whether the system is solar PV, micro-hydro, small wind turbine, an anaerobic digester, or other. Mr. Celentano or Mr. Lehmicke will conduct these initial system inspections, and perform an engineering estimate of the expected production.

However, the RFP requires that 10% of customer-generator applications be inspected before an application is approved. We will follow this requirement and propose a cost accordingly. It is very difficult to determine what 10% of the customer-generator applications will be, particularly in the first few years when many of the utilities' rate caps are still in place and their alternative energy credit requirements are delayed. In order to estimate the cost for this task, it is assumed 10% of the applications equates to the following number of on-site inspections:

	Based on Table 4A (solar as percentage of total Tier I)	Based on Table 4B (solar as percentage of total electric sales)
RY 1	1	12
RY 2	1	47
RY 3	1	48
RY 4	2	48
RY 5	23	765
RY 6	27	776

The above assumes only solar PV system inspections, but it can represent the inclusion of some other behind-the-meter system types. The cost proposal is based on the current ruling, which includes solar as a percentage of total Tier 1 requirements, which are the assumptions based on our Table 4A. Additional information in the cost proposal is provided if the ruling is changed such that solar is based on total electric sales, which are the assumptions based on our Table 4B.

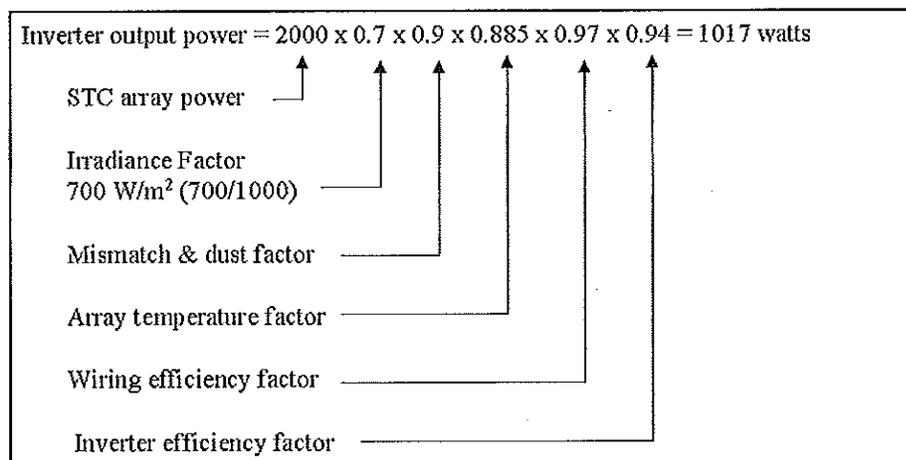
As an alternative, it may be worthwhile to inspect all applications in the first and possibly the second year, or at least up to 50 systems in these first two years. This will help work out the bugs and more swiftly develop the inspection protocol early in the program.

Behind the Meter Solar PV Systems - For behind the meter solar system inspections, the AEPS administrator's inspector will conduct a site visit on a clear sunny day. The inspector will do the following,

- Review the equipment submitted under the application and verify the same equipment at the site
- Conduct a detailed solar audit or site assessment; this will consist of using the Solar Pathfinder for conducting the shading analysis and determining the orientation of the solar array; then using the Solar Audit Assistance Tool (used in the Sustainable Development Solar PV Grant Program), or an equivalent approach, monthly solar generation will be estimated (the Solar Audit Assistance Tool incorporates shading analysis and PVWATTs simulation results); these results will be compared to the results submitted by the applicant; also, these results will be used for comparison of the actual solar RECs reported by the applicant
- Check the performance of the solar PV system; this will consist of measuring of the irradiance level at the solar PV array and the PV array temperature, as well as measure the DC and AC voltage and current; from this data, system performance can be estimated and compared to the inverter display readings; the system should be performing at least 90% of expectation; using the following procedure will determine the system's performance at the time of the inspection,

Nominal Capacity or Rated Power @ Standard Testing Conditions (STC):

- 1000 watts/meter²
- 25 °C Cell Temperature
- 1.5 air mass



- Verify the revenue grade kWh meter has been installed and is properly operating; take a photograph of the kWh meter reading, as well as record the cumulative kWh value from the inverters display; the revenue grade kWh meter reading will be compared to the photograph of the same meter which was sent in along with the application – it will be checked for reasonableness
- Review the wiring and installation configuration to assure compliance with National Electric Code and interconnection standards; this is very important for the AEPS administrator to document current installation practices – there is much evidence that this area needs significant improvement; even the majority of code inspectors need to learn NEC code issues regarding behind-the-meter on-site generation system installations

Based on the above, an on-site visit may take between 1.5 and 3.0 hours, not including travel time, depending on the complexity of the system.

Behind the Meter Non-Solar AEPS Systems - the AEPS administrator's inspector will conduct a site visit and do the following,

- Review the equipment submitted under the application and verify the same equipment at the site
- If applicable, conduct an energy audit or site assessment of the energy production potential for the type of on-site generation equipment installed; such as for a micro-hydro system, small wind system, anaerobic digester, etc. The protocol for this type of inspection will need to be developed as these system types enter the market place; the inspector's estimate for the alternative energy credit generation will be compared to the estimated value submitted by the applicant
- Record all nameplate information of the on-site equipment installed
- If applicable, check the performance of the on-site generator; this may involve estimating the natural resource potential, such as measuring the wind speed or velocity of the water flow in a stream; also measure the DC and AC voltage and current, if possible; from this data, system performance may be estimated and compared to the on-site generator's display readings – if they exist; the system should be performing at least 90% of expectation
- Verify the revenue grade kWh meter has been installed and is properly operating; take a photograph of the kWh meter reading, as well as record the cumulative kWh value from the on-site generator's display – if it exists; the revenue grade kWh meter reading will be compared to the photograph of the same meter which was sent in along with the application – it will be checked for reasonableness

- Review the wiring and installation configuration to assure compliance with National Electric Code and interconnection standards; this is very important for the AEPS administrator to document current installation practices – there is much evidence that this area needs significant improvement; even the majority of code inspectors need to learn NEC code issues regarding behind-the-meter on-site generation system installations

Based on the above, an on-site visit may take between 1.0 and 3.0 hours, not including travel time, depending on the complexity of the system.

Verifying Data Through a Technology Approach

The team recognizes that the most reliable way in which to track production is through direct metering. Where installations utilize remotely accessible meters or data recorders via POTS lines and the owner makes that data available directly, the team will look to leverage that technology by retrieving, parsing, and storing megawatt-hour data for tracking and verification purposes. Unless needed more frequently, such data will be retrieved monthly and stored as interval data for end-of-month reporting. Where interval data is inconsistent and/or missing, automatic reports will be generated identifying those units and the range of dates for which data is missing or inconsistent. A web based set of graphical analysis tools will also be made available to system owners through the CPM administrative portal.

Inspections of Operating Systems

The RFP specifies that the administrator will conduct 10 follow-up site visits to approved customer-generators as part of the verification process. This inspection is to verify that the appropriate technology is being used and that the meter is functioning properly. These 10 visits must include a visit to each type of technology or resource that is being used in Pennsylvania by customer-generators. For example this might include solar, small wind, or biomass facilities that are serving their own load. Depending on the quantity of customer systems installed, we may suggest that more than 10 visits be conducted, so that a statistically significant sample of sites are checked. In New Jersey, we check approximately 10% of the installations, as this provides us with a statistically significant sample size. We suggest a similar approach be used in Pennsylvania. Because the alternative compliance payment in Pennsylvania may be very high, it is important that the credits that are issued to PA-eligible customer-generators be adequately verified. If we are asked to check more than 10 systems per year, our approach is that a certain percentage of the installed systems will be sampled annually to assure accurate reporting, rotating through the total population over several years. This will verify that the production reported by the system owners is accurate, and to check any production reports that are not consistent with the predicted estimates.

Behind the meter system on-site inspections will be conducted by Ron Celentano or Dave Lehmicke. Ron Celentano currently serves as the solar administrator for the Sustainable Development Fund solar program in PECO's territory and currently inspects the solar systems that receive incentive funds from this program. Dave Lehmicke has extensive experience designing, engineering, and installing solar systems primarily in California, but also in Pennsylvania.

3. Verifying Data for Demand Side Management / Energy Efficiency Measures

Our management approach to administering the efficiency and demand side resource components of the AEPS are summarized below. While there are many similarities between the requirements for qualifying and tracking efficiency and generation resources, there are also a number of significant differences. These include additional complexities such as changes over time in efficient and baseline technologies, changes in operating or process "activity levels", and measure lifetime/persistence. In addition, many of the efficiency projects may be small, and will not warrant direct metering, thus necessitating a different level of verification than large generation sources.

The project team members, specifically Enerwise, VEIC, and Optimal have significant direct experience with the tracking, verification and reporting of statewide energy efficiency savings. VEIC and Optimal do this exact work on a daily basis, as a fundamental component of their responsibilities for the delivery of comprehensive "efficiency utility" services in Vermont. They have also helped to design and implement similar systems and mechanisms in a number of other jurisdictions, including Maryland, Massachusetts, New York, New Jersey, New Brunswick and Ontario. This extensive experience includes the tracking and reporting of savings for both standard and custom measures.

This work will start with a thorough identification of the requirements and specifications for including efficiency and demand side management resources in the Administrator's database that CPM will develop. These specifications and requirements will include user interface via the world-wide-web, interface with the PJM generation attribute tracking system (GATS), and the ability to track and report upon both custom and standard (TRM) efficiency measures.

Considerations during this phase of the work will also include the potential requirements and specifications required to support the tracking of efficiency activities in a market with more than 5 million end use electric customers. With each customer potentially having multiple and varied efficiency opportunities, the potential scope and scale of efficiency tracking and reporting is not to be taken lightly. To develop this proposal our team has made several assumptions regarding the levels and types of efficiency and demand management activity we expect will register and qualify for AEPS Tier II credits. We stress here that the ultimate level of effort is highly dependent on assumptions about the level of

efficiency resources bid into the market. As a result, we have priced our services based on these assumptions.

- Based on the availability of qualified generation resources, we expect efficiency and demand management will represent a modest share of the compliance portfolio.
- We have made the assumption that efficiency and demand management projects are expected to contribute roughly 10% of the Tier II compliance requirements, and recognize that EDC's are likely to obtain credits prior to their actual required compliance deadlines to ensure capture of lower cost and available credits in a more orderly fashion. The assumptions regarding the timing of this by each EDC is shown in Table 6.
- We expect that registrants for efficiency and demand management credits are most likely to be aggregating organizations, such as the Energy Coordinating Agency in Philadelphia, existing utility or statewide programs, or private energy service companies, which are current service providers. These entities will view AEPS registration as revenue supplement to support their efficiency initiatives. Note that we have budgeted assuming substantial levels of aggregation. If large numbers of individual small projects are result, this may impact costs in the future.
- Registrants for residential and relatively small commercial and industrial projects are likely to bundle a number of individual sites together. We anticipate it will not be worthwhile for individual households to register efficiency measures.
- The majority of residential measures will have prescriptive savings protocols defined in the Technical Reference Manual.
- Verification for efficiency and demand measures in the residential markets will consist primarily of conducting a technical review of program and service provider aggregate savings claims to confirm that they are consistent with current TRM. We will also conduct telephone, electronic, and/or on-site visits for a limited sample to confirm savings for entities seeking registration.
- The lion's share, 70%, of efficiency and demand management savings are expected to come from the commercial and industrial markets.
- The registrants for C/I efficiency and demand management credits are also expected to be existing utility or statewide programs, and efficiency service providers. On occasion a large individual project may decide to register.
- Efficiency and demand management projects for C/I markets will tend to involve custom measures. Therefore we expect most will involve an engineering level review of the savings claimed, to verify that baseline and savings assumptions are consistent with reasonable engineering practice and guidelines provided by the TRM. This will involve a detailed analysis of supporting documentation for each project submitted. We are assuming we will conduct a paper-based engineering review of 30% of the custom projects to verify their claims, requiring an average of 4 hours per review, as shown in Table 6.

**Table 6
Assumptions regarding Energy Efficiency and Demand Side Management**

EDC Service Territory	Duquesne	Met-Ed	Penelec	Penn Power	PPL	PECO	UGI	West Penn	Wellsboro	Citizens	Pike	Total GWh	Average Annual Growth	
2007 Sales (GWh)	14,430	14,375	14,522	4,798	39,403	40,480	1,093	21,331	389	389	389	151,599	1.53%	
Compliance Begins	2008	2011	2011	2007	2010	2011	2007	2011	2008	2008	2008			
Estimated capture of EE/DSM credits by EDC/Year														
2007	50%	10%	10%	100%	20%	10%	100%	10%	50%	50%	50%			
2008	100%	20%	20%	100%	30%	20%	100%	20%	100%	100%	100%			
2009	100%	30%	30%	100%	40%	30%	100%	30%	100%	100%	100%			
2010	100%	30%	30%	100%	100%	30%	100%	30%	100%	100%	100%			
2011	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%			
2012	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%			
Assumed portion of Tier II that is DSM				10%										
Tier II estimated DSM qualifying credits annual targets (MWh)												Total DSM	Tier II targets	% of Tier II from EE/DSM
2007	30,303	6,038	6,099	20,152	33,099	17,002	4,591	8,959	817	817	817	128,692	4.2%	8.08%
2008	61,532	12,259	12,385	20,459	50,406	34,523	4,661	18,192	1,659	1,659	1,659	219,392	4.2%	3.42%
2009	62,471	18,670	18,861	20,772	68,235	52,575	4,732	27,704	1,684	1,684	1,684	279,072	4.2%	4.29%
2010	63,426	18,955	19,149	21,089	173,192	53,378	4,804	28,127	1,710	1,710	1,710	387,249	4.2%	5.86%
2011	95,058	94,696	95,664	31,607	259,569	266,663	7,200	140,519	2,563	2,563	2,563	998,664	6.2%	10.09%
2012	96,510	96,142	97,125	32,090	263,533	270,736	7,310	142,665	2,602	2,602	2,602	1,013,917	6.2%	10.09%

Tier II estimated DSM additional qualifying credits needed each year to meet targets (MWh)	2007	2008	2009	2010	2011	2012	Estimated average size DSM project 1000 MWh													
	30,303	6,038	6,099	20,152	33,099	17,002	4,591	8,959	817	817	817	817	817	817	817	817	817	817	817	817
	31,229	12,259	12,385	308	50,406	34,523	70	18,192	842	842	842	842	842	842	842	842	842	842	842	842
	940	18,670	18,861	312	68,235	52,575	71	27,704	25	25	25	25	25	25	25	25	25	25	25	25
	954	18,955	19,149	317	21,453	53,378	72	28,127	26	26	26	26	26	26	26	26	26	26	26	26
	31,633	38,774	39,170	10,518	86,377	109,187	2,396	57,536	853	853	853	853	853	853	853	853	853	853	853	853
	1,452	1,446	1,461	483	3,964	4,073	110	2,146	39	39	39	39	39	39	39	39	39	39	39	39
Estimated average size DSM project 1000 MWh																				

Reporting Year	Estimate of number of DSM projects	# Projects with Paper verification (@30%)	# Projects with On- site verification (@10%)
2007	128.69	39	13
2008	161.90	49	16
2009	187.44	56	19
2010	142.48	43	14
2011	378.15	113	38
2012	15.25	5	2

- We anticipate on-site verification of a sample of projects, with sample sizes to be determined based on the types of projects, level of aggregation, and whether they have already undergone some independent verification. For example, if utility program administrators submit aggregated projects that have undergone a rigorous third party evaluation and verification procedure, minimal verification may be necessary. To be consistent with the large generator and customer-generator inspection levels, we are assuming that we will conduct on on-site inspection of 10% of the EE/DSM projects, as shown in Table 6.

Additional factors, such as the potential for banking of credits, and the registration of efficiency measures that were implemented before the enactment of Act 213, also introduce complexities that need to be considered and carefully addressed as the system requirements and specification are being established. There are other potential issues, such as tracking of costs, cost-effectiveness, and the associated cost (or savings) per kWh. This is a scoping question that will need to be verified during the development of specifications and work plans.

The efficiency and demand side components of the evaluation plan will include rules, procedures and protocols for on-site and remote monitoring and verification. This will include establishing sub-metering criteria and requirements, sampling plans, and protocols for the verification and registration of savings from non-metered systems. The Administrator's database discussed above will be developed so that it can be used to record and report on monitoring and evaluation activities. Enerwise will lead the development of the evaluation plan, under the general management and guidance of CPM. VEIC and Optimal Energy will provide significant input and assistance for the development and implementation of the verification and evaluation plan and subsequent reporting.

Technical Reference Manual Development and Maintenance

The PUC has developed a sample TRM. VEIC and OEI were the original authors of this document, and are intimately familiar with it. However, the current TRM only addresses a small number of standard measures. Particularly on the C&I side, we expect much of the energy efficiency resources will not directly apply to these limited measures. In addition, even for those measures already defined on-going modifications and improvements will be necessary as baselines change, efficiency technologies improve, etc.

VEIC and OEI will begin the contract with a thorough review and expansion of the existing TRM to ensure it has appropriate current assumptions and default values, and also to add a significant number of other efficiency measures that are appropriate to define standard savings formulae and assumptions. We will build off of our current TRM in Vermont (the original model for the PA TRM), as well as our work in numerous other jurisdictions to develop this into a more comprehensive TRM very quickly.

OEI will also add protocols for custom C&I measures where appropriate. In many cases, C&I efficiency will be entirely site specific and may not warrant entries in the TRM. However, for others, certain parameters or equations may be defined, as well as procedures related to methods of savings calculation that is appropriate. For example, for variable frequency drive industrial applications, a standard engineering formula may be defined and specific methods for establishing load factors for different periods.

We envision that VEIC's and OEI's efforts related to the TRM will be most significant in the first year due to the substantial expansion and refinement necessary. In future years, we will continue to maintain this living document (e.g., adjustments to baseline assumptions, loadshapes, etc.), and perhaps add some technologies as appropriate, but estimate a lower level of effort.

F. Support services.

There are a number of support service functions that we will provide to the Commission, alternative energy system operators, EDCs, and EGSs.

1. Website

Clean Power Markets currently maintains public websites for the 3 programs we administer: the Wisconsin Renewable Resource Credit Program (www.wlrrc.com), the New Jersey Solar and Behind-the-Meter Renewable Energy Certificate Program (www.njcep.com/srec), and the Connecticut Clean Energy Fund REC Management Program (www.cleanpowermarkets.com/ccefrecs). Each website is slightly different based on the requirements of each agency.

The website will be hosted at one or more Enerwise data centers, providing redundant communications mediums, web servers and databases for increased reliability. Applications will be accessible on a 24/7 basis. As with all such systems, both hardware and software will be monitored on a 24/7 basis by onsite Tier 1 support staff. If this team is selected to serve as the Commonwealth's program administrator, Enerwise will develop and present a set of recommended escalation procedures thereby notifying the commission personnel of any rare access problems that could occur. Routine maintenance and software release schedules will be provided as well.

Attributes of website:

a.) A section describing the administrator and its functions in implementing the Act, and its relationship to the Commission.

This is very similar to what we have implemented for Wisconsin and New Jersey. We will write up a draft of text for this section for approval by the CEEP and Commission staff.

b.) Contact information for the administrator, including a mailing address, email address, facsimile number, and telephone number.

Contact information will be included, including all of the multiple ways to contact us.

c.) A section including hypertext links to the Commission, DEP, PJM-EIS, and other sites as the Commission may specify.

Links to other sites is always important, and will be included in the site. Additionally, important documents, such as the July 20, 2006 Proposed Rulemaking Order and other critical documents like this that help define the program would be accessible to anyone interested in learning about the program.

d.) A frequently asked question section for common inquiries that may be made by owners of alternative energy systems, customer-generators, EDCs and EGSs.

A well-written and comprehensive FAQ section can be very helpful in controlling costs, because if a user of the website can find an answer without making a phone call, it saves time and money on both sides. As new issues come up, we will continually update this section, making sure that the Commission approves any text that is uploaded on this publicly available page.

e.) A section documenting prices for alternative energy credits. Monthly pricing data for alternative energy credits by resource type, Tier type, and a combined resource credit price should be available for public inspection.

In the NJ SREC program, we find that the pricing section is one of the most important section for our users. We like the idea of being able to host the website on our own servers, as it will allow us to frequently and quickly update important information like prices. Monthly prices will be posted, upon approval of the Commission and DEP staff that will be posted by resource type, tier type, and a combined resource credit price.

Another section the Commission might consider is a public page of brokers and aggregators that users can contact to help trade their credits. We find that the brokers and aggregators very much appreciate having their information readily available, the customer-generators can quickly find someone to help them sell their credits, and the LSEs can find suppliers easily.

f.) Customer-generator account system. The Commission does not expect that many customer-generators will register their alternative energy systems with GATS and manage their accounts there. The website should therefore include

functionality that will allow customer-generators to view the credited production of their approved alternative energy system. This feature will require a customer-generator to login and provide a password to access their accounts. The account should include information regarding the alternative energy system, including the alternative energy source type, date qualified by the administrator, cumulative production credited to that system, credits sold, and total credits available for sale. The administrator will need to have a mechanism by which it obtains the price paid for a customer-generator's alternative energy credits by an EDC, EGS or other aggregator/marketer.

The customer-generator account system is where CPM is uniquely qualified. We are the only company in the country that has developed and operates systems specifically designed for customer-generators. These systems are in New Jersey and Connecticut.

New Jersey SREC Program

CPM is the administrator of the New Jersey Solar Renewable Energy Certificate Program, where we maintain the database of customer-generators for New Jersey. Each customer-generator that is registered in our system receives a letter from the state of NJ explaining the process of registering to receive Renewable Energy Credits. Part of this process includes the creation of an owner account. The new facility owners visit our homepage (www.njcep.com/srec) to create their own secure electronic account. They select their login and password to this owner account. When the account has been created, an e-mail notification is sent to the program administrator with details about the new account (e.g. Name, email address, city of registration). The program administrator then links the new account to the facility in the database of customer-generators that have been qualified by the New Jersey Office of Clean Energy. In Pennsylvania's case, as we will also be performing the customer-generator qualification, this will allow us to more quickly link owners to their systems.

Once the link is established, the facility owner is able to see all of the details regarding their system including their facility ID number (which we assign), facility details, date the facility was placed in service, number of RECs earned, REC sales transaction details such as counter-party, date and price. A list of all of the information associated with each customer-generator in the NJ SREC system is found in Table 7.

In addition, the facility owner has access to the bulletin board. The bulletin board allows the facility owner to view current REC pricing for both buyers and sellers, and to place their own offer on the board. There are also menu options available which allow the owner to transfer RECs to a buyer once an agreement has been reached between the buyer and seller. When the seller selects the buyer from the menu, they are forced to input the price for the REC and the price is then captured by the administrator.

**Table 7
Information in Facility Database (NJ SREC Program)**

Facility Owner Data:

CPM Facility ID
 BPU application #
 Name
 Install address
 Install city
 Install state
 Install zip
 Contact first
 Contact last
 Email
 Phone
 SREC owner
 Date owner set
 Date of NJCEP inspection
 Date of utility interconnection
 Utility service area
 Last SREC sequence #
 Attestation Status

Solar System Specific Data:

#Modules
 Module manufacturer
 Module model#
 Power rating (Watts DC)
 #Inverters
 Inverter manufacturer
 Inverter model#
 Total system DC rating (kW)
 Orientation
 Tilt

Wind Generator Specific Data:

of Generators
 Generator Manufacturer
 Generator Model#
 Generator Power Rating (kW)
 #Inverters
 Inverter manufacturer
 Inverter model#
 Total system DC rating (kW)
 Wind hub height
 Wind rotor diameter

Biomass System Specific Data:

of Generators
 Generator Manufacturer
 Generator Model#

Generator Power Rating (kW) Total system DC rating (kW)
System Engineering Estimates
Month and Year kWh Expected per Month
Credit Trading Transaction Tables
SREC serial# Number of RECs Date of Transaction Report year of RECs traded Status From (Seller) To (Buyer) Price per REC (\$)
Meter Reading Data
Date of Read Raw Read Net Read (since last report)

When a REC has been transferred, the system generates an email to the buyer, seller and program administrator that details the transaction. It includes the buyer's name, the seller's name, and the number of RECs transferred. The transferred RECs go into "escrow" for 30 days to ensure that the seller has been paid for the credit that has been transferred. Should the seller receive payment prior to the 30 days, there is an option to "force" the REC out of escrow prior to the 30 days. If there is a problem with the transaction on either end, the party can contact the program administrator to resolve the problem. The two most common problems include non-payment, for which the program administrator would undo the transfer, or non-agreement, in which case the program administrator undoes the transfer and contacts the parties involved to determine who the correct buyer or seller should be.

Connecticut REC Management Program

CPM currently serves this role in its project with the Connecticut Clean Energy Fund (CCFE). CPM works with the Connecticut Department of Public Utility Control to certify resources as eligible to earn RECs in the NEGIS or New England Generation Information System (a corollary to the PJM GATS system). CPM then registers the units in the NEGIS, and manages a website for the CCEF that shows them the production of each unit, the NEGIS entries made by CPM, the number of RECs earned, and the revenues earned from forward and actual sales of the RECs. Screen shots from this website are found in Appendix E, along with descriptions of what these are tracking. This approach can be easily adapted for behind the meter generation in Pennsylvania.

For example, when the Pennsylvania solar owners report in their monthly production through the on-line reporting tool, the inputs will be tabulated to show how many alternative energy credits each solar owner has earned.

Aggregation Services

In the pre-bid conference, the Commission staff indicated they would like the administrator to serve as the fallback aggregator, if not the only aggregator for customer-generator RECs. We agree with that approach, as that combines the capabilities we have developed in both New Jersey and Connecticut programs. For the time being, we would proceed with using GATS as the registry for issuing certificates for behind the meter systems in Pennsylvania. The involvement of individual solar owners would be minimal, as the administrator will actively manage the aggregated GATS account. We will work with the PJM GATS program to develop a protocol to regularly upload the production data we collect as the aggregator of the multitude of solar systems, to avoid having to manually input the data into GATS for possibly hundreds of systems. Because the data we input into GATS has been verified by us, this will provide legitimate backup for the GATS certificates that are then issued.

In the future, as more customer-generators emerge, Pennsylvania could consider joining with New Jersey (and others, as other state programs materialize) to participate in a regional solar REC market. A dedicated region-wide SREC program makes it easy for all solar owners to actively participate outside of GATS, with the ability for Pennsylvania to measure compliance with the solar share of the AEPs through this dedicated solar REC program. Based on our experience in New Jersey, the majority of solar owners want to be actively involved in tracking and selling their solar RECs. Additionally, as New Jersey transitions to a REC-based incentive program, a regional solar REC market will benefit both states. Having a regional solar REC market will provide a larger market for solar RECs, which should lead to more liquidity and price stability in the REC market. Furthermore, since Pennsylvania is basing its REC price at 200% of the regional solar REC price, this will provide the Commission with the data needed to determine exactly what this price point is. A sample of what the bulletin board looks like in the New Jersey program is found in Appendix F.

g.) Public list of qualified alternative energy systems. A publicly available list of qualified alternative energy systems that identifies the resource type, location, nameplate capacity and Pennsylvania state certification number. This list should be updated monthly.

As mentioned near the beginning of this proposal, maintaining a database of all of the qualified alternative energy systems is an important part of tracking the required information for this program. The information will provide information in the aggregate about alternative energy systems in Pennsylvania, while maintaining the privacy of the system owners.

h.) Private list of contact information for alternative energy systems. This list will allow aggregators and marketers a means of contacting alternative energy system owners, and in particular customer-generators. This list will include contact information such as mailing address, telephone number, fax number and email address. An aggregator or marketer will need to register with the program administrator to have access to this list. Registration would require adherence to terms of use to be developed by the Commission, DEP and the administrator. This list should be updated monthly.

This is similar to what we have employed in New Jersey through the bulletin board. If a customer-generator wants to sell their RECs, they post it on the bulletin board, which includes the number of RECs they want to sell, the price, their name, e-mail address, and phone number. Aggregators and brokers, and other account holders are able to contact the potential seller to make a deal. In New Jersey, only those who want their information shown make a posting on the bulletin board. In Pennsylvania, you may want to consider taking a similar approach, as some people do not want to be contacted by anyone.

2. Help Line

The administrator will maintain a phone line for questions from alternative energy system operators, EDCs, and EGSs. Questions will be categorized as Tier 1 or Tier 2, depending on the level of expertise required to answer the question. The CPM team will seek input from the PUC in setting guidelines for the Tier 1 and Tier 2 categories.

Flow:

- Enerwise will provide Tier 1 support through their operations center (Information Control Center, or "ICC"), which is staffed 24,7.
- Tier 1 assistance is available 24 hours per day, 7 days per week.
- Enerwise ICC operators will be trained to handle Tier 1 (software access and support) questions, and will pass Tier 2 calls on to the next level of support.
- Tier 2 support will be available from 8:00 am Eastern Standard Time, to 6:00 pm, Eastern Standard Time, Monday through Friday, excluding federal holidays.
- The administrator will track each call to resolution.
- The administrator, with input from the PUC, will set goals for mean time to resolution for Tier 1 and Tier 2 calls.
- The staff that will provide this Tier 2 support include:
 - Maureen Mulligan and Ron Celentano for solar-related questions
 - Jan Pepper for large generator related questions
 - Raymond Berkebile for energy efficiency related questions
 - Steven D'Angelo for metering and/or data specific technical questions
 - Brad Swalwell for demand side management questions

3. Newsletter

CPM, as the AECF Administrator, will provide a quarterly newsletter that will be updated quarterly and posted on the PA AEPS website. Before posting this newsletter, CPM will review the content with the CEEP and add any additional text they wish to convey to AEPS market participants. The newsletter will include listings of any suspended or revoked alternative system status, newly approved systems, site inspection results, as well as any changes to the administrator's policies or procedures. In addition to these requirements, CPM proposes to include additional items that will assist participants in the Pennsylvania market in determining the current market conditions. CPM will include aggregate program information, such as the number and type of alternative systems installed with their representative installed MW, as well as trading statistics for credits. The trading statistics will detail monthly high, monthly low, and cumulative weighted average pricing information, the number of credits traded in the month, as well as the cumulative number of credits traded in each tier. CPM believes that this type of market transparency is important to the integrity of the credit market.

CPM will also include a section on "Forecast and Market News". This will include information on where the demand for credits is predicted to be for the period, as well as any additional credit market information pertinent to the Pennsylvania participants.

Every quarterly newsletter will provide contact information for the administrator, as well as links to the FAQ pages and information on how to call the helpline.

5. Reports and Program Control

The Project Team will maintain regular contact with the Commission and DEP staff. Dina Deana will be the overall program manager at the start of the project, and will be the point person for the project team. If there are requirements that need immediate attention of a local person, Maureen Mulligan will be the local liaison.

We will maintain all working papers and supporting data for the duration of the contract in order for the project team to refer to them, as well as provide any requests by the Commission or DEP. These papers will be retained for at least one year beyond the expiration of the contract.

Upon start of the project, we will designate which hardware and software platforms we will be using for this project. We expect to use PCs running Windows 2000, and using the Microsoft Office Suite, including Microsoft Word, Microsoft Excel, and Microsoft PowerPoint. This will be supplemented with Adobe Reader and Acrobat. The platform for the Administrator's database and customer-generator account system will be determined upon start of the project,

taking into account the compatibility of different platforms with the Commission's hardware and software platforms.

Regular reports will be provided to the Commission and DEP as described below. All reports will be considered confidential unless the Commission or DEP authorizes they be made public. The team will attend the meetings as described in the RFP and further discussed below.

1. Weekly Informal Reports

As defined in the RFP, we will plan on having weekly conference calls between the Project Team and the Commission / DEP staff during the first year of the contract. Depending on the agenda of those calls, the Program Manager will participate as well as other project team members. As the Administrator, we will maintain notes of these weekly conference calls and provide this documentation to the participants on the call. During the second and subsequent years of the contract, this conference call will be held every two weeks, with appropriate participation of the Program Manager and associated staff.

2. Monthly Written Status Reports

Monthly written status reports will be prepared and submitted to the Commission and DEP staff that includes the following items as specified in the RFP. These will be submitted to the Commission / DEP on the 5th working day following the month's end, and will be submitted for each month once the contract begins.

A. *Alternative energy system applications*

An aggregate and detailed listing of all applications received within the month, including alternative energy source type, the location of resource, and the status of the application.

B. *Alternative energy system site visits*

All site visits that have been conducted in the month will be documented, including those to large generators, customer-generators, and energy efficiency/demand side management projects. An aggregate and detailed listing will be made, including, the name and location of the alternative energy system, and the unique Pennsylvania state certification number. If there are any recommendations for additional action or other findings made, this will be included in the report.

C. *Customer-generator assistance*

We will document the number of inquiries received by customer-generators and break down the type of inquiries, such as status of application for alternative energy system status, account balances, and verification. We will maintain a log of all inquiries which will make it easy to identify areas where there appears to be confusion in the market, in order to make suggestions on changes or

improvements are needed to increase and/or support customer-generator participation.

D. Miscellaneous

This part of the report will address any other activities that have occurred during the month that do not fit into the other 3 categories above.

3. *Quarterly meetings with Commission and DEP staff*

As administrator, we will meet quarterly with the relevant Commission and DEP staff in Harrisburg. The Program Manager and other appropriate staff will attend this meeting to review the activities we have undertaken in the previous quarter and review expenses for that quarter. As we will be submitting invoices on a quarterly basis, this will be helpful to us in making sure that our invoices meet the needs of the Commission/DEP staff so they can be processed efficiently. We will welcome feedback from the Commission on our performance, and see this as an opportunity to discuss the program in general and make sure it meets the needs of the various participants.

4. *Annual report*

We will provide an annual report to the Commission and DEP on September 30 of each year, which is thirty days after the conclusion of the true-up period. This will aggregate the information in the previous 12 monthly reports, and summarize the status of the reporting year.

5. *Alternative energy credit pricing*

We will provide pricing information on the administrator's website, as described above in the support services section, and will include it in the annual report, after consultation with the Commission and DEP staff.

As discussed in Section D above regarding alternative compliance payments, we will ask GATS to provide us with the prices reported by EDCs and EGSs in their GATS accounts. For non-solar credits, we expect the price will be below the alternative compliance payment of \$45 per credit. The aggregate price will be reported by Tier and resource type, on a monthly basis. We will also break out certain resources by resource size, if for example, there are differences in price between large wind generators and customer-based wind generators. We will also report monthly highs, lows, and cumulative averages by reporting year.

As the Administrator, we will present data to the Commission on our calculation of the average market value of solar RECs sold during the reporting period in the PJM region. Some prices for solar RECs may be reported in the customer-generator account system that we will maintain as the Administrator, and others

may be found in the GATS system for any transactions that go through other solar aggregators. We will compile all of the pricing information for solar RECs and report this to the Commission. As with the Tier I and II prices, we will report on the aggregate price for solar on a monthly basis, and report monthly highs, lows, and cumulative averages by reporting year.

Clearly all of this pricing information is confidential, and pricing will not be posted on the public sites if there is not sufficient volume from any one resource in any particular month, in order not to disclose individual credit prices.

As Administrator, we will also document prices over six month periods in order for the Commission to make force majeure determinations.

6. Organizational Chart

CPM has assembled a team of professionals that bring an array of skills that will enable us to perform the activities as described in the RFQ. The key personnel are as follows:

Name	Position	Location	Responsibilities
Clean Power Markets Team Members:			
Janis Pepper	President	Los Altos, CA	Overall team management; alternative energy market assessment; IT design
Dina Deana	Director, Business Development	Wyckoff, NJ	Designated Program Manager for this program. Managing day-to-day use of generation, behind the meter, and DSM/EE database
Ron Celentano	Consultant	Wyndmoor, PA	Behind the meter and large generator site visits and engineering estimates
David Lehmicke	Consultant	Sunnyvale, CA and Philadelphia, PA	Behind the meter site visits and engineering estimates
Maureen Mulligan	Consultant	Shermans Dale, PA	Advisor to team and liaison with PUC and PJM, as needed
Enerwise Global Technologies, Inc. Team Members:			
David Ellis	Vice President, Business Development,	Kennett Square, PA	Project implementation for Enerwise team
Raymond Berkebile	Senior Mechanical Engineer	Kennett Square, PA	Energy efficiency audits, measurement and verification
Lisa Samulewicz	Account Manager	Kennett Square, PA	Demand response audits, measurement and verification
Bradley Swalwell	Energy Analyst	Kennett Square, PA	Energy analysis and reporting oversight
Vermont Energy Investment Corporation Team Members:			
Jan Harris	Project Manager	Burlington, VT	Project Lead
David Hill	Senior Project Manager	Burlington, VT	Senior Project Advisor
Carole Hakstian	Senior Analyst	Burlington, VT	TRM analysis and Support
Toben Galvin	Senior Energy	Burlington, VT	TRM analysis and Support

	Analyst		
Jules Fishelman	Information Technology Manager	Burlington, VT	IT Design Support
Optimal Energy Inc. Team Members:			
Phil Mosenthal	Partner	Bristol, VT	Principal-in-charge for Optimal; review, oversight and development of TRM for commercial and industrial; development of project verification procedures and tools; oversight on project verification
Jonathan Kleinman	Associate	Bristol, VT	Lead investigator; TRM development for and maintenance commercial and industrial; database needs definition; project verification
Lara Bonn	Research Analyst	Bristol, VT	TRM development and maintenance for commercial and industrial sites; project verification
Steve Bower	Senior Consultant	Bristol, VT	Database and tool development and maintenance; TRM development and maintenance for commercial and industrial sites; project verification

CPM will manage the project, with staff augmentation from Enerwise. Dina Deana of CPM will be the designated program manager for the program, and serve as the main interface with the Commission. Jan Pepper will provide overall team management for the CPM project team, coordinating the work of each of the subcontractors and consultants. Dina Deana and David Ellis of Enerwise will interface with the Commission in determining the overall scope of work, and communicate the scope to the project team. Maureen Mulligan will be available as a local liaison to the Commission, and advisor to the team regarding ongoing Commission activities that affect the activities in this program. Other project team members will handle the day-to-day AEPS qualification process, updates to the Program Administrator database, and implementation of behind the meter tracking activities. David Ellis of Enerwise will lead any software development activities for developing the Administrator database, including customization of CPM software platforms for the Pennsylvania market. Lisa Samulewicz of Enerwise will maintain the project log and monitor progress of Administrator activities for the team.

David Hill of VEIC and Phil Mosenthal of Optimal will lead the implementation of the energy efficiency and demand side management activities for their respective companies, within the project team, with input from Bradley Swalwell of Enerwise. This includes further work in defining the TRM and custom measures for the Pennsylvania market; on-going TRM maintenance; development of verification protocols and tools; and project verification services. Ron Celentano and Dave Lehmicke, both consultants to CPM, will lead the on-site monitoring and verification of behind the meter resources and large generator resources.

Raymond Berkebile of Enerwise will lead the on-site monitoring and verification of DSM/EE measures, supplemented by additional Enerwise personnel as required.

Resumes for all personnel listed above are included in Appendix J.

The project team members understand that they will all be required to sign a confidentiality agreement. We are also aware that all staff will have a criminal background check conducted by PA State Police before beginning.

7. Training

A monthly training conference call will be scheduled. All registered users will be notified via the email address provided during the creation of the owner account. These conference calls will explain in detail the features of the owner account and the website in general, as well as provide an open forum for questions. CPM finds that these calls are helpful in the New Jersey program as an orientation for new users as well as continuing Q/A for existing users. CPM has found that the facility owner acquires a basic knowledge of the system and can contact the administrator with more detailed questions. This reduces the call volume for the program administrator for basic new owner questions.

Periodic training sessions will be hosted through a web conferencing center providing participants and the Commission with internet access the ability to view live demonstrations of the administrative website features and functionality.

8. Objections and Additions to Standard Contract Terms and Conditions

We have no objections or additions to the standard contract terms and conditions at this time.

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- A. Detailed Experience of Clean Power Markets, Inc.
- B. Sub-Contractor Profiles: Enerwise
- C. Sub-Contractor Profiles: Optimal
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- E. Resumes of Key Team Members
- F. NJ SREC Program Audit Process
- G. Screen Shot of New Jersey On-Line Production Report
- H. SDF Solar PV Grant Program in Southeastern Pennsylvania
- I. Solar Methodology Memo from SDF Fund to Commission
- J. CCEF REC Management Program Screen Shots
- K. Wisconsin RRC Program Annual Status Report
- L. VEIC Efficiency Utility Annual Report (included in RFQ; not included here)
- M. Table of Contents for Current Vermont TRM (included in RFQ; not included here)
- N. Sustainable Development Fund's Solar PV Grant Program Application Form
- O. NJ SREC Attestation Form

**Appendix A
Detailed Experience
Clean Power Markets, Inc.**

This section describes the projects Clean Power Markets, Inc. is running for the Public Service Commission of Wisconsin, the New Jersey Board of Public Utilities, and the Connecticut Clean Energy Fund.

Public Service Commission of Wisconsin

1. Business name:

Public Service Commission of Wisconsin (PSCW)

2. Address:

610 North Whitney Way
P. O. Box 7854
Madison, WI 53707 – 7854

3. Contact person:

Mr. Paul Helgeson, Senior Engineer

4. Phone number:

(608) 266-3905

5. Type of work performed:

Design, build, and administer a renewable resource credit tracking system for facilities that are registered as "renewable" in Wisconsin.

6. Period work was performed:

September 2002 to present

7. Brief description of scope of work, limited to one page per client

The Wisconsin Renewable Resource Credit (RRC) Program allows Wisconsin electric providers to use a web site, which was designed, built, and is administered by Clean Power Markets, to track and report deliveries of renewable power for compliance with the State's renewable portfolio standard (RPS). The system issues RRCs (also known as renewable energy certificates (RECs)) for deliveries exceeding RPS requirements, which are deposited in each electric provider's account. The program calculates the number of RRCs each electric provider needs to meet their RPS requirement, and automatically retires

these from each electric provider's account. Trading of RRCs is facilitated through an electronic bulletin board, which can be sold or traded to others in Wisconsin, the Midwest, and beyond. The website for this program can be found at www.wirrc.com.

CPM developed an audit function for verifying generation and preventing double-counting of renewable energy production. The program provides an easy method for the electric providers to report their renewable energy information, and an automated report for the regulators (Public Service Commission of Wisconsin and the Department of Administration) to monitor compliance with the RPS regulation. The RRC system tracks the RRCs over time, including retirements, transfers, and year-to-year banking. It also provides a means of tracking the renewable output of dual-fueled generators.

At this time, the rules for Wisconsin's program allow only electric providers (investor-owned utilities, rural cooperatives, and municipal utilities) to participate in the RRC program. There are 108 electric providers that maintain accounts in the RRC Program. They are listed at www.wirrc.com/rrc/PublicProviderReport. There are 120 renewable power plants that are registered in the program, located in Wisconsin, Iowa, Minnesota, and Michigan. The listing of these facilities can be found at www.wirrc.com/rrc/PublicFacilityReport. Annual reports for years 2001, 2002, 2003, and 2004 that show the total quantity of renewable energy delivered in Wisconsin, and the amount used to meet the RPS requirements is found at www.wirrc.com/rrc/PublicRRCReportOptions. The report for 2005 will be posted when reporting for 2005 is closed out, which will be on July 1, 2006.

The Public Service Commission of Wisconsin selected Clean Power Markets, Inc. to build and administer the RRC Program for the State through a competitive bid in July 2002. Clean Power Markets has partnered with ZyQuest for software development and systems operation support for this project, and with Beantree for web hosting services. The site was launched in February 2003; CPM has a contract to serve as the program administrator for an initial four-year term, which ends in June 2007.

8. If subcontracting, describe vendor's experience in managing subcontracts and the experience with the proposed subcontractor

Clean Power Markets has two subcontractors on this project, ZyQuest and Beantree. Neither of these subcontractors will be used for the Pennsylvania AEPS Administrator project.

New Jersey Board of Public Utilities

1. Business name:

New Jersey Board of Public Utilities, Office of Clean Energy

2. Address:

Office of Clean Energy
P. O. Box 350
44 South Clinton Avenue
Trenton, NJ 08625-0350

3. Contact person:

B. Scott Hunter

4. Phone number:

(609) 292-7471

5. Type of work performed:

Design, build, and administer solar and behind the meter renewable energy certificate program for New Jersey's renewable portfolio standard.

6. Period work was performed:

January 2004 to present

7. Brief description of scope of work, limited to one page per client

The Clean Energy Program of the New Jersey Board of Public Utilities selected the Clean Power Markets team in January 2004 to build and administer the tradable renewable energy certificate program for solar energy in the State. This web-based on-line program tracks the production of all solar photovoltaic (PV) systems in the state for the purpose of issuing solar renewable energy certificates (SRECs). Solar system owners or their agents' establish a secure electronic account on the SREC website, www.njcep.com/srec. Through monthly meter readings (for systems \geq 10 kilowatts) or engineering estimates (for systems $<$ 10 kilowatts), electricity production is tracked. When 1000 kilowatt-hours (kWh), or 1 megawatt-hour (MWh), are produced, an SREC is issued and deposited into the account.

The SRECs can then be sold to New Jersey utilities to meet their renewable portfolio standard requirement for solar, or to any other entity that wants to

support solar energy production. CPM facilitates matching buyers and sellers through the electronic bulletin board on the site. Monthly pricing and trading statistics are published on the public pages, where the cumulative average price is posted, as well as highs, lows, and volumes for each month.

The New Jersey renewable portfolio standard has a specific requirement that electric suppliers deliver a certain percentage of electricity from solar PV systems. Purchasing SRECs meets this requirement. All New Jersey electric suppliers must use this New Jersey SREC Program to demonstrate their compliance with this requirement. As the electric suppliers accumulate SRECs for each year, they "retire" the SRECs to meet their purchase requirement.

Clean Power Markets conducts an annual audit of this program to determine if 1) the PV Watts engineering estimates closely match the actual output of the solar systems that are <10 kW in size; 2) if the production readings reported by the ≥10 kW systems are being reported accurately by the owners; and 3) how closely the PV Watts estimates match the actual readings for systems ≥10 kW. The 2005 audit showed that the engineering estimates were about 9% higher than actual production. The results of the 2006 audit are still being analyzed and a report will be issued in July 2006.

Clean Power Markets also conducts a monthly teleconference training session on the program for solar owners and account holders. About 100 systems and new accounts are added each month to the database we maintain for these behind the meter systems. The training session walks the participants through the easy-to-use website, plus provides an opportunity for solar owners to "meet" after the session to discuss issues they have in common.

A high degree of customer service is required for administering this program. Solar owners are typically not sophisticated energy traders, and most do not know the difference between a kilowatt and a kilowatt-hour. Our New Jersey-based employee, Dina Deana, fields the phone and e-mail questions, as well as provides the day-to-day updates for this program.

Clean Power Markets teamed with the Pace Law School Energy Project in this project. Clean Power Markets performed the software system design and development, and updates and maintains the site. CPM also provides the daily customer support for the program. The site is hosted on the New Jersey Clean Energy Program website. Pace provided local support and legal counsel in developing a paper certificate, which was part of the initial program design, but was subsequently eliminated as program design moved forward.

8. If subcontracting, describe vendor's experience in managing subcontracts and the experience with the proposed subcontractor

CPM would be happy to work with Fred Zalcman, the Executive Director of the Pace Energy Project, and Sam Swanson, one of the project managers at Pace as potential team members. The quality of work from the Pace team is excellent, and draws on their experience from multiple renewable energy and energy efficiency projects in a number of states, including Pennsylvania. Although we have not included their resumes in the listing of team members for this RFP, we may have them assist us if appropriate once the project starts. If that is the case, we will inform the Commission and get their approval before having Pace get involved.

Connecticut Clean Energy Fund

1. Business name:

Connecticut Clean Energy Fund

2. Address:

200 Corporate Place, 3rd Floor
Rocky Hill, CT 06067

3. Contact person:

Bryan Garcia, Director, Energy Market Initiatives

4. Phone number:

(860) 563-0015 ext. 314

5. Type of work performed:

Manage the RECs owned by CCEF behind the meter projects that qualify as Class I renewables in Connecticut. Track the production and sell the credits, and provide a website for CCEF to track the status of the RECs and revenues.

6. Period work was performed:

September 2004 to present

7. Brief description of scope of work, limited to one page per client:

In September of 2004, Clean Power Markets, along with team members VAIES, Inc. and GFI Group, were selected to provide a turnkey solution to manage the Connecticut Clean Energy Fund's (CCEF) renewable energy credits (RECs). Currently CCEF has eight renewable energy projects that qualify as Connecticut Class I renewables under the Connecticut Renewable Portfolio Standard.

Clean Power Markets developed a web-based application to track and manage the RECs owned by CCEF. Additionally, CPM registered each unit with the Connecticut Department of Utility Control as meeting the Class 1 criteria in Connecticut. CPM also set up an account in the New England Generation Information System (NEGIS) on behalf of CCEF to report and transfer the RECs issued for these projects.

The website provides access to the database of information logged on these projects. There is generator information, which includes all the contact and facility specific data for each generator. VAEIS provides data loggers at each

site, which download the monthly production data into the CPM website. This is captured and displayed on another page. This production data is then used to calculate the number of RECs that each project can apply for in the NEGIS, and calculates the associated emissions information that also has to be input into NEGIS (for non-solar projects).

GFI, the broker on the team, arranged some forward sales of RECs to different buyers in the New England market. We track these forward sales, and track the actual delivery of RECs (based on the actual production). Different web pages display the forward sales, the actual transfers, and the variances between the forward and actual sales, including the dollar value. This can be displayed by quarter and year, and by generator, making it easy for CCEF to monitor the sales of their RECs.

CPM will be expanding the site to manage the solar RECs of individual homeowners who have installed solar systems utilizing the incentive funds provided by the CCEF. CPM will register all of the facilities with the Connecticut Department of Utility Control, and manage the RECs in the NEGIS. CPM will set up the on-line system to allow the homeowners to upload their monthly inverter readings (as is done on the New Jersey site), and view the status of their RECs. Working with CCEF, we are arranging the sale of the solar RECs and will transfer the RECs to the buyers, with the majority of the proceeds going back to the solar homeowners.

8. If subcontracting, describe vendor's experience in managing subcontracts and the experience with the proposed subcontractor

CPM will not be working with VAEIS on this project, as at this point, automated data logging of renewable energy production is not required. Were that to be required, CPM would work with Enerwise to define the appropriate metering required. CPM may work with GFI, or any number of other REC brokers that we work with in New Jersey, if we serve as the aggregator of the solar and behind the meter RECs in this program.

Appendix B
Sub-Contractor Profile
Enerwise Global Technologies (Enerwise)

1. Complete name and address

Enerwise Global Technologies, Inc.
511 Schoolhouse Road, Suite 200
Kennett Square, PA 19348
(610) 444-1100

2. Short narrative of sub-contractor's experience level, years in business, and years experience providing services similar to those requested in this SOW

Enerwise is a leading energy and energy infrastructure product and service provider, currently serving over 100 Fortune 500 firms in 48 states and 4 Canadian Provinces. Through its headquarters office in Kennett Square, Pennsylvania Enerwise employs approximately 50 professionals offering products and services ranging from consultative energy analyses and demand response services to advanced metering design data retrieval and web presentment.

Enerwise has long standing Pennsylvania origins since it was founded in 1980, operating as Multi-Test Maintenance Corp. Enerwise Global Technologies was officially formed in 2001 providing Pennsylvania with its premier energy management product and service provider. Following is a list of relevant services offered:

- Enerwise Energy Manager – Custom branded web based software platform with automated energy data retrieval, asset tracking, presentment, and reporting.
- Energy Auditing and Analysis Services – Staff of energy professionals, which identify areas of inefficient energy, use and make recommendations for improvement and areas of cost savings.
- Field Services – Engineers, which perform field level electrical, and mechanical equipment assessments, testing, and reporting. (On call 24 hours per day)
- Demand Side Management Services – As a curtailment service provider within PJM, Enerwise offers significant experience and tools for managing, tracking, and reporting demand related activities for customers
- Engineering – Fully staffed electrical engineering team offering substation design and range of feasibility and reliability studies

- Metering and Integration – Advanced metering professionals with experience designing and deploying everything from the very complex metering infrastructure to simple data logging technology for measurement and verification of energy efficiency and demand management projects.
- Information Command Center – 7x24x365 manned call center located in Kennett Square acting as the hub for energy and related infrastructure monitoring, customer inquiries, and/or initiation of service visits.
- Data Centers – Enerwise has 2 geographically disparate company owned data centers and one co-location facility to ensure energy data redundancy and optimal web based application support.

3. Experience

City Utilities

Springfield, MO

Contact: Howard Conus

Phone: (417) 831-8556

Email: Howard.Conus@cityutilities.net

As part of their community outreach efforts on renewable energy, City Utilities has installed a wind turbine, a fixed solar panel, and a tracking solar panel. The purpose of the project is to educate their customers on how wind and solar work, how much energy these two types of alternative energy provide, the pluses and minus of each, etc. For instance, they compare the kWh output of the fixed and tracking solar arrays.

Their web page has articles on renewable energy resources that include links to the Enerwise wind and solar pages.

<http://www.cityutilities.net/community/renewable.htm>

The Enerwise pages are hosted at <http://www.datapult.com/CU/CUwind.html> for wind and <http://www.datapult.com/CU/CUsolar.html> for solar.

-ING Direct

Wilmington, DE

Contact: Leslie Orr, Director of Facilities

Cell: (302) 218-4960

Currently we are the energy consultant of record performing energy audits for all sites in four states to determine potential for energy conservation measures, demand response strategies, and renewable programs.

-Ridley School District

901 Morton Avenue

Folsom, PA

Contact 1: Dr. Nicholas Ignatuk, Superintendent
Phone: (610)534-1900 x 1101

Contact 2: Mr. Bill Euker
Business Manager (retired)
Phone: (215)576-6319

Cell: (310)944-4895

Enerwise has recently completed a energy efficiency project for the Ridley School District in Ridley, PA. It entailed upgrading district buildings with lighting, mechanical system retrofits, and window replacements. Included in the project was installing metering, sub-metering and monitoring services to conduct Monitoring and Verification. Through the monitoring process, Enerwise has determined additional opportunities to reduce energy costs, assist in cost allocation processes, and re-calculate energy bills using interval data.

-MBNA
Wilmington, DE
Mr. Ed Jackson
Vice President
(302)218-8920

Enerwise manages the load response efforts for MBNA for eleven buildings throughout the mid-Atlantic region. This process consists of data gathering and analysis, discussing energy reduction strategies with internal MBNA stake holders, enrolling the energy reduction load across the enterprise, providing notification and alarming services, providing settlement information to PJM, calculating and estimating settlement, and revenue disbursement.

Appendix C
Sub-Contractor Profile
Optimal Energy, Inc. (Optimal)

1. Complete name and address

Optimal Energy, Inc.
14 School Street
Bristol, VT 05443
(802) 453-5100

2. Short narrative of sub-contractor's experience level, years in business, and years experience providing services similar to those requested in this SOW

Optimal Energy is an eight-person energy consultancy concentrating on energy-efficiency and renewable energy as resources for energy-service providers, and as competitive energy solutions for businesses and consumers. We specialize in assessing, developing, planning, startup, and management support for ratepayer-funded energy-efficiency programs and market-based energy products and services. Founded in 1996, our clientele includes utilities, consumer and environmental advocates, government and regulatory agencies, and energy-service providers.

Optimal Energy is a privately held company owned by two principals. Philip Mosenthal co-founded Optimal in 1996. Possessing 23 years experience in energy planning, he has served as advisor, negotiator, and expert witness on virtually all aspects of utility and government demand-side management, including residential, industrial and commercial efficiency potential assessments; program design; program implementation; monitoring and evaluation; performance incentive mechanisms; and regulatory, planning and policy issues. Eric Belliveau joined Optimal in 1999 and in 2000 became a principal in the firm. He brings over twenty years of hands-on development, sales, operations and management experience in the energy, agricultural, construction and food industries to his work on efficiency program management, program implementation management and support, business development and planning.

We supplement our capabilities through association with other nationally recognized organizations and individuals with a wide range of specialties. Our strategic partners include consulting utility program managers, implementation contractors, and industry-specific efficiency experts. We maintain special relationships with the Vermont Energy Investment Corporation (VEIC), a Burlington-based organization with whom we have teamed on numerous residential and renewable consulting assignments outside Vermont since Optimal's inception, and with Green Energy Economics Group (GEEG) of Starksboro, VT. Since 2000, Optimal and VEIC have partnered to run Efficiency Vermont, the nation's first energy-efficiency utility.

3. Experience

Vermont Department of Public Service, 120 State Street Drawer 20,
Montpelier, VT 05602, Scudder Parker, Former Director of Energy Efficiency,
(802) 223-4848.

*Program Design, Planning and Analysis; Efficiency Administration Structure and Funding; Efficiency Program Implementation Support; Efficiency Potential Studies; Evaluation Planning; Performance Incentive Design and Negotiations; Expert Testimony on Utility DSM Plans and Performance
1996-present*

OEI and VEIC run Efficiency Vermont, the nation's first efficiency utility, under contract to the VT Public Service Board. OEI has led the development and design of Efficiency Vermont's business services since its inception in 2000, and business savings and verification and evaluation issues. OEI has also led business development efforts, including training staff on how to market and sell efficiency to business customers. OEI has led the development of Efficiency Vermont's savings, monitoring and verification procedures and algorithms, and the development of Efficiency Vermont's Technical Resource Manual (TRM), which documents engineering savings methods for standard measures and certain engineering procedures and assumptions for custom measures. The TRM has been referenced by numerous parties throughout North America, and is likely the most comprehensive and well-documented efficiency program savings verification document in North America. OEI also serves as lead negotiator for business efficiency savings, monitoring and verification issues with the VT Department of Public Service.

Prior to Efficiency Vermont's inception, OEI developed the plan to create Efficiency Vermont in 1997-1999, including: establishing the optimal administration model for VT; designing and analyzing a portfolio of efficiency programs and associated budgets, savings, evaluation and staffing needs; establishing funding strategies and systems benefits charge levels and negotiating settlements with all 22 VT utilities and other stakeholders; establishing contractual and management arrangements for the efficiency utility; identifying all infrastructure and database needs; and providing expert testimony on all regulatory proceedings leading to the creation of the efficiency utility.

OEI has also provided the following other services to the VT DPS: In 2002-2004 OEI performed a detailed efficiency potential study for VT, including designing programs that could capture maximum achievable potential. In 1996-2000 OEI provided expert testimony and supporting analysis on various VT utility efficiency plans and performance. This included critical review of plans and program designs, verification of savings and cost claims; and recommendations on improvements and cost recovery outcomes. We have also performed program

evaluations and advised on evaluation planning. Most recently, OEI led a commercial and industrial building code update process, including advising on appropriate code modifications and leading a statewide working group and public outreach process to gain support of important market actors in the private sector.

Long Island Power Authority, 333 Earle Ovington Blvd., Uniondale, NY 11530, Dan Zaweski, Director of Clean Energy Initiatives, (516) 719-9886.
Program Design, Planning and Analysis; Efficiency Program Implementation Support; Evaluation Planning; Efficiency Administration Structure and Funding 1998-present

OEI serves as LIPA's lead consultant advising it on all aspects of its Clean Energy Initiative. This includes originally developing its portfolio of programs in 1998 and associated analysis and DSM plan development and cost-effectiveness screening, to ongoing program design, planning and evaluation support. In addition, OEI provides implementation management support, including assisting LIPA and its implementation contractors to develop mechanisms and procedures to deliver programs, advising on tracking and savings verification, staff training, and development of marketing plans. Of particular note is OEI's role in developing LIPA's 75 MW standard offer solicitation for competitive bids of efficiency and supply resources. This innovative program was designed to test the market for efficiency resources to compete with conventional supply and distributed generation for new load. We designed the program and assisted LIPA in developing the RFP and solicitation strategy, reviewed solicitations for LIPA, advised on contractor selection, and provide on-going monitoring and evaluation of bidder savings claims and verification. OEI has also developed comprehensive savings and verification methods and procedures for LIPA to document and verify all efficiency savings, and has developed inspection protocols for efficiency projects.

Citizens for Pennsylvania's Future, Walnut St., Suite 1100, Philadelphia, PA 19102, Tom Tuffey, Director, Center for Energy, Enterprise & Environment, (215) 545-9694.
Program Design, Planning and Analysis; Efficiency Program Implementation Support; Evaluation Planning; Efficiency Administration Structure and Funding 2005

OEI assisted Citizen's for Pennsylvania's Future to develop mechanisms to add energy efficiency as a qualifying resource to an Alternative Energy Portfolio Standard for Pennsylvania. This project including identifying appropriate mechanisms to solicit and value energy efficiency resources, including developing sample protocols and procedures for quantifying and certifying energy efficiency resource savings. OEI also provided recommendations on net metering and interconnection issues related to renewable and CHP resources. Provided testimony before the PA PUC.

New Brunswick Department of Energy, P.O. Box 6000, Fredericton, New Brunswick, E3B5H1, Darwin Curtis, (506) 453-3720.

*Program Design, Planning and Analysis; Efficiency Program Implementation Support; Efficiency Administration Structure, Data Systems and Funding; Savings Verification Methods and Documentation; Cost-effectiveness Screening Tool Development
2005-present*

OEI, in conjunction with VEIC, has assisted New Brunswick since 2005 in analysis and advice to develop a province-wide efficiency infrastructure, funding mechanism, and program portfolio to capture efficiency resources. Under an "Efficiency Utility" model, New Brunswick Provincial Government would establish a set of programs and, through a contractual relationship, administer them. We have analyzed the efficiency potential for the Province, developed a portfolio of efficiency initiatives, and advised on all aspects of development and start-up, from funding mechanisms to tracking systems, to staffing needs and evaluation and verification services. Of particular note for this project is the development of a detailed Technical Reference Manual that documents all standard efficiency measures promoted and established engineering algorithms and default assumptions for claiming savings for each measure. We have also developed cost-effectiveness screening tool software for Efficiency New Brunswick to use to model both portfolios and individual projects.

**New York State Research and Development Authority, 17 Columbia Circle, Albany, NY 12203, Erin Hogan, Project Manager, (518) 862-1090 x-3246.
*Efficiency Potential Studies and Program Design and Planning
2003-present***

In 2003 OEI led a comprehensive assessment of the electric efficiency and renewable potential in New York. This project, analyzing over 2,000 separate efficiency measures alone, identified potential opportunities in 6 separate load zones throughout New York. It also included detailed analysis of New York likely appliance standards impacts, and analysis of the optimal strategies for meeting New York's Greenhouse Gas Initiative targets. From 2005 to the present, OEI is leading a similar project for NYSERDA to identify the natural gas efficiency potential for New York, in support of forthcoming NY PSC hearings on the potential establishment of a Natural Gas systems benefits charge — potentially the first in the nation. This analysis not only includes detailed analysis of over 1,000 gas efficiency measures, but also design of a gas program portfolio for delivery statewide, integrated with existing electric initiatives. It also includes a ground-breaking analysis of the natural gas statewide and national price effects likely from capturing gas efficiency savings in New York.

Appendix D
Sub-Contractor Profile
Vermont Energy Investment Corporation (VEIC)

1. Complete name and address

Vermont Energy Investment Corporation
255 South Champlain Street, Suite 7
Burlington, VT 05401
(802) 658-6060

2. Short narrative of sub-contractor's experience level, years in business, and years experience providing services similar to those requested in this SOW

The Vermont Energy Investment Corporation is a non-profit corporation with approximately 100 full- and part-time employees, most of whom work out of VEIC's Burlington, Vermont office. Since its creation in 1986, VEIC's sole mission has been to reduce the economic, social, and environmental costs of energy consumption through the promotion of cost-effective energy efficiency and renewable energy technologies. One of our unique and most valuable assets is our extensive knowledge of energy program design, coupled with our broad experience in the implementation of energy-efficiency services, as well as well as our history in energy program evaluation. This synergistic blend of the theoretical and practical allows us to continually inform and improve our design implementation and evaluation efforts.

In addition to implementing the Energy Efficiency Utility (EEU) contract for the Vermont Public Service Board, VEIC provides services to a wide array of clients around the world in the areas of program design, planning, implementation and evaluation, information technology systems for energy efficiency programs, performance contracting, financing, education and training, and energy and regulatory policy. Recent clients outside Vermont include the states of New York and New Jersey, the Province of New Brunswick, and the Long Island Power Authority.

VEIC has extensive experience with the development of protocols and algorithms for estimating efficiency measure savings and renewable energy generation. Perhaps most notably, as part of our Efficiency Vermont work we have developed an extensive (i.e., 350+ page) Technical Reference Manual that documents all assumptions (savings, load shapes, incremental costs, measure lives, free rider rates, spillover rates, etc.) – and the basis for those assumptions, including specific evaluation references, engineering algorithms, and so on – for all efficiency measures for which we claim savings prescriptively. We have also developed – with the Vermont Public Service Board (our client), the Vermont Department of Public Service (the agency charged with evaluating our work) and our Contract Administrator – a formal process by which new measure

characterizations can be added to the Technical Reference Manual and older characterizations can be updated.

Further details of selected relevant experience are given below, followed by contact information for several references.

3. Experience

Work in Vermont

VEIC has acted as the Prime Contractor to the Vermont Public Service Board in delivering the EEU from its creation in 2000. In the summer of 2005 VEIC was again selected through a competitive bid process to continue serving as the EEU contractor in Vermont through 2008. Information on Efficiency Vermont programs can be found at www.encyvermont.com.

An essential part of any efficiency program is its ability to identify and screen for cost effectiveness all viable DSM or EE measures. Additionally, program administration requires the ability to verify and track energy savings for each screened measure continually throughout the program. As part of the EEU contract, VEIC's Information Technology Division has developed and implemented a central tracking and reporting system, in collaboration with our partner, Conservation Services Group. The system, *Knowledge-based Information Technology Tool (KIT)* has been fully operational for six years.

Recent independent program evaluations, contracted by the Vermont Department of Public Service and performed by KEMA, Inc., have found the IT system to be "excellent in design and implementation to support management, planning, reporting, and evaluation" of energy efficiency programs.

In addition to the tracking system, VEIC's IT division has developed numerous applications including residential and commercial energy efficiency analysis tools, data importing and exporting tools, customer satisfaction survey tools and billing and usage analysis tools. With these systems, VEIC has successfully met all of the reporting requirements established by the Vermont Public Service Board and has successfully reported savings estimates that have proved to be reliable after extensive savings validations conduct by the Vermont Department of Public Service.

VEIC has demonstrated its ability to successfully administer the EEU contract since 2000 in the following ways:

- Met all of our energy savings goals and all but one of the other negotiated performance indicators and goals in the first contract period (2000-2002), exceeding them in many cases, therefore earning the maximum performance incentive possible. In the second contract period (2003-2005) VEIC exceeded its MWh target by 27%.

- Successfully met all contract requirements for reporting and financial management
- Maintained a positive and productive working relationship with the Board's Contract Administrator and Board staff to ensure compliance with the letter and spirit of the contract
- Established recruitment and staff development practices that have resulted in hiring, training, and retaining our talented staff
- Provided an extremely high level of customer service, using input from customers and others to improve our services
- Leveraged non-ratepayer dollars by securing high levels of customer investments and third-party funding

Last year's annual report summarizing the activities of the Efficiency Utility is attached to our qualifications as Appendix H.

Prior to being awarded the contract to deliver EEU services, VEIC administered a variety of demand side management (DSM) programs for utilities in Vermont. Between 1989 and 2000, we managed the installation of efficiency measures in approximately 5,000 residential dwellings and 100 small commercial establishments through implementation of DSM programs on behalf of Central Vermont Public Service, Citizens Utilities Company, Green Mountain Power, Village of Stowe Water and Light Department, Vermont Electric Cooperative, Washington Electric Cooperative, and Vermont Gas Systems. VEIC also developed and administered Vermont's Residential Energy Efficiency Program (REEP) from 1995 until its integration into Efficiency Vermont. REEP was a voluntary, utility-funded, statewide program that provided services to multifamily low-income clients, which was a precursor to the concept of an energy efficiency utility.

Related work outside Vermont

Word of the success that the VEIC team has achieved in operating the EEU has spread over the years, so that we are now being visited and called upon by administrators from more than a dozen states and provinces to learn how we operate and what they can apply in their own areas. Some examples of recent work include the following:

- VEIC participated in the Act 213 Implementation Working Groups for net metering, interconnection, and efficiency in Pennsylvania. Our work, on behalf of PennFuture, included drafting recommended residential TRM measures for efficiency measures and comments and recommendations for net metering and interconnection standards.
- The Oregon Energy Trust has adopted our information technology system and is considering using our Confidential Information Management System.

- We have worked with the Long Island Power Authority since 1998 in the design and development of their Clean Energy Initiative portfolio of efficiency, renewable and load management programs. Our work with LIPA has included assistance on the reporting and tracking of savings and generation from EE/DSM and photovoltaic systems. This information has been used in annual, monthly and quarterly reports and as the foundations for program planning and cost effectiveness screening.
- VEIC also played major roles in the development of all the residential energy savings algorithms filed by New Jersey utilities several years ago (and we understand are currently being used, though perhaps with some modifications).
- We also represent a coalition of environmental groups on committees of stakeholders who are responsible for overseeing the annual hiring of an auditor and directing of its work in reviewing and critiquing both Enbridge Gas' and Union Gas' savings claims for the Canadian province of Ontario.
- VEIC has also reviewed and critiqued savings claims on behalf of rate-payer advocates and other non-utility clients in Massachusetts, Maryland, Iowa, and several other jurisdictions.

Other recently concluded consulting projects include work for the province of New Brunswick and the state of New York determining energy efficiency potential, screening efficiency measures for cost effectiveness and creating a portfolio of recommended measures. Our approach and our analytic tools for cost effectiveness screening as well as measure savings verification and tracking served as the foundation for the recent creation of "Efficiency New Brunswick" modeled largely on our successful Efficiency Vermont program.

We support this work through the use of a variety of tools and approaches including the "KITTT" tool described above, and other cost effectiveness "screening tools" which have been refined over many years of use. We have also created a detailed "Technical Reference Manual" which includes all necessary savings algorithms and cost assumptions for selected energy efficiency measures. The Table of Contents for the Current Vermont TRM is included as Appendix I to these qualifications.

The Technical Reference Manual ("TRM"), attached as Annex A in the "Final Order" for the implementation of the alternative energy portfolio standards was based on the Vermont TRM created by VEIC. What is found in Annex A is a small piece of a much larger document. As noted in the "final order", the appropriate and cost effective efficiency measures evolve and change over time necessitating continual monitoring, maintenance and revision of the TRM. In addition to identification of appropriate and cost effective efficiency measures, our program design and tracking approach includes methods of accounting for

equity across all ratepayer classes, as well as out of program effects such as spillover and "free-ridership".

Selected References for VEIC:

Michael Wickenden
EEU Contract Administrator
446 Tenney Hill Road
Hyde Park, VT 05655
(802) 888-6231

Michael Ambrosio
Director, Ambrosio Associates
417 Dennison Street
Highland Park, NJ 08904
(732) 296-0770

Tom Tuffey
Director, Center for Energy, Enterprise
& Environment
Citizens for Pennsylvania's Future
1518 Walnut St., Suite 1100
Philadelphia, PA 19102
(215) 545-9694

Dan Zaweski
Director of Clean Energy Initiatives
Long Island Power Authority
333 Earle Ovington Blvd.
Uniondale, NY 11530 USA
(516) 719-9886

Appendix E
Resumes of Key Project Team Members

APPENDIX E

Resumes of Project Staff

Clean Power Markets, Inc.

Janis C. Pepper
Dina M. Deana
Ronald Celantano
David Lehmicke
Maureen Mulligan

Enerwise Global Technologies, Inc.

David Ellis
Raymond Berkebile
Lisa Samulewicz
Bradley Swalwell

Vermont Energy Investment Corporation

Jan Harris
David Hill
Carole Hakstian
Toben Galvin
Jules Fishelman

Optimal Energy, Inc.

Phil Mosenthal
Jonathan Kleinman
Lara Bonn
Steve Bower

Professional Experience:

Clean Power Markets, Inc., Los Altos, CA

May 2000 – present

President

Founder of company to track renewable energy production for renewable portfolio standard requirements and voluntary green markets. Company builds web-based systems for tracking renewable production, including issuing renewable energy certificates (RECs), managing electronic accounts for users (utilities, renewable generators, regulators, brokers, and others), and facilitating REC transfers through a bulletin board. Manage day-to-day operations, working relationships with strategic partners, and business development.
(www.cleanpowermarkets.com)

- Awarded contract in 2002 by Public Service Commission of Wisconsin to develop and administer renewable certificate tracking system for Wisconsin's renewable portfolio standard (RPS). System operational in February 2003, with contract to provide on-going program administration for 4 years.
- Awarded contract in 2004 to develop and administer Solar Renewable Energy Certificates tracking program for the New Jersey Bureau of Public Utilities Clean Energy Program. System operational in June 2004, with contract to provide on-going program administration. Over 1400 solar systems and 1300 user accounts registered as of June 2006, with 100+ added each month.
- Awarded contract in 2004 to develop and administer renewable certificate tracking program for Connecticut Clean Energy Fund (CCEF). Program tracks renewable production of CCEF-owned renewable facilities, and facilitates transfer of RECs into New England GIS to allow CCEF to receive income stream for RECs.
- Filed comments with regulatory agencies in various states (Pennsylvania, New York, Colorado, California) on issues related to distributed generation, renewable energy, and renewable energy certificates.

Enertron Consultants, Los Altos, CA

1987 – present

President

Successfully manage consulting business in energy industry. Perform projects in the utility and independent energy industry, focusing on the renewable energy industry. Projects include power purchase contract development and negotiations, expert witness testimony, financial analysis of existing and new energy projects, energy price forecasts, renewable energy market evaluation and development, distributed generation, and technical analysis of renewable energy projects. Assist clients in selling their power to utilities or other buyers in regulated and deregulated markets. Provide sales and marketing support to local solar electric contractor to encourage installation of solar PV systems on residential and small commercial buildings. Work with local affordable income housing developer to determine economics of solar on their buildings and to reduce their operating costs. Analyze economic impacts and benefits of performance-based incentives, net metering tariffs, and time-of-use rates on project paybacks. Clients include Pacific Gas and Electric, Electric Power Research Institute, National Renewable Energy Laboratory, California Energy Commission, California Power Authority, Monterey Regional Waste Management District, Pace Energy Project, Nehemiah West Housing Corporation, South Coast Air Quality Management District, California Solar Energy Industries Association, and other independent power producers.

Automated Power Exchange, Santa Clara, CA

April 1997 – May 2000

Director, Green Market Development and Vice President

- Designed and operated the highly successful APX Green Power Market in California, which facilitated wholesale trades and provided scheduling coordinator services between renewable generators and renewable providers.
- Introduced innovative "Green Tag" approach for trading green power in California and across the country. Worked with market participants to develop liquidity in the market.
- Recruited customers, provided training, handled customer problems, and reported to regulatory authorities; generated 75% of company's revenues in 1999.
- Developed press releases, held press conferences, and responded to questions from the press regarding the APX Green Power Market and APX in general.
- Brought in venture capital firm for company's first round of funding. One of founding members of company, joining company in 1997.

Pacific Gas and Electric Company, San Francisco, CA

1984 – 1987

Negotiated power purchase and other agreements with independent renewable energy power producers, including analyzing and assessing risks and benefits of non-standard terms and conditions. Participated in policy/regulatory procedures/decisions affecting the utility and third party produced generation, including transmission, wheeling, utility competition, and resource planning methodologies.

Atari Corporation, Sunnyvale, CA

1981 – 1984

Manager of Sales and Marketing for new Atari Service product. Performed entire product management functions, including market research and forecasting, marketing, sales, production, fulfillment, and systems support, with annual sales of \$3 million. Responsible for budgeting and product line profit and loss. Supervised staff of 8.

Previous experience at Science Applications International Corp., and Mobil Oil Corp.

Education:

B. S. Civil Engineering, With Distinction, Stanford University

Elected to Tau Beta Pi (engineering honor society)

M. B. A., Stanford University, 1981

Presentations and Publications

Make presentations at numerous energy-related technical conferences, including Solar Energy Industries Association, American Solar Energy Association, American Wind Energy Association, National Green Power Marketing Conference, Biomass Conference of the Americas, and ASME.

Affiliations / Other:

- Registered Professional Engineer, Civil Engineering, California
- Board Member, Power Association of Northern California
- Member, American Wind Energy Association and American Solar Energy Society
- Volunteer, Stanford Business School Alumni Consulting Team
- Installed 3.2 kW DC photovoltaic system on own home in 2001, with battery backup, which supplies entire electrical usage of home resulting in no charge for electricity usage on an annual basis. Net metered with time-of-use rates (PG&E E-7 rate).

- Member of Women's Electric Racing Team, which converted a diesel rabbit to an electric car, and raced it in the Phoenix 500 Electric Car Race.

Dina M. Deana
Director, Business Development
Clean Power Markets, Inc.

Page 1 of 2

Professional Experience:

Clean Power Markets, Inc., Wyckoff, NJ (November 2005 to present)

Director, Business Development - NJ Solar Renewable Energy Credit Administrator

- Provide daily customer service to solar facility owners and installers in New Jersey
 - Phone calls and email inquiries
 - Troubleshoot owner accounts
- Manage NJ Solar Facility database
 - Link owner accounts to solar facilities
 - Verify all paperwork received
 - Process SRECs on monthly basis
- Participate in industry events to speak about NJSREC program
- Member of MSEIA REC working group to transition NJSREC market from a rebate based program to a REC only based program

Flack + Kurtz Inc., New York, NY (April 1997 to October 2005)

Director of Marketing

- Manage all facets of the firm's new project submissions – from organizing detailed proposal packages to overseeing multi-media presentation production
- Works closely with the firm's Chairman, President and Senior Principals in long-range planning
- Oversees annual marketing budget
- Coordinates participation and visibility at technical conferences and industry networking events
- Responsible for advertising placement and article review
- Supervises staff which includes the firm's Marketing Manager, Events Coordinator, and Graphics Coordinator
- Responsible for the upgrade and population of the firm's database of project experience
- Tracks annual proposal output by sector to assist with long-term market strategy

Marketing Manager

- Answered Requests for Proposals and Requests for Qualification.
- Searched for leads in newspapers and government announcements
- Utilized time management techniques for meeting multiple changing deadlines

Design Engineer, Telecommunications

- Responsible for drafting and design of telecommunications systems for clients from schematic design through construction punchlists
- Responsible for Quality Assurance of all drawings submitted for deadlines

- Major projects include: 731 Lexington Avenue; William J. Clinton Presidential Library; The New York Times Headquarters; The New York Public Library; New York, NY; Repsol YFP; Buenos Aires, Argentina; DISA (Defense Information Systems Agency) Headquarters, Washington D.C.; DoDDS (Dept. of Defense Dependent's School) Rota, Spain and Aviano, Italy; Columbia University School of

Law, New York, NY; 330 Jay Street/12 Metrotech, Brooklyn, NY; Bank Boston, Buenos Aires, Argentina and Sao Paulo, Brazil; Year 2000 Compliance Assessment for two major banks: Project included research and contact of manufacturers to obtain statements, assessment of risk for building systems, and the coordination of a contact database for clients' use

Insignia/Edward S. Gordon Company, Inc., New York, NY (May 1995 to April 1997)

Energy Administrator

- Reported directly to Director of the Gordon Energy Group.
- Developed a utilities monitoring program in approximately 50 NYC buildings in order to discover and correct discrepancies in billing and building operations.
- Gained an extensive knowledge of all Con Edison steam and electric tariffs. Assisted in the discovery, calculation and negotiation of a \$2 million overcharge for a client.
- Researched and developed training programs for account executives regarding the deregulation of electricity.

Education: **Steven's Institute of Technology, Hoboken, NJ – 2000 - Graduate Certificate, Project Management**

Fairfield University, Fairfield, CT - B.A. Economics; Mathematics

Memberships: **MSEIA (Mid Atlantic Solar Energy Industries Association – Member of REC Working Group**

SMPS – Member of National Convention Committee (August 2004 in New York)

CoreNet

Honors: **Omicron Delta Epsilon - Economic Honor Society**

Pi Mu Epsilon - Mathematics Honor Society

QUALIFICATIONS

Recent experience includes designing/administrating a solar grant program; conducting detailed inspections of solar photovoltaic systems, as well as designing and installing solar electric systems for residential and commercial applications; PowerDOE modeling for LEED certification; developing EXCEL models for processing solar energy audit data and a tool for managing load shapes; Specialist in conducting technical analysis and benefit/cost analysis of alternative technologies for commercial, residential, and industrial lighting, HVAC, water heating, refrigeration and other end-uses. Extensive experience in using several building energy simulation computer models, as well as in the development of load shape modeling software. Experience also includes demand-side management (DSM) type projects for over a hundred utilities worldwide, as well as private companies, and government agencies. Skilled in research and commercial installation of solar hot water and heating systems.

EXPERIENCE

Celentano Energy Services

Principal

1996-Present

- **Sustainable Development Fund Solar Photovoltaic Grant Program Administrator** – Co-designer of the SDF Solar PV Grant Program; started up the program and currently oversee operations; review grant applications and system designs; PV systems performance inspector; educate and provide technical assistance to consumers, installers and code officials; collect and analyze performance and cost data: Aug. 2001-Present
- **Solar Coalition of PA** – Helped draft legislation for a renewable portfolio standard (RPS) in Pennsylvania, particularly spearheading the effort to include a Solar Share, or a separate requirement for solar photovoltaics; crafted language for statewide net metering and interconnection standards for on-site generation supplied by renewable energy sources; provided technical support and economic analysis to legislators and related parties; currently supporting the PA PUC develop the regulations: 2004-Present
- **MADRI Model Small Generator Interconnection Procedures** – Represented the renewable energy small generator group as part of the Mid-Atlantic Distributed Resources Initiative, a consensus stakeholder process to develop statewide interconnection standards for the Mid-Atlantic region: 2005
- **Assessment of Program Energy Savings** – Two year project auditing the energy savings and benefit cost results reportedly achieved by funding recipients for the CA Public Utility Commission regarding California's Senate Bill X1 5 energy efficiency program legislation (2002-2003)
- **Solar Electric or Photovoltaic (PV) System Projects** – Designed/installed/serviced solar PV systems including several residential grid-tied PV systems, remote PV systems, and a commercial grid-tied PV system (50 kW) : 1996-Present
- **Building Energy Simulation - PowerDOE, DOE2, Energy-10, MicroAccess and Market Manager (over 15 years experience)**; involved in several green building design projects which consist of building simulation modeling using PowerDOE; some of these projects are intended to comply with the LEED (Leadership in Energy & Environmental Design) Green Building Rating System™; two in particular include, *St. Stephen's Episcopal K-8 School in Harrisburg, PA*, and *59th St. Baptist Church in Philadelphia, PA*; other recent building energy simulation projects include *Peace Valley Nature*

Cente, Doylestown, PA, St. John 's United Church of Christ, Evanston, IL to Philadelphia, PA, Many commercial buildings for Tennessee Valley Authority

- **Net Metering and Distributed Generation Interconnection:** Helped craft Philadelphia Energy Company's (PECO) net metering tariffs which are used for residential and commercial renewable on-site generation; these tariffs were used as templates across Pennsylvania as the electric utilities deregulated since 1998; also helped craft PECO's interconnection requirements for renewable distributed generation up to 40 kW: *Philadelphia Million Solar Roofs Initiative sponsored by Energy Coordinating Agency*
- **Load Shape Development and Analysis:** *BW-Energy LLC; Ecom-Energy Inc.*
- **Technical and Economic Analysis of Energy Efficiency and Renewable Technologies:** *Long Island Power Authority; City Gas Company of Florida; Energy Coordinating Agency*
- **ASHRAE 90.1 Code Compliance Evaluation:** *City of Philadelphia, Office of Housing and Community Development*

SRC Systems Inc. Support Services, Manager 1995-1998

SRC Systems developed client/server database software systems for electric utility customers

- Conducted testing, debugging and quality control of client/server software
- Technical writer of user guides, electronic help files, training and marketing materials
- Involved in the conceptual interface design of developing software
- Provided support services, such as software training and telephone technical support

Synergic Resources Corporation Senior Engineer, Manager 1985-1995

Energy Engineering/Economic Analysis

- Conducted studies/projects on technical assessment, end-use load shape development, and cost benefit analysis for hundreds of utilities worldwide, as well as private companies, and government agencies
- Developed residential, commercial, and industrial technology and cost data bases
- Developed prototypical buildings for computer modeling from surveys and audit data
- Simulated energy use in residential and commercial buildings using computer models
- Assessed technical impacts and incremental costs for technology alternatives

Computer Modeling

- Proficient in using several commercially available building energy simulation models, such as PowerDOE, eQuest, DOE2, MicroAXCESS and Market Manager; some experience with BLAST; recent experience with Energy-10
- Developed several energy estimation/simulation models for load shape analysis
- Developed hourly weather data for energy simulation models
- Proficient with benefit/cost analysis models such as COMPASS; worked with DSManager; developed and worked with several economic spreadsheet models

Environmental Health Research & Testing	Software Consultant	1985
New Jersey Institute of Technology	TA and Researcher	1983-1984
Solar Alternatives, Inc.	Solar Energy Consultant	1979-1980
Stockton State College Solar Energy Facility	Instructor/Researcher	1978-1979

EDUCATION:

M.S., Mechanical Engineering, New Jersey Institute of Technology, Newark, NJ, 1984
 B.S., Physics, Stockton State College, Pomona, NJ; 1977

2005-present GEOFF SHUEY BUILDER/FULL CIRCLE ENERGY COOP, INC

Santa Cruz, California

Contract engineering and design engineering for residential and commercial PV projects, including backlog EcoEnergies projects following absorption by REC Solar in October, 2005.

1999-2005 ECOENERGIES Sunnyvale, California

Senior Applications Engineer for manufacturer/installer of concentrating and flat plate PV systems serving Sacramento Utility District, Arizona Public Service, Sunline Transportation Company, California Energy Commission, others. Over 300 residential and commercial PV and wind power projects comprising almost 2 MWp designed and installed.

Design and install grid interactive PV systems from 2 kW to 300 kW. Produce IntelliCad drawings for O&M manuals, county permits, subcontractor construction. Engage and oversee electrical subcontractors as member of PV system installation team. Ensure code compliance of design and construction. Write O&M manuals.

Specify and procure vendor equipment from Xantrex, Trojan Battery, SMA America, Outback Power, Beacon Power, Fronius, Blue Sky Energy, Solar Converters, many others, including all major PV module manufacturers.

1996-1997 UTILITY POWER GROUP Chatsworth, California

Assistant Project Manager on 400 kW/5MWh PV/battery installation for US Army in Yuma, Arizona, with 12.5 kV system inertia.

Coordinate US Army Corps of Engineers submittals re project schedule, equipment specifications, code compliance. Procure construction materials. Write O&M manual. Oversee and coordinate subcontractor activities in frame erection, PV installation, electrical construction, system control.

1984-1995 SOLAREX THIN FILM DIVISION Newtown, Pennsylvania

Senior Engineer at a:Si PV module manufacturing plant.

Process Engineering. Process development of thermal processes, one-sun simulation, electrical burn-in. Write process specs. Evaluate, specify and procure vendor equipment from Glenro, Spire, others. Design, procure, build and program test equipment as member of CIM-line team.

Product Engineering. Product testing for shadowing, mismatch, reliability. Design, procure, build and program automated outdoor test equipment. Develop novel PV module roof-mounting concept (now in use by Power Light, Berkely, California).

Systems Engineering. Design and installation of all or parts of PV systems from 50 W to 40 kW using equipment from Omnion Power, Campbell Scientific,

Specialty Concepts, others. Interface with Philadelphia Electric and Ascension Technology to install and collect research data from grid-interactive PV/battery system. Coordinate trade school student participation in installation of 5-kW PV system on Philadelphia Public Schools property.

1982-1984 **BATELLE MEMORIAL INSTITUTE** Columbus, Ohio
Researcher in aerosol experiments and nuclear reactor accident simulations for NRC contracts.

1980-1982 **TEXAS INSTRUMENTS** Lubbock, Texas
Process Engineer in manufacture of 64k DRAM memories.

Registration Professional Electrical Engineer, State of California, E15537. NABCEP certified, charter class.

Skills AutoCad/IntelliCad, Campbell Scientific PC208, PV DesignPro

Education BS Physics, with honors, Angelo State University, San Angelo, TX, 1980.
MS Electrical Engineering, Ohio State University, Columbus, OH, 1984.

Military US Army, 1975 to 1978. Honorable Discharge. Top Secret Clearance. ASA Arabic linguist.

Communications, Lobbying, Public Participation and Adult Education Consultant for Sustainable Futures

Award

Recipient: 50 Best Women in Business for 2006 Award –May 2006

Client List & Activities 2004-06

- *Advanced Solar Products –Initiated negotiations on solar project development on Native Lands in Kauai, Hawaii (2006)*
- *Department of the Navy, U.S. – Public relations/education and contributing writer on renewable energy and energy efficiency for Naval Energy Managers (2003-2005)*
- *PV NOW- Advanced Energy Portfolio Standard and solar lobbyist/strategist (2004-Current)*
- *Sustainable Energy Fund of Southeastern Pennsylvania – Education Grant Program Coordinator - \$2.5 million over 5 years(2002-Current)*
- *Sustainable Development Fund Solar Photovoltaic Grant Program- Developing and overseeing surveying and marketing (Current)*
- *Carlisle Health Wellness Center – Facilitator of Grant Task Force to fulfill a \$700,000 estate behest to serve health care needs in Perry County, Pa. (2004-05)*

2002-2003 Contracts

- *Energy Association of Pennsylvania- Researched and authored the Low Income Usage Reduction Research Project Report*
- *Affordable Comfort Conference –Conference planning and special projects for the largest home energy efficiency conference in the United States*

Previous Job History

***Pennsylvania Public Utility Commission, Community Relations Liaison
May 1988 to August 2002- Chief, Consumer Education PUC***

- *Managed the Commission’s \$55 million dollar grassroots consumer education program on electric choice. Chaired the public relations/media/education restructuring oversight board comprised of heads of state government agencies and the electric association.*
- *Developed extensive community leadership outreach programs and statewide “train the trainers” programs on all regulated utility issues.*
- *Developed policy statements and drafted rules on education and consumer protection issues, chief author of all reports and publications on utility education matters including Pennsylvania’s first plain language utility communications policy, utility restructuring, and public participation.*
- *Chaired the Commission’s electric and gas education policy and restructuring working groups.*
- *Advisory staff to the Commissioners for the renewable and sustainable development funds.*
- *One of the authors of the \$2.5 million utility renewable energy pilot rules*

- Creator, contributing editor of the Commission's community focused newsletter.

Maureen A. Mulligan

Page 2 of 2

- Member, Quality Task Force set up to recommend operational improvements within the Commission.

Team Member

- Key team member of the award-winning electric choice education program. *Rated #1 in the United States by USA Today.*
- Key team member responsible for setting up the Commission's not-for-profit organization to educate on electric, gas, and telecommunications issues.

Telecommunications Education Fund, Board of Directors

July 1991 - December 1999

Commission appointee to the Board of Directors for the not-for-profit education fund with grants totaling \$6.5 million dollars. Served as Chairwoman for first three formative years.

Education

University of Pennsylvania, Masters Government Administration,

Fels Leadership Scholar, MGA 1989

Pennsylvania State University, B.S. Education 1974

Professional Development Programs

Pennsylvania State University – Management Development for Supervisors –1995

Duke University – Governor's School for Excellence 1990 – Certification of Completion

National Association of Regulatory Utility Commissioners Regulatory Studies - 1988 Program Participant

Other Projects and Achievements

- *The Energy Cooperative, Philadelphia, Pa., a non-profit energy buyers cooperative – Board Member – 2004-06*
- *Alternative Fuels Renewable Energies Council Voting Member-Business to Government Advocacy Organization for Pennsylvania – 2003-04*
- *Energy Coordinating Agency, Philadelphia, Pa –A non-profit energy assistance and service organization- Board Member 2003-05, Chairwoman, Board of Directors 2005-06*
- *Philadelphia Electric Companies' Low Income Usage Reduction Advisory Board-2003-04*
- *Northeast Governor's Consumer Education Committee on Electric Choice 1998-1999*
- *Commissioner Nora Mead Brownell's representative on National Association of Regulatory Utility Commissioners (NARUC) Committee on Consumer Affairs - 1998*
- *NARUC Staff Sub-Committee on Education - 1998*
- *National Low Income Energy Conference Planning Committee - 1998*

- *Who's Who of International Women – 1998*
- *Affordable Comfort Conference Planning Committee – 1990 to 2003*

Education

MBA, Business Administration, Eastern College, 2000
BS, Electrical Engineering Technology, Penn State University, 1991
AS, Electrical Engineering Technology, Penn State University, 1988

Professional Affiliations

PJM Members Committee
PJM Market Implementation Committee
PJM Demand Side Response Working Group
MADRI Business Case Subgroup
Association of Energy Engineers
Institute of Electrical and Electronics Engineers Power Society
Institute of Electrical and Electronics Engineers Computer Society

Certifications

National Institute for Certification in Engineering Technologies (NICET), Associate Engineering Technologist
in Electrical Engineering Technology

Advanced Technical Training

Fundamentals of Energy/Electricity Forward Markets, Futures, Options & Derivatives
Power Systems Analysis, Drexel University
Power Systems Analysis, Penn State University
Protective Relaying Design & Application, Georgia Tech
Supervisory Control and Data Acquisition, British Columbia, Canada
IEEE Adjustable Speed Drives, University of Pennsylvania
Westinghouse Relays & Controls, Pittsburgh, Pennsylvania
Doble Power Factor and Watts Loss
Construction Safety Training, Delaware Technical Institute

Experience Summary

Mr. Ellis offers over 17 years experience in software and technology development and energy information, operations, and network management in the engineering, communications, and software service industries. Current responsibilities include corporate business development and product management initiatives including Federal, State and Regional regulatory focused products and services specifically related to energy, emissions, and renewable resources. Coordination of team (attorneys and internal personnel) in response to federal and state orders, develop and submit technology concepts for implementation, research and maintain competitive market information, and patent filings in the US, Canada, and Europe.

Project Summary

- Developed and implemented the Enerwise renewable energy credit tracking platform
- Implementation and oversight of existing Enerwise Demand Response products and services
- Developed and implemented several web-based applications for use by large national commercial and industrial customers.

- ❑ Managed supervisory control and data acquisition (SCADA) and web development teams. Designed, implemented, and managed Information Command Center through which all remote meter-related activity is monitored and managed for over 100 Fortune 500 companies.
- ❑ Issued four software applications and processes to the office of US Patents for review.
- ❑ Managed relationship of strategic alliances with key hardware and software manufacturers.

- ❑ Provided financial and technical project management and implementation of power system engineering studies for universities, pharmaceutical manufacturing companies, hospitals, and other large manufacturing facilities. Developed communications and network system designs.
- ❑ Conducted engineering studies and contingency analyses. Managed power system studies and engineering team. Provided technical support to sales team. Coordinated activities closely with field engineering team, electricians, and software implementation teams to meet customer requirements. Analyzed results and developed and presented technical reports.
- ❑ Established and hosted in-house technical training courses for customers and internal engineering personnel.
- ❑ Conducted power distribution system load flow and contingency studies. Implemented power factor correction studies. Provided system optimization and power system design review and developed protective device specifications.
- ❑ Provided field-testing and maintenance of high and low voltage power distribution system equipment (i.e., protective relay and circuit breaker testing and calibration). Developed testing and maintenance plans and managed electrical system outages at large commercial, industrial, and institutional facilities.
- ❑ Designed and implemented radio frequency, telephone modem, simplex, full, and half duplex communications systems.
- ❑ Developed, implemented, and administered local area networks (LANs) for integration with SCADA systems.
- ❑ Reviewed and modified technical drawings. Tested generator sets in land-based test facility. Conducted vibration analysis of instrumentation transducers.

Work History

- | | |
|----------------|---|
| 2005 – Present | Vice President, Business Development, Enerwise Global Technologies, Inc., Kennett Square, Pennsylvania |
| 2004 - 2005 | Vice President, Technology; Enerwise Global Technologies, Inc., Kennett Square, Pennsylvania |
| 2001 - 2004 | Director, Technology & Business Development; Enerwise Global Technologies, Inc., Kennett Square, Pennsylvania |
| 1997 - 2001 | EM&C Applications Manager, Project Engineer; Conectiv Solutions LLC, Kennett Square, Pennsylvania |
| 1991 - 1997 | Project Manager, Field Engineer; Multi-Test Maintenance Corporation, Kennett Square, Pennsylvania |
| 1987 - 1989 | Engineering Assistant, Naval Ship Systems Engineering Station, Philadelphia, Pennsylvania |

Education

BS, Mechanical Engineering, Widener University, 1989

Professional Affiliations

American Society of Heating, Refrigeration, and Air-conditioning Engineers (ASHRAE)

Association of Energy Engineers (AEE)

Tau Beta Pi (national engineering honor society)

Experience Summary

Mr. Berkebile offers over fourteen years of experience in mechanical engineering, including six years of facility utility and maintenance engineering. His experience also includes process engineering with specialized training in American Society of Mechanical Engineering (ASME) code design and process upset overpressure protection design. Areas of expertise include heating, ventilation, air-conditioning, and refrigeration (HVAC/R), project management, utility infrastructure design, maintenance, and management. Mr. Berkebile also offers experience in indoor air quality investigation and remediation, and preventive predictive maintenance. As a mechanical project engineer, Mr. Berkebile is currently responsible for managing large mechanical and energy efficiency construction projects, including scheduling, budgeting, and construction management.

Project Summary

- ❑ Led utility infrastructure design of new Nomex[®] paper-making facility in Asturias, Spain, for large international chemical manufacturer. Gross project value was \$300 million, while the utility gross project worth was \$45 million.
- ❑ Served as lead mechanical energy engineer for manufacturer's film department (Mylar[®], Kapton[®])
- ❑ Engineered and specified HVAC/R equipment (e.g., air-handling units, pressure-reduction stations, coils, blowers, motors).
- ❑ Engineered and specified pressurized equipment for overpressure protection relief device systems (e.g., pressure relief valves, rupture discs, blow-out panels, flame arrestors). Engineered and specified piping systems (e.g., pipe, valves, regulators, control valves).
- ❑ Reviewed and approved engineering designs developed by engineers, designers, and draftsmen.
- ❑ Provided maintenance engineering support for laboratory, process, and office facilities.
- ❑ Identified and corrected design, installation, and maintenance deficiencies. Managed cost and capital improvement projects ranging in dollar value from \$2,000 to \$4 million.
- ❑ Led and managed 14 engineers, designers, draftsman and inspectors for a pressurized systems design, inspection and maintenance team from 1989 through 1992.
- ❑ Identified and implemented cost reduction initiatives by applying continuous improvement, process mapping, and benchmarking. Efforts resulted in yearly fixed cost savings of \$600,000 and 75 percent reduction of fixed cost for program administration.
- ❑ Served as department's computer system engineer and technical resource.
- ❑ Identified, specified, led, and managed implementation of department's Local Area Network (LAN).
- ❑ Responsible for specification and installation of maintenance hardware and software systems to support various preventive and predictive maintenance programs (e.g., vibration analysis, steam trap maintenance, bar coding for inventory tracking systems, computer-aided manufacturing).

- As adjunct faculty instructor, instructed engineering students on basic fundamentals of mechanical engineering statistics at Delaware Technical Community College in Stanton, Delaware, from September 1995 through December 1995.

Work History

- 2001 - Present Senior Mechanical Engineer, Enerwise Global Technologies, Kennett Square, Pennsylvania
- 1998 - 2001 Mechanical Project Engineer, Conectiv Solutions, Kennett Square, Pennsylvania
- 1997 - 1998 Area Engineer, Energy Engineering—Corporate Engineering, E. I. du Pont de Nemours and Company, Wilmington, Delaware
- 1992 - 1997 Facility Engineer, DuPont Facility Services, DuPont Experimental Station, E. I. du Pont de Nemours and Company, Wilmington, Delaware
- 1989 - 1992 Design Engineer, Corporate Research and Development—Pressurized Systems Engineering and Inspection, DuPont Experimental Station, E. I. du Pont de Nemours and Company, Wilmington, Delaware

Education

BS, Electrical Engineering with Mathematics Minor, Villanova University, 1987

Experience Summary

Ms. Samulewicz offers over 17 years experience in the utility field and competitive markets, specializing in program coordination, project management, and engineering for electrical design and construction projects. She is presently responsible for internal coordination of demand response activities for Enerwise Global Technologies personnel and subcontractors. Her past responsibilities have ranged from installing new electrical services to researching electrical capacity, power quality, and reliability problems for commercial and industrial customers.

Project Summary

- ❑ Managed electrical, gas, mechanical, telecommunications, and production projects from the development of scope and estimates through construction completion for small, medium, and large commercial and industrial customers. Significant accomplishments include the engineering and project management of two load forecast capacity studies for different municipalities and the proposal development of two, multi-million dollar (\$2.5 million to \$7.0 million) design/build substation and distribution improvement projects.
- ❑ Coordinated the overall development of an electrical substations and distribution system, including the preparation of the load forecast, emergency firming analysis, ten-year planning study, and the distribution loss study for the Federal Energy Regulatory Commission (FERC). Conducted process mapping of load forecast and firming analysis processes to streamline activities and efficiently manage time for the entire team.
- ❑ As an area engineer, supervised the engineering and coordinated the installation of new electrical service to all residential, commercial, and industrial customers in Ocean City, Maryland. This assignment involved the turnkey management and coordination of engineers, architects, land owners/developers, electricians, electrical contractors, municipal officials, inspectors, utility construction crews, and customers. Significant accomplishments included the design, engineering, and scheduling of an overhead to underground electrical conversion of eight blocks in downtown Ocean City. Construction of this \$500,000 project was completed under budget and on time and involved coordination of work with other sewer, water, telephone, cable TV, and roadway improvements.
- ❑ As an engineer, responsibilities included the design of an electric distribution system, supervision of the capital distribution improvement projects, development and tracking of the reliability statistics for the entire electrical system of circuits, maintenance of the computerized circuit models, coordination of system protection and capacitor applications, and preparation of capital budgets.

Safety Experience Summary

- 1998 - Present Chairperson of Kennett Square office SAC, which developed fire evacuation plan for new building; subcontractor safety policies and procedures, orientation form, and audit form; confined-space entry policy and training class; control of hazardous energy (lockout/tagout policy and procedures). SAC also provided 1999 OSHA Construction Site Safety; Fire Extinguisher and Fire Blanket Safety; Personal Protective Equipment; Hazardous Communications; and First Aid/CPR safety training to all employees in Kennett Square.
- 1994 - 1998 Held various SAC positions across Delmarva Power / Conectiv.

- 1992 - 1993 Special assignment in Corporate Safety Department implementing employee Safety Action Committees (SACs) across the company (over 60 committees). Included development of training course for SAC leaders and supervisors. Spoke publicly at team meetings to provide necessary information to employees regarding SAC implementation. Spoke at annual corporatewide meeting about SAC activities. Helped to develop and implement corporate subcontractor safety policies and procedures, monthly employee safety publication, and safety awareness campaign.
- 1988 - 1992 Held various local Health and Safety Steering Committee positions

Work History

- 2001 - Present Technical Services Engineer, Enerwise Global Technologies, Kennett Square, PA
- 1996 - 2001 Manager—Construction Management, Conectiv Solutions, Kennett Square, PA
- 1994 - 1996 Distribution Planner and Team Leader, System Planning, Delmarva Power, Newark, DE
- 1992 - 1993 Safety Action Committee Project Coordinator, Safety Department, Delmarva Power, Wilmington, DE
- 1991 - 1992 Area Engineer and Team Leader, Customer Engineering, Delmarva Power, Ocean City, MD
- 1989 - 1991 Project Engineer and Team Leader, Distribution Engineering, Delmarva Power, Salisbury, MD
- 1988 - 1989 Distribution Engineer, Distribution Engineering, Delmarva Power, Salisbury, MD
- 1987 - 1988 Product Assurance Administrator, AT&T Bell Laboratories, Allentown, PA

Education

MBA, Business Administration, Washington University, 1978
BA, Economics, Davidson College, 1976

Professional Affiliations

Association of Energy Engineers
Automatic Meter Reading Association (AMRA)

Certifications

Certified Energy Manager (8479)
Certified Energy Procurement Professional (790)

Advanced Technical Training

Three-phase Power System Basics, 2002
Fundamentals of Buying and Selling Energy, 2001
Comprehensive Energy Manager's Training Program, 2000
Principles of Public Utilities Operation and Management, 1996

Experience Summary

Mr. Swalwell offers 24 years of business experience in the energy and chemical industries, particularly related to evaluating, developing, and implementing business strategies and related projects. His expertise includes development of energy efficiency and energy information projects for universities, health care institutions, financial businesses, and insurance companies. As an account manager, Mr. Swalwell serves as the primary point of contact for major customers, ensuring efficient day-to-day operations and customer satisfaction.

Project Summary

- ❑ Managed post-sale implementation process for one of Enerwise's larger energy service provider partners. Implemented meter provisioning program for 100 customers with 400 locations across the United States using both utility meters and Enerwise-installed field devices. Integrated customers into Enerwise's web-based energy information system (EIS).
- ❑ Managed post sale implementation process for Canadian utility partner in Québec, including first foreign language release of Enerwise EIS platform.
- ❑ Led implementation of business intelligence and on-line analytical processing platform to automate screening process of customer interval meter data. Platform rapidly highlights anomalies, inefficiencies, and unusual energy consumption patterns while producing standard analytical reports and profiles.
- ❑ Co-led development of unique metering and energy information system for 50 building, 2.5-million-square-foot college campus in New Jersey. In addition to real-time and historical energy consumption information, system provides real-time, automated load shedding to customer-specified demand level, resulting in cost savings averaging approximately \$200,000 per year.
- ❑ Designed and implemented energy reporting system for large financial institution. The system analyzes and ranks their 13 United States sites using a variety of energy use and cost indexes.
- ❑ Developed tariff rate models for multiple electricity and natural gas distribution companies. Models validate customer utility bills and highlight beneficial rate class changes.

- Developed \$750,000 energy efficiency project for New Jersey community college using unique application of ground-coupled heat pump technology. Financed via resulting energy savings, project renewed college's infrastructure.

Work History

2001 - Present Account Manager, Energy Specialist; Enerwise Global Technologies, Inc., Kennett Square, Pennsylvania

1996 - 2001 Market Manager; Conectiv Solutions LLC, Kennett Square, Pennsylvania

1993 - 1996 President; Renaissance Consulting, Hockessin, Delaware

1978 - 1993 Training & Sales Development Manager, Customer Service Manager, International Sales Development Manager, Senior Financial/market Specialist, Division Supervisor, Senior Programmer, Programmer; E. I. du Pont de Nemours and Company, Wilmington, Delaware

Jan Harris is a member of the Planning and Evaluation division at VEIC. His work includes wide-ranging projects in energy efficiency, renewable energy, and green building. Jan is a seasoned building professional with more than 10 years of experience in construction management, real estate development, and hands-on implementation of energy efficiency and renewable energy technologies. Jan currently serves as the vice president of the board of the Vermont Green Building Network and as a commissioner for the Burlington Electric Commission.

PROFESSIONAL EXPERIENCE

December 2004 – Present

Project Manager, Vermont Energy Investment Corporation, Burlington, VT

Manages program design and evaluation of energy efficiency, renewable energy, and green building programs and projects throughout the US, including:

- Studies determining cost-effective energy efficiency potential in New Brunswick and New York
- Managed a study of fuel cell technology for the Clean Energy States Alliance
- Managed a study of heat pump water heaters for the National Resource Defense Council
- Managed a study of oil furnace technology for the US Environmental Protection Agency
- Managed evaluation of Cape Light Compact Green Building Pilot Program
- Managed a study of the costs and benefits of green school construction for the Massachusetts Technology Collaborative
- Developed a business plan for an Energy Services Company in Nanjing, China

2003-2004

Consultant, Commons Capital, Venture Capital for a Sustainable Future, Boston, MA

Perform industry and market analysis and source deals for fund in renewable energy, green building, and environmental technologies/products space. Provide evaluation of competitive landscape, technology assessment, business plan review and due diligence on potential investment opportunities. Create investment recommendations for management, investment advisory committee and limited partners.

2001-2002/1994–1998

President, Envisage Builders, Cambridge, Massachusetts/Telluride, CO

Managed construction and development projects. Responsibilities included planning, design, permitting, finance, and construction management. Integrated green building principals at every opportunity. All development projects produced after tax return on equity > 20% annualized.

2000-2001

Project Manager, Adam Construction, Needham, MA

Managed construction of multiple residential and light commercial projects simultaneously, with combined budgets of over \$6 million. Managed client and architect relationships and all contracting. Convened weekly job meetings, created job schedules, and tracked project costs and timelines to insure on time, on budget completion.

1998– 1999

Superintendent / Project Manager, Ludford Construction, Norwood, CO

Directed construction of several large residential and light commercial projects with budgets greater than \$1 million.

EDUCATION

MBA, Boston University Graduate School of Management, Boston, MA 2002-2004
 International Management Program, Shanghai, China, Summer 2002
 Recipient Deans Award Scholarship,
 President, Public and Nonprofit Club

The Evergreen State College, Olympia, Washington 1985-1988
 BS Physics/Energy Systems

Semester in Nepal through School for International Training, Brattleboro, VT 1986
 Additional postgraduate coursework in Small Business Management, Grant Writing, Nonprofit Management, Real Estate Investment Analysis, Real Estate Development Process

ADDITIONAL PROFESSIONAL EXPERIENCE

1997-2002

Founding Board Member, New Enchantment Assoc. for the Preservation of Nature, Santa Fe, NM
 Created new US based organization for rainforest preservation in cooperation with a Brazilian based NGO. Established mission, goals and objectives, articles of incorporation, obtained 501(c)(3) status, state incorporation and recognition as a legal entity. Identified, funded and successfully completed a land preservation project at the Sarare Aboriginal Reserve in the Brazilian state of Mato Grosso in cooperation with FUNAI and our Brazilian NGO partner.

1990-1993

Executive Director, Energy Outreach Center, Olympia WA

Managed office and staff of six and numerous volunteers and student interns at a nonprofit energy conservation office. Significantly increased visibility, awareness and effectiveness through new program development in education of renewables, conservation and transportation. Diversified funding sources through procurement of the organizations first grant from a private foundation. Personal recognition for innovative program implementation by then Governor Booth Gardner. More than doubled revenue and staff over a two year period, and reached five times more people than ever before.

1992

Founding Member, Olympia Sustainable City Roundtable, Olympia WA

Consortia of local Government, business and nonprofit organizations who created a program to recognize and promote local sustainable businesses.

1992-1994

Leader/Organizer, Tri Peak '93 (In association with the American Alpine Club, NY, NY)

Organized and led a three man unsupported team to the summits of three of the worlds tallest Himalayan peaks, including Mt. Everest. Became the second person in history to successfully climb three 8000m

(27,000'+) peaks within one year. Negotiated with several volatile governments, developed promotional materials, obtained corporate sponsorships and in kind contributions from numerous sources.

PROFESSIONAL EXPERIENCE

1998 – Present

Senior Project Manager, Vermont Energy Investment Corporation, Burlington, VT

Responsible for the management of consulting projects involving the design, delivery, and evaluation of energy efficiency and renewable energy measures, programs, and policies. Recent and current major project activities include:

- Northeast Energy Efficiency Partnerships (NEEP): Dr. Hill led a team conducting a quantitative analysis of the achievable potential for current and enhanced energy efficiency initiatives in the Northeast region in the 2009 to 2014 time frame. This work was a strategic regional level analysis that was used as the basis for recommendations to NEEP's Strategic Initiative Review Committee on future directions and priorities
- New York State Energy Research Development Authority (NYSERDA): Dr. Hill served as the renewable team project manager for a comprehensive technical and achievable potential assessment of renewable and energy efficiency technologies for New York. The renewable energy analyses include the estimation of the full economic costs and benefits for eight renewable energy resources and over twenty specific technologies under four planning scenarios. He presented results from this study at the 2004 ACEEE Summer Study
- Massachusetts Technology Collaborative (MTC): Dr. Hill is leading a team, comprised of staff from VEIC, Optimal Energy Inc., and the Natural Resources Defense Council, on a project to assist the MTC and Renewable Energy Trust develop a framework for case studies of the renewable and green building projects. The project team is providing expert assistance and recommendations on case study content, marketing channels, format and materials designed to meet the priority needs of specific target audiences
- Natural Resource Defense Council– New Jersey Utilities Collaborative: Dr. Hill was a leading designer, and served as the collaborative advisor, for the statewide renewable energy, and residential retrofits programs adopted by the New Jersey Board of Public Utilities. Specific duties include multi-year program planning, budgeting, establishment of performance metrics, the development and execution of marketing strategies, the supervision and conduct of technical and economic screening analyses, and the development and management of multi-year evaluation plans
- Long Island Power Authority Clean Energy Plan: Dr. Hill manages the VEIC team working with LIPA to provide program design and implementation assistance for residential efficiency and solar programs in the Clean Energy Initiative, including the Solar Pioneers Program, Residential Energy Affordability Program, and the Residential Lighting and Appliance Program
- Vermont's Million Solar Roofs Partnership: Dr. Hill directs the Renewable Energy Resource Center, which provides marketing and analytic support for consumers and the renewable energy industry in Vermont. The RERC has recently been selected by the State of Vermont Department of Public Service to design and administer Vermont's Solar and Small Wind Incentive Program starting in October, 2004. Dr. Hill also managed a Solar Hot Water Market Development grant conducted for the Department of Energy, and has assisted two Vermont utilities with the design and implementation of pilot programs offering direct financial incentives for solar hot water and photovoltaic systems
- Alliance for Climate Action: Dr. Hill was the lead author for Burlington's Climate Protection Action Plan and is an ongoing consultant for the newly formed Alliance for Climate Action. His current

activities include serving as a Board member for the Alliance, and leading the development of the Ten Percent Challenge Campaign's calculator tools, and monitoring and reporting system. The Ten

David G. Hill

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Percent Challenge is increasingly being recognized at the regional and national level as a leading example of local climate initiatives

1993 – 1998

Research Associate, Tellus Institute, Boston, MA

Responsible for program design and marketing assessment and monitoring and evaluation of residential, commercial, and industrial energy efficiency activities. Dr. Hill was contributed to dozens of projects for domestic and international clients, including work in Asia, Africa and South America.

EDUCATION

PhD, University of Pennsylvania	1993
Energy Management and Policy Planning	
MA, University of Pennsylvania	1989
Appropriate Technology and International Development	
BA, Middlebury College	1986
Geography and Political Science	

ADDITIONAL INFORMATION

- Charlotte Central School Board elected school board member (2003 – present)
- Renewable Energy Vermont, founding board member, and current board chair for renewable industry trade association in Vermont (2000 – present)
- Alliance for Climate Action, founding board member (1999 – present)
- American Solar Energy Society, non-Board volunteer member of ASES policy committee (2004-present)
- Fulbright Scholar; conducted dissertation research on energy decision making in rural Nepal (1991-1993)
- US Peace Corps volunteer, Sierra Leone (1984-1986)

SELECTED RECENT PUBLICATIONS, PRESENTATIONS, AND REPORTS

- | | |
|------|---|
| 2005 | “Market Response to Photovoltaic Incentive Offerings: An Analysis of Trends and Indicators” International Solar Energy Society Solar World Congress 2005, Orlando, Florida August 11, 2005. |
| 2005 | Testimony to the Ontario Energy Board on Hydro One Networks and Brampton Conservation and Demand Management Plans. February 17-18, 2005. |
| 2005 | Testimony to the Vermont State Legislature House Committee on Energy and Natural Resources on Vermont's Solar and Small Wind Incentive Program. February 9, 2005. |
| 2004 | “Cost Effective Contributions to New York's Greenhouse Gas Reduction Targets from Energy Efficiency and Renewable Energy Resources”, <u>Proceedings of ACEEE 2004 Summer Study Conference on Energy Efficiency in Buildings</u> , Volume 8, (with John Plunkett, Lawrence J. Pakenas, R. Neal Elliot, Christine Donovan, Phil Mosenthal, and Chris Neme). |

2003 “Solar Energy Value and Opportunities in Vermont”, Invited Session Panel Moderator and Speaker, 2nd Annual Power for a New Economy Conference, Burlington, Vermont, October 8, 2003. Renewable Energy Vermont.

PROFESSIONAL EXPERIENCE

2000 – Present

Senior Analyst, Vermont Energy Investment Corporation, Burlington, VT

Manages budgeting process for \$50 million Efficiency Vermont contract by facilitating the development of forecasts and monitoring strategic objectives. Provides feedback and decision-making support to all levels of Efficiency Vermont management. Monitors Efficiency Vermont progress toward 3-year contractual goals. Prepares detailed cost versus budget variance reports for market managers and directors. Participates in financial planning and data analysis to evaluate resource allocation. Prepares monthly cost and forecast reports for market managers; provides guidance to managers on financial consequences of budget decisions; assists in the preparation of annual report and annual plan to the Vermont Public Service Board. Developed feasibility analysis to determine cost effectiveness of fuel-switch measures. Manages the Efficiency Vermont Technical Reference Manual and performs research and develops characterizations of energy efficient measures.

1997 – 1999

Senior Financial Analyst, IDX Systems Corporation, Burlington, VT

Designed and monitored financial analysis tools used to forecast multi-year product sales and earnings. Created comprehensive revenue model to analyze trends and for use as a planning and decision-making tool. Developed extensive cost/benefit analyses to address need for restructuring. Member of Pricing Team, which conducted market research and performed rigorous analysis to determine pricing criteria for different product lines. Provided Pricing Team with reliable data necessary to present convincing arguments regarding pricing policy changes. Participated in IDX Leadership Academy, designed to prepare future leaders of the organization.

1994 – 1997

Derivatives Trader, First National Bank of Chicago, Chicago, IL

Provided pricing to customers and liquidity to the market in the interest-rate options market. Cultivated inter-bank trading relationships with other securities firms. Built analytical tools and devised hedging routines used on a daily basis by traders in the derivatives group. Developed hedging models to assist customers in managing interest-rate risk. Monitored successful implementation of risk-management practices, ensuring stability of the options portfolio in the face of market volatility and pricing fluctuations.

1993

Associate, Equity Research and Sales, UBS Securities, Inc., New York, NY

Assisted senior salesperson managing Canadian institutional investors. Called clients and provided market commentary. Assisted healthcare analyst in modeling financial forecasts and performing research on the healthcare market trends. Established relationships with colleagues in the research, sales, and trading groups.

1990 – 1992

Data Analyst, Rand McNally, Skokie, IL

Instrumental in the creation and enhancement of the computerized trip-planning model. Managed in-house trip service and supervised three employees. Provided data analysis for digital mapping projects

and the development of electronic routing systems for the Transportation Data Management team. Translated promotional materials and met French clients to discuss new product ideas.

EDUCATION

MBA, University of Chicago	1994
Finance and Statistics	
BA, University of Wisconsin	1989
Economics and Statistics	

PROFESSIONAL AFFILIATIONS

- Member, Vermont Security Analysts Society

CERTIFICATIONS

- National Association of Securities Dealers – Series 7 Certification
- North American Securities Administrators Association – Series 63 Certification

PROFESSIONAL EXPERIENCE

2005-Present

Senior Energy Analyst, Vermont Energy Investment Corporation, Burlington, VT

Analyst with VEIC's Planning and Evaluation group for program design and evaluation of energy efficient technologies and renewable energy systems. Specific duties include demand side management (DSM) program design, evaluating proposed energy efficiency and renewable measures for cost effectiveness, and working with clients as a program advisor on residential new construction, lighting and appliances, existing homes, demand response, and information and education programs. Representative projects include:

- Efficiency Vermont: Analyst for Efficiency Vermont, the nation's first statewide energy-efficiency utility. Provide DSM planning assistance to the Residential New Construction, Retail Lighting and Appliances and Existing Homes market strategy teams. Conduct special research and evaluation projects in support of DSM program design, measure savings, and market potential.
- Long Island Power Authority: Assisting with program design, research, evaluation, and incentives analysis for the ENERGY STAR Residential New Construction, Information and Education, and Demand Response Programs.
- Department of Energy, New Brunswick, Canada: Research and measure screening analysis for a 10-year DSM energy efficiency potential study for the Province of New Brunswick, Canada. Area of focus included Retail Lighting and Appliance options. Prepared a detailed Technical Reference Manual (TRM) custom for New Brunswick that presents energy and demand savings for efficient measures.
- Natural Resources Defense Council- New Jersey Utilities Collaborative: Co-author of an incentives analysis for ENERGY STAR Homes Program. Delivered to seven New Jersey electric and gas utilities facilitating the development of and rebate incentive levels for a uniform statewide new construction program.
- Renewable Energy Resource Center: Program design, consumer education, and implementation support for Vermont's Solar and Small Wind Incentive Program for solar electric, solar hot water, and small wind technologies. Program manager for VEIC's U.S. Department of Energy "Million Solar Roofs" grant agreement.
- Alliance for Climate Action-10% Challenge Program: Research analyst for greenhouse gas emissions inventory estimate for Burlington, VT.

2002-2005

Energy Analyst, Vermont Energy Investment Corporation, Burlington, VT

Evaluation and quantitative analysis of the measure savings and cost-effectiveness of energy efficient and renewable energy technology. Perform cost-effectiveness screenings for energy efficiency measures, research and write measure characterizations, present and negotiate technical issues with regulatory agencies. Primary author of Efficiency Vermont's Technical Reference Manual (TRM), that documents in

narrative form the energy and demand savings, freeridership, spillover, incremental costs, and lifetimes of the prescriptive measures implemented by the programs.

2000-2002

Economist, National Oceanic and Atmospheric Administration (NOAA), Damage Assessment Center, Silver Spring, MD. Natural resource economist / policy coordinator for damage assessment, economic analysis, and environmental restoration projects related to oil spills, boat groundings, and superfund contamination sites in the southeast United States.

1996-1998

Policy Coordinator, Conservation International. Conservation Policy Department. Washington, D.C. Assisted resource economists and policy specialists with project oversight and research related to United States Agency for International Development (USAID) funded forestry, tourism, and infrastructure studies to conserve biodiversity "hot spots" around the globe.

1995

Project Assistant, Chemonics International, Inc. Project in Development and the Environment (PRIDE). Washington, D.C. Assisted with the design and implementation of pollution prevention and community-based environmental projects for USAID projects in Central America and the Middle East.

EDUCATION

Master of Science, University of Florida Resource Economics	2000
Bachelor of Arts, Grinnell College Anthropology	1994
Semester Abroad, School for International Training, Quito, Ecuador Comparative Ecology	1991

SOFTWARE SKILLS

Access, REM/Rate

COMMITTEES

Residential Energy Services Network (RESNET) Technical Committee;
Consortium for Energy Efficiency (CEE)- Residential New Construction, Appliances, Gas, and Evaluation

CERTIFICATIONS

RESNET Accredited Certified Home Energy Rater (in process)

PUBLICATIONS AND REPORTS

Galvin, T. Faesy, R. Slote, S. Harrison, K. 2004. Residential New Construction Baseline Study Best Practices: Lessons Learned from Long Island, New York. Prepared for the American Council for an Energy Efficient Economy 2004 Summer Study Conference. Monterrey, CA. 16pp.

Faesy, R. Galvin, T. Hill, D, Kallock, B. Neme, C. Slote, S. 2004. Long Island Residential New Construction Baseline Study. Prepared for Long Island Power Authority. 164pp.

PROFESSIONAL EXPERIENCE

2004 – Present

Information Technology Manager, Vermont Energy Investment Corporation, Burlington, VT
Plans, organizes, and facilitates the work of VEIC's information technology (IT) team and its delivery of services to both internal and external customers. Responsibilities include supervision of a staff and subcontractors, coordinating the work of the team's project leaders, ensuring that the IT team effectively communicates with and successfully delivers high quality services to its customers, assisting team members with their professional development, and serving to promote IT's services to both internal and external customers.

1998 – 2004

Network Administrator, Vermont Energy Investment Corporation, Burlington, VT
Responsible for the administration of a 100+ seat mixed server network environment, software and hardware support for a windows XP Intel-based desktops and laptops, plus specifying and purchasing all hardware and software for VEIC's LAN and workstations. A sample of some specific projects include installing and configuring Citrix Metaframe XPe, Novell Zenworks for Desktops 4, and Microsoft Office XP. Oversaw the transition to a fully gig capable network backbone, installing a company-wide AntiSpam and AntiVirus solution, and the introductions of T1 level internet service. Developed a custom application designed using VBA, Microsoft Excel, and Microsoft Access, which created a real-time link between VEIC's financial accounting system and its time-management systems. Provided employee training on a variety of Microsoft, Novell, and custom-developed applications. Developed project-specific Microsoft Access databases. Oversaw VEIC's network consultants.

1997 – 1998

Customer Service Representative, Kea Technologies, Williston, VT
Provided support services software and hardware distribution for a variety of small and mid-sized corporations. Responsibilities included customer service and sales, employee training, and handling returned merchandise and corporate purchase-order fulfillment.

EDUCATION

BA, University of Vermont	1995
Religion and Psychology	
Software Development Management, Costrux Software	2005

COMPUTER SKILLS

- Novell Netware, Groupwise, and Zenworks for Desktops Administration
- Citrix Metaframe XPe
- Firewall Configuration
- DNS/DHCP, TCP/IP
- Veritas Backup Exec
- Anti-Spam, AntiVirus, Advanced MS Office
- Crystal Reports
- Data Structures for MAS 90
- Visual Integrator for MAS 90 (ODBC export import tool for financial accounting system)
- Advanced PC troubleshooting and repair
- Experience with Microsoft Windows 9x troubleshooting
- Microsoft Visual Basic for Applications programming
- Lotus 123
- NetWare Troubleshooting

Mr. Mosenthal has 23 years experience in energy efficiency consulting, including facility energy management, utility and state planning, program design, implementation, evaluation and research. He has particular expertise in the commercial, industrial and institutional sectors.

PROFESSIONAL EXPERIENCE

1996 – present

Founding Partner, Optimal Energy, Inc., Bristol, VT.

Consult with electric and gas utilities, governments and other non-utility parties on energy efficiency, resource planning and regulatory issues. Develop strategies for achieving energy efficiency and least-cost resources, including administrator funding and incentive mechanisms, and program and market design and analysis. Projects include lead work on utility DSM collaboratives; development of utility, state and regional IRP and DSM filings; expert testimony in contested regulatory proceedings; program design, implementation, planning, monitoring and evaluation; energy efficiency resource assessment; and advisory roles on the development of energy policy. Current or recent projects include: Manager of electric and natural gas efficiency and renewable potential assessments for New York State Energy Research and Development Authority; Lead advisor on C&I planning and program design for Efficiency Vermont, the nation's first and only state efficiency utility; Advising two provincial governments in China on development of efficiency efforts that would serve as a model for long term national efforts; and Team Leader for Commercial and Industrial sectors in the NSTAR Collaborative.

1995 – 1996

Senior Research Associate, Resource Insight, Inc., Middlebury, VT.

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

1990 – 1995

Chief Consultant, Xenergy, Inc. (now Kema), Allendale, NJ.

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

1990

Research Associate, Center for Energy and the Environment, University of Pennsylvania, Philadelphia, PA.

Supported design and analysis of a performance-based hook-up fee program for the New York Power Pool. Activities included modeling building energy use and peak loads; identifying

residential and commercial new construction baseline practices; identifying barriers to efficiency in residential, commercial and industrial new construction and analyzing the economic, energy efficiency and legal impacts of the potential program.

1989

Independent Researcher, Natural Resources Defense Council, New York, NY.

Developed report on potential incentives for commercial energy efficiency improvements in New York City. Analyzed technical lighting efficiency potential in New York City commercial buildings; identified existing regulatory, institutional and market barriers to improved efficiency; and proposed potential regulatory, legislative and market incentives at the state, city and utility levels to encourage increased efficiency.

1988 – 1990

Private Consultant, Philadelphia, PA.

Clients included non-profit, governmental and private entities. Performed energy-related research, developed and analyzed potential energy efficiency programs, wrote reports and proposals, aided in contract negotiations and performed building energy audits.

1986 – 1988

Acting Executive Director, Community Energy Development Corp. (CEDC) with simultaneous positions as General Manager, Citizens Coalition for Energy Efficiency (C2E2) and General Manager, Community Energy Consumers (CEC), Philadelphia, PA.

Managed all aspects of CEDC, C2E2 and CEC operations including: program design and development; program implementation; provision of energy efficiency consulting services for multifamily and institutional building owners; and delivery of a fuel oil cooperative program. CEDC and C2E2 were non-profit organizations providing direct energy efficiency services and energy policy research, respectively. CEC was a for-profit CEDC subsidiary that brokered fuel oil for commercial and residential customers.

1983 – 1986

Director of Technical Services, Pennsylvania Energy Center, Philadelphia, PA.

Managed, designed and developed energy services for the Southeast Regional branch of the Pennsylvania State Energy Office. Designed and developed technical energy services for commercial, industrial and institutional building owners; supervised staff of energy auditors and subcontractors; performed over 400 commercial and industrial energy audits; and taught energy management workshops.

EDUCATION

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

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

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

PROFESSIONAL EXPERIENCE

2004 – present

*Senior Associate, **Optimal Energy, Inc.**, Bristol, VT.*

Providing consulting services in the development and implementation of initiatives to leverage customer investments in energy efficiency.

- Managing project to quantify energy efficiency, combined heat and power, and photovoltaic energy and demand savings potential in Southern Vermont.
- Designing and planning demand-side management portfolios for municipal utilities in Connecticut.
- Implemented Efficiency Vermont's "Customer Solutions" process on a trial basis. Provided 30 cash-flow presentations, financing services, and financial incentive offers with a 70 percent success rate and over 2,000 MWh in annual electrical energy savings. Trained project managers in the use of cash flow analysis and non-energy benefit presentation to leverage energy efficiency investments. Revising Efficiency Vermont "account management protocols" to take advantage of these findings.
- Conducted market evaluations in Vermont's industrial, college/university, K-12 schools, design professionals (architects, engineers), and trade allies (contractors, suppliers) sectors to assess Efficiency Vermont's market penetrations and achieved proportion of potential savings in each sector.

2001-2004

*Project Manager and Market Coordinator, **Vermont Energy Investment Corporation**, Burlington, VT.*

Worked with businesses, institutions, design firms, and contractors to lower energy costs, increase building durability, enhance occupant comfort, and improve the indoor work environment.

- Developed Efficiency Vermont's "Customer Solutions" process, leveraging energy efficiency projects by providing cash flow analyses to customers, supporting customers in obtaining leases or loans, walking customers through a request for proposals process, and rendering other services as needed.
- Created the Efficiency Vermont "Green Schools" program, in which project management staff work with teachers and students to identify, analyze, and implement energy efficiency projects in K-12 schools.
- Helped 44 Vermont businesses and institutions save a total of \$350,000 annually in utility costs.
- Analyzed the costs and benefits of a wide range of energy efficiency opportunities, including lighting systems and controls, process and space cooling chilled water systems, refrigeration systems, heating systems, demand-controlled ventilation, fuel switch opportunities, and various industrial processes.

2000-2001

Special Projects Coordinator, Washtenaw Technical Middle College, Ann Arbor, MI.

Provided computer support, web site maintenance, data management, and educational reporting services to a public charter high school.

2000-2001

Project Manager, Quantum Compliance Systems, Inc., Ypsilanti, MI.

Provided project management and software customization for environmental, health, and safety (EH&S) database software company.

1999-2000

Planner/Project Manager, Environmental Consulting & Technology, Inc., Detroit, MI.

Provided environmental consulting to comply with Federal water quality regulations.

1997-1999

Environmental Protection Specialist, U.S. Environmental Protection Agency, Washington, DC.

Developed guidance documents and regulations for the Office of Water's NPDES, Total Maximum Daily Load, and Water Quality Standards programs.

1996-1997

Planner, Vanasse Hangen Brustlin, Inc., Watertown, MA.

Provided planning and transportation evaluation consulting services to private- and public-sector clients.

1992-1993

Energy Specialist, Government Purchasing Project, Washington, DC.

Served as energy expert for a non-profit organization that promotes public sector procurement as a means to leverage environmentally-benign technologies and products.

1991-1992

Environmental Engineer, Abt Associates, Inc., Bethesda, MD.

Provided environmental consulting services to the U.S. Environmental Protection Agency's Office of Solid Waste.

EDUCATION

M.S., Technology and Policy and M.S., Civil & Environmental Engineering, Massachusetts Institute of Technology; 1996. Recipient, Goldman Award for International Understanding, 1994. Recipient, National Science Foundation Fellowship, 1993.

B.S., Mechanical Engineering (with Distinction) and B.A., College Scholar Program (Magna Cum Laude), Cornell University; 1991. Recipient, Cornell Undergraduate Research Apprenticeship, 1989.

Ms. Bonn has over five years consulting experience, primarily focused on environmental issues. For Optimal Energy, Inc. she has conducted research and analysis on energy efficiency measures, DSM plans and market actor attitudes and performed customer surveys and interviews. Prior to working for OEI, Lara was a senior consultant for Booz Allen Hamilton where she worked on environmental enforcement, research, and public outreach for the U.S. EPA. As a team lead and project manager, she designed enforcement strategy and managed application development for the EPA Region 1 Superfund program.

PROFESSIONAL EXPERIENCE

March 2006 – present

Analyst, Optimal Energy, Inc., Bristol, VT

Conducts research and analysis on energy efficiency measures, DSM plans and market actor attitudes and performed customer surveys and interviews. Recent projects include reporting for Long Island Power Authority Clean Energy Initiative, conducting customer surveys for Efficiency Vermont and reporting on Ontario's conservation culture.

2000-2005

Senior Consultant, Booz Allen Hamilton Inc, Boston, MA

Managed enforcement support functions and support staff for multiple U. S. Environmental Protection Agency (EPA) New England - Region 1 Superfund Case Teams which included conducting research, writing drafts and issuing legally binding documentation, assisting with cost recovery through negotiation and settlement, providing an information hotline, drafting and overseeing website content and design, assisting with Potentially Responsible Party (PRP) meetings, compiling Administrative Records, maintaining the site repository, overseeing information and records management, ensuring data quality, and any other requests from the site attorneys, paralegals, Enforcement Coordinators, and Remedial Project Managers. Served as Client Site Lead (EPA New England - Region 1) for Booz Allen enforcement support to superfund case teams, responding to requests on any contract. Acted as Lead Analyst and Project Manager for the EPA Beede Waste Oil Superfund Site. Marketed Booz Allen support capabilities to additional EPA Superfund Case Teams which yielded additional contracts. Supervised contract particulars which included creating project plans, drafting level of effort estimates, projecting future resource needs, writing client deliverables, and reporting weekly on project status and expenditures inclusive of future monthly and annual projections to the project managers and the Booz Allen National EPA Program lead. Functioned as the System Testing and Reporting Manager for system development and maintenance for the Enforcement Action and Response System (EARS) software application, created by Booz Allen and used by EPA New England - Region 1, 3 & 10 staff to store, manipulate and report on data from several Superfund Sites. Responsibilities included gathering and drafting client requirements for new functions, working with developers to implement new capabilities, writing technical support documentation

including user manuals and quick reference guides, delivering and presenting to clients the new features of EARS, providing training to new clients or prospective clients, designing and writing technical ad-hoc technical reports and proffering a wide spectrum of support for EARS users in Region 1. Awarded Booz Allen Hamilton Certificate of Appreciation for Outstanding Performance (October 2004).

1998 & 2000

Regional Assistant Development Director, The Wilderness Society, Boston, MA
Designed, wrote, produced and executed a successful mail fundraising campaign. Co-led the New England donation campaign and donor outreach including corresponding and meeting with significant donors.

EDUCATION

B.A., Double Major: Biology with Concentration in Environmental Science and Environmental Policy, Colby College, Waterville, ME, 2000.

Biodiversity and Conservation semester study, School for International Training, Iringa, Tanzania, 1999.

Graduate Class Work:

Environmental Law, Tufts University, Medford, MA, 2002

International Criminal Law, Harvard Extension School, Cambridge, MA, 2004

PROFESSIONAL AFFILIATIONS

Member, National Association of Environmental Professionals (NAEP), 2004-2005

Steven Bower has over 16 years of work experience in information systems planning, design and development, data management and analysis, and project management. He has developed systems ranging from custom applications for small offices to data warehouses to large-scale, web-based transaction processing systems for mission-critical delivery of healthcare services. His expertise spans the entire lifecycle of information system development: requirements engineering, technical design, construction, verification and validation, deployment and support. Mr. Bower has lead responsibilities for developing and maintaining Optimal Energy's energy investment and economic modeling tools.

PROFESSIONAL EXPERIENCE

March 2006 – present

*Analyst, **Optimal Energy, Inc.**, Bristol, VT.*

Providing strategic planning for and management of Optimal Energy's software tools for energy efficiency and economic modeling.

- Developing processes for version management and enhancement prioritization.
- Implementing prioritized enhancements to support customer needs for functionality.
- Developing User and Technical Manuals to improve tool usability and assure continuity of tool maintenance and support.
- Applying Optimal Energy's efficiency modeling tools to provide analytical support for specific projects.

2000-2006

*Software Engineer and Project Manager, **IDX Systems Corporation (now GE Healthcare)**, Burlington, VT.*

Developed mission-critical radiology and cardiology imaging software applications.

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

1996-2000

*Senior Analyst, **GIS/Trans, Ltd.**, Cambridge, MA.*

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

- Technical lead for design, development and implementation of an Oracle-based data warehouse for the Maine Department of Transportation (1997-2000). Responsible for technical staff and success of all technical aspects through system implementation.
- Project manager and lead author for development of a Linear Referencing Practitioner's Handbook for the Federal Highway Administration (1996-1998).

- Technical Lead, Statewide GIS Planning, Analysis and Implementation Project (1996–1998). Lead a team of nine working groups in developing the Florida Department of Transportation's enterprise-wide GIS implementation.

1990-1996

Database Administrator, Vermont Center for Geographic Information, Burlington VT.

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

1989

Information Systems Consultant, Vermont Agency of Natural Resources and Vermont Department of Health, Waterbury and Burlington VT.

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

1983-1986

Peace Corps Volunteer, Zaire (now Democratic Republic of the Congo).

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

EDUCATION

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

B.A., Physics and Computer Science (Magna Cum Laude, GPA 3.65), Brandeis University; 198