HIGH-BAY HIGH-EFFICIENCY LIGHTING AND DEMAND RESPONSIVE BUILDINGS REGISTRY PROGRAM

Prepared for:

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SECTION I. PROGRAM OVERVIEW

I.A. Program Concept

The High-Bay Lighting Efficiency and Demand Responsive Buildings Initiative is a retrofit rebate program that has several goals designed to support the California Energy Action Plan:

1. Optimizing energy conservation by providing incentives to replace high-intensity discharge (HID) lighting with high-efficiency fluorescent high-bay light fixtures in industrial and warehousing facilities. We will Implement a marketing effort directed at small, medium, and large commercial and industrial facilities that have a high probability of participating.

2. Create a registry of facilities that can participate in demand response and voluntary dynamic pricing programs. This registry will profile the demand response potential at each facility participating in the program by cataloging end use equipment and controls capability (i.e. HVAC system, thermostat technology, etc.). The 'demand responsive' of these facilities will regularly report to the CPUC, the CEC, the California ISO, and the participating IOU. Our intent is to promote participation in demand response program by providing detailed information to implementers of DR programs, and by providing education and awareness of these programs to facility owners and operators. We will, in effect, prospect for demand response offering when available and appropriate.

3. Encourage participation in the state's Climate Change Registry by soliciting program participants to sign a California Climate Action Registry Statement of Intent Form.

We believe that the savings that result from replacing HID lighting with high-bay fluorescent lighting very are significant, but require a targeted marketing and delivery approach. In addition, we believe that these favorable economics will encourage the small, medium, and large commercial facilities that participate in this program to participate in current and future demand response (DR) programs.

I.B. Program Rationale

Summit Blue estimates that there is over 1.4 billion square feet of high-bay facilities in California. Lighting is typically the largest component of the electric bill in light manufacturing and warehouse facilities, and the vast majority of these facilities are lit with conventional HID technologies including high-pressure sodium, metal halide and mercury vapor fixtures. High-efficiency fluorescent lighting based on T-5 technology from Sylvania, GE, and Philips provides better high bay light quality compared to Metal Halide or High Pressure Sodium while ***consuming 49% less*** electricity. Because fluorescent lights can be switched off and on immediately, net annual ***savings can exceed 65%*** when automatic controls are used to turn lights off during periods of vacancy or adequate light from skylights.

Consider the outstanding benefits and demand/energy savings potential of this application;

- Immediate and verifiable savings of 49% on electrical costs for lighting
- Savings typically exceed 65% when lighting controls (occupancy sensors, etc.) are used.

- Very attractive simple paybacks and rates of return.
- Typically reduces insurance costs by eliminating halide and sodium lamps as a fire ignition source.
- Produces more light than either sodium or metal halide with 49% less energy.
- Produce better quality light—renders colors more accurately than either sodium or halide.
- Significantly lower lamp lumen depreciation over the life of the lamp.
- Same lamp life compared to High Pressure Sodium and Metal Halide lighting.
- Fluorescent systems generate approximately 50% less heat than HID lighting.
- Fluorescent lights return to full light output immediately after a power outage or shutdown.

These benefits have been well documented in a recent study by E-Source.[1] Several of these benefits are discussed in more detail below.

- *Less Light Depreciation* - HID lights and T-5 fluorescent lights have the same 20,000 hour rated life. But HID lights loose 35%+ of their light output as the lamps age. T-5 fluorescent lights loose only 5% of initial output during their entire life. This means that even though HID lights initially put out more light than fluorescents, their output quickly drops below the output of T-5 fluorescent lights.
- *Better Fixture Efficiency* - A better measure of light output is how efficient the light fixture is at actually delivery of the light a lamp produces. Industrial fluorescent lights use highly reflective polished aluminum reflectors to maximize light output. This allows fluorescent fixtures to reflect more light, delivering 95% of lamp light output (95% efficient) versus 70% efficiency for HID lights, which typically use an inefficient 'bell' as a reflector.
- *More Light* - After considering more consistent light output with a much higher fixture efficiency, T-5 industrial fluorescent fixtures provide an average of 18,525 design lumens, over 10% more light than the 16,800 provided by HID fixtures.
- *50% Less Electricity* – A 400 watt HID fixture uses an average of 458 watts including the ballast which drives the lamp. A T-5 industrial fluorescent fixture requires a net fixture wattage is 234 watts — a 49% reduction while providing more light.
- *Excellent Controllability* - T-5 fluorescent lights are rated at 100,000 switching cycles, and can be easily controlled for both occupancy and daylight simultaneously.
- *Reduced fire risk and lower insurance costs for customers* – FM Global is the largest commercial insurer in the world and they recognize substantial fire hazard in HID lighting. They recommend that all HID fixtures "use external shields made of borosilicate glass that do not leave any gaps between the glass and the fixture" and/or "replacing all HID lighting with non-HID." [2]

[1] *New High-Intensity Fluorescent Lights Outshine Their HID Competitors*, E Source, Report Number ER-00-1, January 2000.
[2] *Electrical Fires*, FM Global, Data Sheet 5-21, May 2001.

With the high concentration of high-bay facilities in California presents a substantial demand and savings opportunity across the state. This potential represents real and verifiable demand savings for sponsoring IOUs, and substantial end user benefits in the form of significantly reduced lighting energy costs at very attractive paybacks and return on investment.

In addition to the immediate demand reduction potential of this application, other demand reduction potential exists in this market segment. Opportunities include:

- Cycling or temperature setback/setup of HVAC equipment using communicating thermostats. Often the comfort needs in the conditioned spaces of these facilities are less demanding than other commercial sector facilities, and climate control is almost universally by packaged HVAC equipment. This situation lends itself to load control via communicating thermostats.
- Demand management of electric fork lift battery chargers.
- Demand management of refrigeration equipment in refrigerated warehouses.
- Demand management of electric process applications in manufacturing operations.
- Direct load control of ventilation equipment.

The idea behind the demand responsive buildings registry is to categorize buildings according to their demand response potential, inventory their demand responsive features and opportunities, and create a registry of demand responsive buildings. This will create a known demand response resource so that the IOUs and ISO can more efficiently capture this resource as demand response programs become a more prominent part of California's electricity system resource mix. We propose to develop a standard method for creating a demand responsive buildings registry and create a registry for this market segment as a pilot test through this program. We believe that this can be done cost-effectively while on site for verification inspections.

I.C. Program Objectives

Summit Blue expects to complete installations at approximately 240 facilities, while achieving an overall demand reduction of 3.5 MW over the two-year course of the program. This achievement represents a penetration of approximately 3% of technical potential. For the budget proposed, these savings will provide customers with a payback of well less than two in most cases (depending on facility operating hours). A summary of the overall market, including facility types, square footage, HID fixture populations, expected penetration rates, and projected demand and energy savings is provided in Section IV.

SECTION II. PROGRAM PROCESS

This is a retrofit program and the program concept is intended to provide two different project delivery options for customers to participate in the program. They may choose to have the retrofit completed on a turn-key basis by our trade partners, or they may access materials and program rebate funding and complete the installation on their own. Summit Blue will provide all

aspects of program delivery and fulfillment. Additional details on the implementation process are provided in the sections below.

II.A. Program Implementation

As noted above, this program provides two distinct and customer participation tracks:

1. **Direct installation by pre-qualified electrical/lighting contractors.** This is a full service option where our trade partners provide all materials, installation services and system commissioning (where controls are involved). Summit Blue provides marketing support, customer liaison, project oversight, and site inspection both before and after an installation occurs. We will act to coordinate and manage a third party measurement and verification provider.

2. **Self-directed installation by the facility's own staff.** In this case, the program provides materials only and the facility's internal construction and maintenance staff are responsible for the installation and controls commissioning. Summit Blue provides customer liaison, project oversight, and site inspection and verification.

Regardless of participation track, Summit Blue provides all aspects of program delivery and fulfillment including

- Contractor and manufacturer/supplier pre-qualification and management (including quality control)
- Marketing
- Customer enrollment and liaison
- Application processing
- Rebate disbursement
- Inspection and verification of installs
- Program tracking (including EM&V data management)
- Reporting to the CPUC and the IOUs.

Additional details on the implementation process are provided in the sections below.

Summit Blue staff has over two decades of program design, evaluation and implementation experience to back up our program design. In addition, our project manager, Mr. Floyd Keneipp, has actually successfully completed retrofits of several facilities in California with just the solution we are proposing for this program. We are familiar with the details and nuances of program implementation and evaluation, and the practical needs of on-site installation of lighting equipment and commissioning of control technologies. Program implementation is a practical process with real world demands and implications. The process needs to be supported by well conceived logic models, processes and implementation tools. We have laid out an outline for the implementation process below. This process will be supported by implementation tools and processes. The implementation tools that we will develop at the outset of the program include:

- *Program application form* – This is the basic program documentation source that will be used to track program progress from initiation to completion.

- *Standard Facility Audit (SFA) template* – This audit will be used by the installation contractor or facility staff to provide the initial quantification of the project, demand and energy savings, and rebate request. The SFA report will be the key pre-installation project processing document.
- *Standard Installation Design (SID) template* – Project installation requires a certain amount of layout and design in order to assure correct fixture layout and occupancy sensor placement for best lighting quality and savings potential. Summit Blue will provide a standard design and layout template (including equipment specification worksheet) for completion by installing contractors and/or facility staff. This will essentially serve as a quality control and documentation tool and may be supplemented by other design/layout documents developed by the installing entity.
- *Project Installation Report (PIR) tem*plate – Once the project is completed, the PIR provides a method of documenting the as-built features of the project and forms the basis for Summit Blue's request for rebates and quantification of achieved project demand and energy savings and costs.
- *Program management and EM&V database* – An important aspect of our proposal is to include an integrated evaluation element. This essentially entails capturing and maintaining and "evaluation-grade" dataset on program activities and achievements that will have sufficient detail and completeness to support downstream third-party evaluation activities. Our project team is experienced not only in evaluation processes but also in developing and deploying just such database tools.

Coordination with other programs

The RFP requests that our proposal identify areas of coordination with other energy efficiency programs. We recognize that high-bay fluorescent lighting fixtures are included on the statewide rebate programs. Our program proposal differs in the level of focused niche marketing, full service delivery and fulfillment from concept to installation, and integrated evaluation approach. However, we will coordinate with the statewide programs, and provide application processing on behalf of the customer in addition to full service delivery and assistance to customer with all aspects of program participation and installation

II.B. Marketing Plan

Marketing will be directly to end-use decision makers by Summit Blue marketing staff. We intend to use direct mail to warehousing and industrial facilities with telephone follow-up by project development sales staff. Our team already has a substantial database of facilities based on SIC code. Summit Blue will develop all marketing material and collateral, and dedicate space on its website for both promotion and fulfillment functions. Marketing material to be developed and utilized for the program includes:

- A program brochure describing benefits, features, a call to action and contact information
- An application factsheet detailing the technology applications, savings benefits and payback information.
- A case study of a similar project completed in a warehouse facility (currently in development) by the program staff.
- Excerpts from E Source study on high-efficiency high-output fluorescent lighting in this market segment.

- An information factsheet on the importance of demand response, how the program will make the customer facility demand responsive, and how this will benefit both the customer and state electrical system in the future.
- Website content with downloads and links.
- Marketing contacts database

II.C. Customer Enrollment

This section describes the customer enrollment process for the two participation tracks. The process for the direct installation path is as follows:

- Step 1: Customers call Summit Blue program administration to initiate a project. Summit Blue screens the customer for eligibility, and enters eligible customers into the program tracking system.
- Step 2: Qualifying customers are sent a program application form and referred to a pre-qualified installation contractor in their area.
- Step 3: Contractor visits site and completes the Standard Facility Audit (SFA). Contractor submits the SFA presenting estimated energy savings, cost savings and payback information to the customer. For those customers who elect to proceed, customer forwards SFA and application form to Summit Blue for review and approval.
- Step 4: Summit Blue reviews and approves (or disapproves) SFA and notifies contractor to proceed. In cases where the SFA and/or application are incomplete or disapproved for whatever reason, contractor and customer will have the opportunity to correct the deficiency in most cases.
- Step 5: Contractor prepares Standard Installation Design (SID) and submits to customer and Summit Blue for approval. Summit Blue enters data into program tracking system. The SID provides equipment specifications, project design and layout, and final customer savings and cost proposal.
- Step 6: Summit Blue reviews and approves (or disapproves) SID and notifies contractor to proceed.
- Step 7: Contractor completes project and prepares Project Installation Report (PIR) and submits to customer and Summit Blue for approval. Summit Blue gets final sign-off from customer, and enters data into program tracking system.
- Step 8: Summit Blue conducts on-site verification inspection, and completes demand responsive buildings survey.
- Step 9: Summit Blue submits project completion documentation to the CPUC along with rebate distribution request
- Step 10: Summit Blue distributes rebate funds upon receipt.

The process for self-directed installations is as follows:

- Step 1: Customers call Summit Blue program administration to initiate a project. Summit Blue screens the customer for eligibility, and enters eligible customers into the program tracking system.

- Step 2: Qualifying customers are sent a program application form and referred to a pre-qualified manufacturers/suppliers in their area.
- Step 3: Customer completes the Standard Facility Audit (SFA), and submits the SFA and application form to Summit Blue for review and approval.
- Step 4: Summit Blue reviews and approves (or disapproves) SFA and notifies customer to proceed.
- Step 5: Customer prepares Standard Installation Design (SID) and submits to Summit Blue for approval. Summit Blue enters data into program tracking system.
- Step 6: Summit Blue reviews and approves (or disapproves) SID and notifies customer to proceed.
- Step 7: Customer completes project and prepares Project Installation Report (PIR) and submits to Summit Blue for approval. Summit Blue gets final sign-off from customer, and enters data into program tracking system.
- Step 8: Summit Blue conducts on-site verification inspection, and completes demand responsive buildings survey.
- Step 9: Summit Blue submits project completion documentation to the CPUC along with rebate distribution request
- Step 10: Summit Blue distributes rebate funds upon receipt.

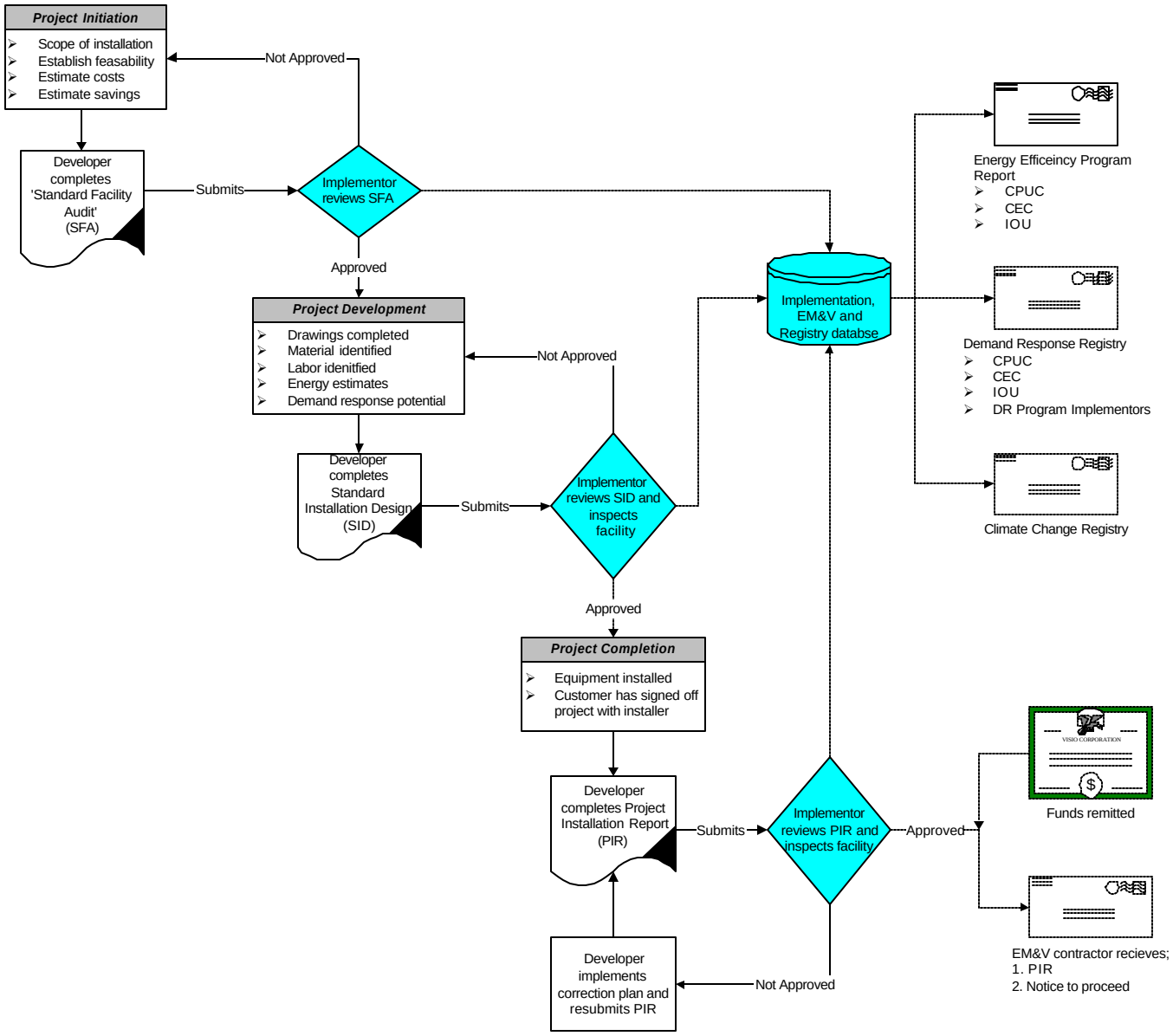
The demand responsive buildings survey will be conducted at the time of the on-site verification inspection. In addition to the standard facility details (e.g., facility type, square footage), data that will be gathered in the survey include opportunities for direct load control (e.g., control of HVAC equipment via communicating thermostats), opportunities for price responsive demand management, and infrastructure needs for demand response. This proposal envisions developing a data collection instrument for this market segment with standard categories of information that can be completed in a timely fashion while on-site for the verification inspection. The survey information would then be compiled in a demand responsive building registry database. Our project team will develop the details of the survey in consultation with the CPUC, ISO and IOUs.

Exhibit II-1 presents a graphical depiction of the customer enrollment and fulfillment process.

II.D. Materials

The procedures for procurement, delivery and installation of equipment are summarized in this section. It is important to note the one of the first steps that Summit Blue will take is to pre-qualify lighting fixture and occupancy sensor manufacturers including specification of acceptable ballasts and lamps. This step is necessary in order tot assure that only those products that meet performance and quality standards acceptable to the management are installed through the program. The program will allow several different lighting fixture manufacturers, and Wattstopper occupancy sensors (or an equivalent). With regard to communicating thermostats, the program will utilize Honeywell products.

Exhibit II-1: Project Process Flowchart



Another key step in the process is the pre-qualification of installation electrical/lighting contractors. This all important step is to assure that our installation trade partners provide high quality services at competitive prices. Contractors will be screened on the basis of referrals and reputation in the industry, record with the Better Business Bureau, skills and competencies, and overall capabilities to provide the programs scope of services.

For direct installation projects, contractors will order materials directly from pre-qualified manufacturers, and handle all aspects of materials pickup, delivery to the jobsite and installation. For self-directed projects, customers will acquire products directly from manufacturers/suppliers.

The project team will establish equipment specifications for equipment performance and installation including:

- Performance and quality standards for lighting fixtures:
- Performance and quality standards for occupancy sensors
- Cost parameters for equipment
- Disposal of old removed fixtures
- Installation standards

II.E. Payment of Incentives

Incentive funds will be channeled through Summit Blue, and we will disburse funds directly to customers in the form of product rebates based on the detail in the PIR. At the outset of the program, our project team will set up the program tracking and financial processing systems. Financial processing will be completed by our professional certified public accounting firm, and overseen and management by the program management staff. Regular standard accounting reports will be provided to the CPUC and the IOUs and all accounting records will of course be open to review and audit at all times.

The proposed incentives for this program for high-efficiency lighting fixtures and occupancy sensors are:

- $100 per fixture for lighting fixtures
- $30 per control for occupancy sensors.

II.F. Staff and Subcontractor Responsibilities

The Summit Blue core project team and their principal responsibilities are summarized below.

- **Mr. Floyd Keneipp** will serve as project manager. Mr. Keneipp recently marketed, engineered, and installed over 1.5 million sq ft of HID to T5 retrofit as owner of the Industrial Lighting Company, and provided support on a PG&E Small SPC Program case study of one of the Industrial Lighting Company installations at the San Jose Distribution Services warehouse in San Jose. Mr. Keneipp will be the principle customer, contractor and manufacturer/supplier liaison, and will manage all aspect of the program from Summit Blue's Clayton, CA office. He will also manage and conduct field verification inspections and demand responsive building surveys.

- **Mr. Marshall Keneipp** will serve as senior project advisor for program design, evaluation planning and implementation support. Mr. Keneipp recently designed four residential and commercial market transformation programs, and served as the implementation manager for the residential programs for Arizona Public Service. Mr. Keneipp will direct program tracking and financial processing systems, lead the development of the demand responsive buildings aspect of the program, and assist with field verification inspections and demand responsive building surveys.
- **Ms. Meg Matt** will lead program marketing efforts and will be responsible for developing and executing the marketing campaign and development of marketing materials. Ms. Matt is currently President of the Board of Directors of the Association of Energy Service Providers

- **Dr. Dan Violette** will act as senior project advisor for program logic models and evaluation issues.

Key program support staff include:

- **Mr. Paul Monkman** will serve as senior technical engineering support and assist with SFA, SID and PIR review.
- **Mr. Kurt Velguth** will provide technical engineering support and take a lead role in program database tracking system deployment.

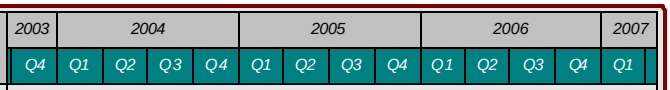
Our key subcontractor on this project is Ms. Meg Matt of the Matt Group, who will lead program marketing efforts. Apart from Ms. Matt, all program management and fulfillment will be handled by internal Summit Blue staff.

Our trade partners and equipment manufacturers/suppliers are also key aspects our project team. As noted above will intend to pre-qualify a team of electrical/lighting installation contractors as one of the first steps in program delivery. We have identified eleven different lighting fixture manufacturers whose products meet the quality and performance criteria acceptable to this program. We intend to use Wattstopper occupancy sensors or their equivalent.

II.G. Work Plan and Timeline for Program Implementation

- The proposed timeline for the project is summarized in Exhibit II-3 below.

ID	Task Name	Start Date	End Date	Duration
1	Program approved	1/2/2004	1/2/2004	0d
2	Contracting complete	2/12/2004	2/12/2004	0d
3	Program begins	2/12/2004	2/12/2004	0d
4	Contractor and manufacturer qualifications complete	3/31/2004	3/31/2004	0d
5	Program marketing begins	3/31/2004	3/31/2004	0d
6	Program year 1 ends Target = 40% of net savings	3/31/2005	3/31/2005	0d
7	Prgoram year 2 ends Final project acceptance	3/1/2006	3/1/2006	0d
8	All physical installation complete	6/1/2006	6/1/2006	0d
9	Final program evaluation report	9/1/2006	9/1/2006	0d
10	Final progam report	12/31/2006	12/31/2006	0d



SECTION III. CUSTOMER DESCRIPTION

III.A. Customer Description

The target customers for this program are industrial, warehouse and retail facilities with high-bay HID lighting in the SCE service regions. All sizes of facilities are eligible for the program, and candidate facilities will range in size from under 20,000 square feet (approximately 20 fixtures or less, 4 KW lighting load) to large industrial facilities with several million square feet and thousands of retrofit candidate fixtures. Although we expect that the majority of program participants will fall into the mid- to large size of the market range, every effort will be made to minimize the transaction costs of the program in order to serve the more hard-to-reach small end of the market spectrum and encourage participation in the small commercial/industrial market segment. The key market actors from a customer point of view are the decision makers who need to be reached by the program. These market actors include business/facility owners, property/facility managers and building engineers. Summit Blue is well versed in reaching and conveying the concepts, benefits and costs of this program to this group of market actors.

III.B. Customer Eligibility

As noted above all sizes of customers in the industrial and warehouse market segments with high-bay HID lighting in the target market areas are eligible for this program. Eligibility criteria include:

- Must be located in the SCE service region.
- Must have interior high-pressure sodium, metal halide or mercury vapor high-bay lighting.
- Must not have had a recent prior retrofit of HID to high-efficiency T-8 or T-5 fluorescent lighting.
- Refrigerated warehouses and exterior lighting applications are not eligible for the program.
- Customers may participate in either of two delivery tracks: 1) direct installation by pre-qualified lighting/electrical contractors, or 2) self-installation by the customer's own facility staff.

III.C. Customer Complaint Resolution

The first level of complaint processing proposed by the program is to avoid complaints in the first place. We will strive for this goal by rigorous pre-qualification of both installation trade partners (lighting/electrical contractors) and products. Each installation contractor will be pre-qualified in terms of skills, time in the business, Better Business Bureau record and references from customers. Each installation contractor will be required to complete and submit a quality control and complaint resolution plan to Summit Blue. We will also make it abundantly clear to installation contractors that any and all complaints will be dealt with promptly and completely and that unresolved complaints will result in dismissal from the program. Summit Blue will also investigate and implement other quality control mechanisms such as performance bonds prior to

fielding the program. With regard to products, Summit Blue will screen and pre-qualify only those products that meet the highest quality and reliability standards and have established reputations in the industry for technical, design and performance quality.

III.D. Geographic Area

The geographic focus of the program is the SCE service territory, however, Summit Blue will consult with representative of the utility and the ISO at the outset of the program and periodically thereafter to determine the desirability of target marketing to selected areas that are either transmission or distribution constrained.

SECTION IV. MEASURE AND ACTIVITY DESCRIPTIONS

IV.A. Energy Savings Assumptions

The energy savings assumptions supporting this program are based primarily on 3 factors

I. The technology
II. The end use customer
III. The type of installation
IV. Base equations.

Each of these influencing factors is discussed below

1. The technology

This program is designed to replace high intensity discharge lighting with high output fluorescent lighting. In recent years the emergence of more intense and efficient fluorescent lamps coupled with specially designed reflecting fixtures has enabled fluorescent systems to compete directly with HID lamps in indoor high bay (up to 35' high ceiling) applications. This technology is available in both T5 and T8 lamp technology. New fluorescent fixture designs provide 90% fixture efficiency to fully capitalize on the high efficacy offered by new fluorescent lighting.

Manufacturers of High output fluorescent light fixtures offer various lamp configurations and fixture designs. Fluorescent fixtures that are excellent candidates to replace 400W HID lighting typically consume between 225 to 305 watts, depending on design. We believe that this target wattage will allow the broadest range of manufacturers to participate in the program, while providing an excellent baseline value on which to base program energy calculations.

The target market for this technology is the installed base of high intensity discharge lighting, primarily 400 watt metal halide lamp, which has been the pre-eminent light source for interior highbay lighting for the past several decades. High pressure sodium and mercury vapor lighting still exists, but is much less prevalent. As a class, 400 watt HID fixtures consume 400 watts and the lamp, and typically loose an additional 50 to 65 watts at the ballast. Our proposal standardizes on 458 watts as being the net wattage for the existing HID lighting infrastructure being targeted in this program.

Exhibit IV-1 below provides a summary of the existing and proposed standard wattage values used to calculate the energy potential in this program.

Exhibit IV-1: Typical Lighting Fixture Performance and Savings

	Light Source		
	Existing	***Proposed***	
Demand	***High Intensity Discharge***	***High Output Fluorescent***	***Savings***
Lamp Watts	400	216	184
Ballast Watts	58	18	40
Total Watts	***458***	***234***	***224***

2. The end use customer

The target market for this program is high bay lighting in industrial facilities. The type of retrofit anticipated is a point-for-point replacement of existing HID fixtures, and will typically involve the same number of fixtures in both the pre and post retrofit facility. This population can be further divided into 2 sub-groups

1. Light fixture controlled on existing facility controls (clock, breakers, switches, etc.). We expect that this subset will constitute 80% of the market.

2. Light fixture controlled with dedicated occupancy controls (1 control per fixture). We expect that this subset will constitute 10% of the market.

The 1999 Commercial Buildings Energy Consumption Survey (CBECS) provides an estimate of facility area (interior space) that is supported by HID lighting in the Pacific West region (Washington, Oregon, California, Hawaii, and Alaska). This same survey provides an estimate of operating hours for the survey population. We estimate that California comprises 60% of this survey territory. Based on our analysis of CBEC data, we conclude that roughly 475,907,000 sq ft of facility area in the SCE service territory is supported by HID lighting, and operates at between 2,236 to 8,736 hours per year, with an average annual facility operating schedule of 4,489 hours / year. Exhibit IV-2 below summarizes the distribution of facility operating hours as presented in the CBEC Survey.

Exhibit IV-2: Facility Area Summary

	Weekly hours of operation and potential HID lighted area (sq ft) in SCE service territory					
	85 to 167	61 to 84	49 to 60	40 to 48	39 or Fewer	
Annual Operating Hours Class	8,736	5,408	3,848	2,860	2,236	Total
Percent of Facilities	8%	10%	14%	21%	46%	100%
SCE Service Territory Facility Area	***38,457,203***	***48,071,503***	***67,300,104***	***100,950,157***	***221,128,915***	***475,907,882***

Based on our extensive experience auditing industrial lighting in numerous facilities, we conclude that there is a technical potential for HID lighting replacement of 88,955 kW, based on an existing load of 181,880, as shown in Exhibit IV-3 below.

Exhibit IV-3: Technical Potential Summary

Technical potential of HID lighting infrastrucutre in SCE service territory						
Area Coverage per Lamp	% of Facilities	Net Sq Ft	Number of HID Fixtures	Existing Demand (kW)	Potential Demand	Net Savings Potential
625	5%	23,795,394	38,073	17,437	8,909	8,528
900	40%	190,363,153	211,515	96,874	49,494	47,379
1,600	40%	190,363,153	118,977	54,491	27,841	26,651
2,500	15%	71,386,182	28,554	13,078	6,682	6,396
Total	***100%***	***475,907,882***	***397,119***	***181,880***	***92,926***	***88,955***

Our program target a 3% penetration of technical potential, or roughly 2.6 MW. This level of activity will require replacing approximately twelve thousand (11,900) 458 watt HID fixtures with an equal number of industrial fluorescent fixtures with an average demand of 234 watts.

3. Type of installation

Approximately 100% of installations will be point-for-point replacements of existing lighting fixtures. We expect that the program will replace roughly 11,900 fixtures in the SCE service territory.

Approximately 90% of fixtures installed will be controlled via the existing facility lighting control system. In the majority of industrial facilities this is accomplished via manual switches.

Approximately 10% of fixtures installed will have occupancy controls installed, with an average of 1 fixture per control. These types of installations will be promoted in areas where occupancy is typically less than 30% on net facility operating hours. We expect that during periods of vacancy, a light will be turned off 100%. This will appropriate for warehouse and distribution facilities where savings from low occupancy rates will provide a financial incentive to install controls on significant numbers of fixtures. We expect that controls will reduce average operating hours on controlled fixtures by 3,011 hours annually.

4. Base equations

Demand savings

(Current fixture wattage – new fixture wattage) x target number of fixture replacements

(458-234) watt/fixture x 11,900 fixtures/1000 watts/kW = 2,669kW

Exhibit IV-4: Projected Program Demand Savings

Projected demand savings from application of new light fixtures	2,669
Projected demand savings from occupancy controls	0
Net projected program demand savings	2,669

Energy savings

Fixture retrofit;

(Current fixture wattage – new fixture wattage) x average facility operating hours x target number of fixture replacements

(458-234) watt/fixture x 4,488 hrs/yr x 11,900 fixtures/1000 watts/kW = 11,972,531 kWh

Incremental energy savings from controls;

new fixture wattage x reduction in operating hours from controls) x target number of fixture replacements x % of fixtures with controls

234 watt/fixture x 3,011 hrs/yr x (11,900 fixtures x 10% penetration) /1000 watts/kW = 838,498 kWh

Exhibit IV-5 below summarizes the expected savings resulting from this program

Exhibit IV-5: Projected Program Energy Savings

Projected energy savings from application of new light fixtures	11,972,531
Projected energy savings from application of occupancy controls	838,498
Net projected program energy savings	12,811,029

IV.B. Deviations in Standard Cost-effectiveness Values

We do not see any deviations in standard cost-effectiveness values for this program.

IV.C. Rebate Amounts

The rebate amount proposed by this program are $100 / fixture and $30 / control, for approved equipment. These rebate levels are designed to accomplish the following financial goals:

- Ensure broad financial appeal to small, medium, and large commercial accounts by providing excellent project payback;
  - Facilities that self sponsor and install the systems themselves will typically payback in less than 1.5 years. Even facilities with relatively short operating hours (less than 2,400 hours annually) should experience a simple payback of less than 2.5 years
  - Facilities where 3rd parties provide all material and labor for installation will typically payback in less than 3.0 years. Even facilities with short operating hours (less than 2,400 hours annually) should experience a simple payback of less than 4.0 years.

IV.D. Activities Descriptions

The project team believes that substantial additional demand savings exist in this market segment beyond those that will be captured through the lighting retrofits. Much of that potential takes the

form of potential demand response either through direct load control or price responsive actions by facility operators. Our proposal for the demand responsive buildings registry, is to pilot test a process of identifying the demand responsive features in buildings, and logging those features in a registry format. This approach would provide industry decision makers with an information resource for rapidly and efficiently capturing demand reductions through demand response programs as these programs become a more prominent in California's electricity system management mix. To accomplish this, the project team will develop a data collection instrument and database format in consultation with the CPUC, the ISO and the IOUs, collect data during the on-site verification inspections, and log the data in the registry. As part of our year end reports we will summarize the demand responsive building characteristics of this market segment and assess the utility of this approach as a market assessment and marketing tool for future demand response programs in California.

SECTION V. GOALS

The goals for this program fall into four broad categories:

1) demand and energy savings
2) customer satisfaction and delivery efficiency
3) market penetration
4) success in managing schedule and budget.

The market penetration is estimated to be 3% of technical potential. Demand and energy savings goals of the program are 2.6 MW and 12,800 MWh over the two-year timeline of the program.

Regarding customer satisfaction and process efficiency, clearly we will strive for high customer satisfaction. However, a key element of success is the need to have the highest quality field installation services and products available. That is why an important part of our overall program design is the requirement to carefully and thoroughly screen our installation contractor and product supplier partners for best-in-class products and services.

As a final aspect of program goal setting, our project management team will strive to maintain our implementation and delivery schedule, and deliver the highest quality services possible within the budget we have requested for the program.

SECTION VI. PROGRAM EVALUATION, MEASUREMENT AND VERIFICATION (EM&V)

Summit Blue staff have conducted a wide range of utility energy program evaluations and our senior staff have been at the leading edge of program evaluation theory and application for nearly two decades. With this background we are highly sensitive to one of the key issues related to program evaluation and that is the need for high quality data to support evaluation analyses. Our view on evaluation data collection is that it should be integrated to the greatest extent possible with program implementation and that is why our approach to this program will be to develop an evaluation-grade data collection and tracking system at the outset of the program and to maintain the necessary data elements throughout implementation to support downstream impact, process and market evaluation. This does not mean that third-party evaluation contractors will not need to conduct original data collection as indeed they will, but

rather that the necessary data will be collected and maintained by Summit Blue during the course of implementation to accurately and thoroughly document program processes, actions and achievements so that third party evaluators can focus on key evaluation issues instead of routine data development. This will allow third-party evaluators to focus on verification activities and original research needed to develop insights into program successes and shortcomings and identify ways to make the program more effective and better serve the citizens of California, the goals of the CPUC, and the needs of the ISO and the utilities. We refer to this approach as "integrated evaluation" and propose to adopt this method for this program.

According to a ***draft*** of the New California Evaluation Framework Roadmap Project, Exhibit VI-1, "one of the 1st steps in the evaluation planning process should include a review by the evaluator of the program theory, and if available the program logic model, as a tool to inform the development of a program evaluation plan.

Alternatively, if there is no PT/LM the evaluator should lead the development of a program theory as a component of the evaluation project, in coordination with the program team so that the evaluators fully understand what the program is designed to accomplish, how the program will accomplish the established goals and the relationships between program objectives and program materials and operations. PT/LM models that are thorough and consistent with other research on the market in question are critical for quality market evaluations and education/information program effects evaluations. Their development, if unavailable, and use, however, should also be considered for other program types within funding constraints and competing evaluation demands."[3] Our program design will provide sufficient documentation on program theory and logic so as to provide evaluators with a clear roadmap to program goals and processes.

Consistent with standard evaluation practice, our evaluation plan will encompass three broad components: 1) impact evaluation, 2) process evaluation, and 3) market evaluation. Our approach to each of these aspects of the EM&V plan is discussed below.

VI.A. Impact Evaluation

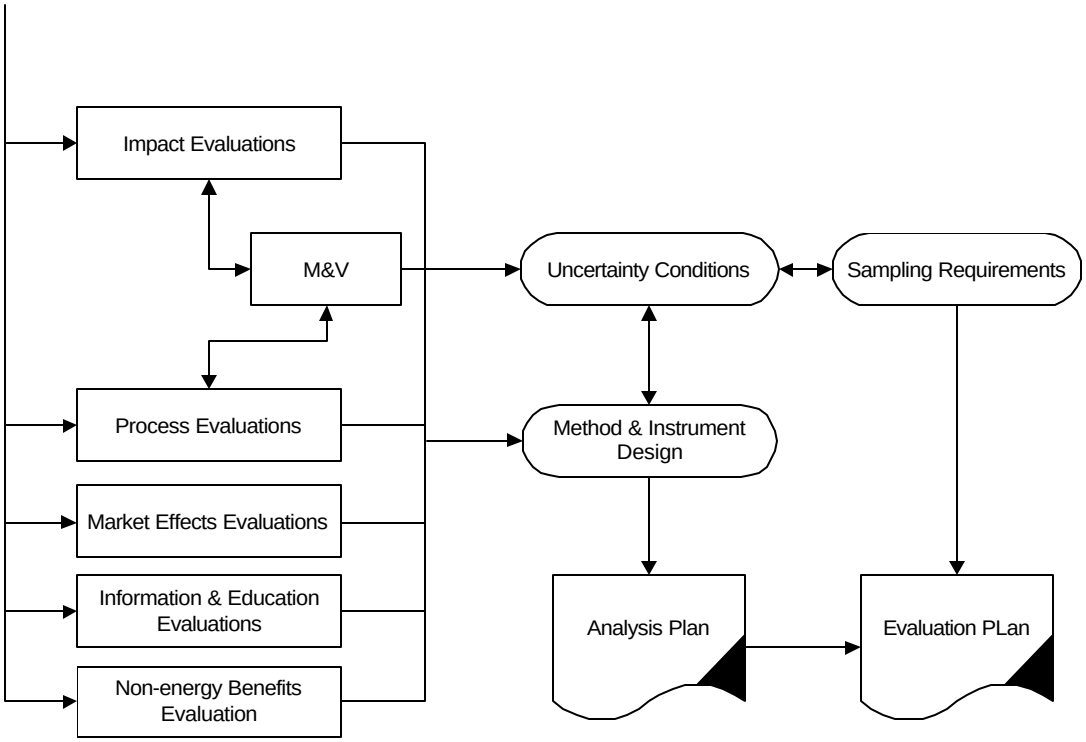
The California evaluation roadmap states that "an important overall goal of impact evaluation is to reliably estimate the magnitude of the energy efficiency resource at the portfolio level in terms of both energy and demand savings." Our integrated evaluation approach entails collecting and maintaining the data necessary to reliably estimate demand and energy savings from this program. In order to facilitate evaluation by third-party evaluators, our project team will set up a program management and evaluation tracking database at the outset of the program. This tracking system will serve two primary purposes:

1) Program management

2) Providing a data resource for third-party evaluation.

[3] *New California Evaluation Framework Roadmap Project*, CPUC, September 2003 discussion session draft.

Exhibit VI-1: *Proposed Draft* of the New California Evaluation Process Diagram



With respect to downstream impact evaluation, we will collect and maintain data necessary for impact assessment including, but not limited to:

- Location
- Contact information
- Facility type
- Facility size (square footage)
- Facility operating schedule
- Year constructed
- Construction type
- HVAC system type
- HVAC control type and operating schedule
- Heating system size and fuel
- Cooling system size and fuel
- Pre-installation lighting system technology details
    - Number of fixtures
    - Wattage of fixtures
    - Control type
- Post-installation lighting system technology details
    - Number of fixtures
    - Wattage of fixtures
    - Control type

This comprehensive and detailed database will be specified and built by our experienced program evaluation staff members with downstream third-party evaluation work in mind, and will provide an invaluable data resource for evaluators.

With regard to net-to-gross analysis and attribution of savings to program actions, the evaluation plan will call for assessment of free-ridership, spillover and persistence. We will avoid pre-judging these effects in this proposal and leave their objective determination to other professional evaluation firms, however, as part of our integrated evaluation approach we will take two key constructive steps during implementation to support net-to-gross analyses. First, we will collect the necessary information for third-party evaluators to conduct their research efficiently. These data will include key contact information, facility information, and project installation details and timing. Second, we will conduct our own internal assessments with each project for the purposes of obtaining information to guide and inform program management. These feedback mechanisms will include project motivations, satisfaction with program services, success of quality control procedures, success of program marketing efforts, and other similar aspects of program delivery. These data will be collected as part of project closure procedures and planned interactions and interview with project contacts.

With regard to sampling and survey research be third-party evaluators, we expect that survey sample plans will be stratified random samples and that will achieve an accuracy and precision of 90% ± 10%. Since this program is constrained to a very focused market segment, we expect that survey stratification/segmentation will be by major facility type (warehouse, manufacturing, etc.), utility service region, and facility size.

VI.B. Process Evaluation

It is expected that a downstream process evaluation will be conducted on this program. As identified in the California roadmap, we anticipate that the process studies will be "designed to answer 3 questions: What works well?, What does not?, and How can the program be improved? This is done to also answer questions regarding the efficiency of program delivery, promotional strategy effectiveness, and level of customer and trade partner satisfaction."

We recognized that third-party evaluation is necessary in order to minimize bias and conflict of interest related to implementers evaluating their own programs. However, our program management also requires ongoing information and feedback on program process and functional efficiency, and our belief in integrated evaluation leads us toward data collection and management approaches that will facilitate third-party evaluation. In this context, our project team will design our own internal process feedback mechanisms, and maintain data necessary for third-party evaluation.

Our internal management evaluation efforts will focus on customer satisfaction, performance of subcontractors and effectiveness of our delivery systems. To accomplish our evaluation goals, we will conduct exit interviews with customers at the completion of each job and leave them with a mail back survey. The exit interview guides and mail back surveys will be designed at the outset of the program.

To support third party process valuation efforts, we will maintain information that will support process evaluation efforts. These data will include:

- Detailed contact information for decision makers and others (e.g., facility engineers) who may provide insight into process issues.
- Program theory and logic model descriptions.
- Timing of and participation details for program implementation activities completed.
- Supporting process and marketing information including application forms, marketing materials, and other fulfillment tools.

If requested, we will also provide access to our internal program management evaluation results.

VI.C. Market Evaluation

Even though many of the facilities that will participate in this program may be very large (500,000 square feet or more), we believe that much of the target market falls into the hard-to-reach market sector that is often referred to as small- to mid-sized commercial. A key element of the program theory behind our proposal is that this market can be more effectively approached by highly targeted, niche market offerings that are easy for the customer to grasp and say yes to, are well focused on their specific business activities, and have low transaction costs in terms of time, technical knowledge, hassle factor and so on.

As noted above, another significant component of our program theory is that this is a very large and largely untapped market with substantial demand reduction and energy savings opportunities. The savings provide significant benefits to both the customer in terms of reduced operating costs, better light quality and improved productivity, and the State of California in terms of reduced demand on the electrical system, and the environment in terms of reduced emission from power plants.

While this program is not intended to transform the market for this energy efficiency technology, we are confident that it will significantly stimulate adoption of lighting efficiency and provide a demonstration of the effectiveness of niche marketing to the small- to mid-sized market segment. We believe that a market assessment of this program is warranted in order to validate the potential for additional savings in this market segment, and to the effectiveness of the niche marketing approach. As with the other aspects of evaluation requirements, our project team will maintain data and information to support third party assessments. In the case of market evaluation, we will provide program theories and logic models, data that assembled for the assessment of the market for this proposal, additional market intelligence garnered during the course of implementation, and facility and contact databases used for marketing purposes.

VI.D. Information and Education Evaluation

Customer education and information activities included in the program include:

1. Informing the customer of the potential for lower insurance costs with fluorescent lighting and suggesting that they contact their carriers for more information.
2. Educating customers on the topic of demand response, current demand response initiatives in the state, and how the demand responsive profile of their facility may help them to manage their energy costs through controlling peak load and participating in demand response pricing or load control programs.

3. Educating the customer on operation and maintenance of their new lighting system. "Unit goals" are all participating customers, and "direct cost per unit" is included in the program management budget.
4. Educating the customer on the California climate change registry, how it fits into overall resource planning in California, and how it impacts their business and the operation of their facility.

The evaluation will assess the effectiveness of the program on the education of the customer in these areas.

VI.E. Non-Energy Benefits Evaluation

One of the key potential non-energy benefits of this program is reduced fire risk of fluorescent fixtures compared to HID, and the potential to reduce insurance premiums as a result. Summit Blue staff will inform the customer of this potential, provide a summary from FM Global on the issue and suggest that they contract their insurance carrier for more information. The evaluation will assess the effectiveness of this process and actions taken by customers in response to this information.

SECTION VII. QUALIFICATIONS

Our project team will be led by senior staff members of Summit Blue. Our team will be supported on marketing activities by the Matt Group. In addition to our core management team, the project will be supported by Summit Blue's talented team of engineers, market researchers and support staff.

VII.A. Primary Implementer

The primary implementer for this program is Summit Blue Consulting, LLC (Summit Blue). Summit Blue provides professional consulting services to energy companies and the utility industry. Summit Blue is a team of experienced energy industry professionals with a wide range of backgrounds and skills, including economics, engineering and market research. Summit Blue's primary practice areas include:

- Energy efficiency and load management program development and implementation
- Energy efficiency and load management program performance measurement and evaluation
- Energy systems technology assessment and technical potential studies
- Quantitative and qualitative market research and market assessments
- Utility business management consulting
- Utility industry restructuring and deregulation strategies
- Renewable energy strategy and program development.

Within these practice areas, Summit Blue's services span the spectrum from strategy development to product and program planning to full-service implementation and evaluation.

Relevant to the proposed project, Summit Blue professionals have designed, implemented and evaluated utility demand-side management programs for nearly two decades. In addition, our

key staff members have served as building design engineers and have designed and installed exactly those lighting retrofit projects intended for this program. Our proposed project manager, Mr. Floyd Keneipp has implemented these measures for California clients as part of his work with Industrial Lighting Company, and is intimately familiar with the technologies, customer needs, installation requirements, and EM&V protocols. Our proposed senior project advisor, Mr. Marshall Keneipp has designed, implemented and evaluated DSM programs across North America and in California, and has recently served as project and implementation manager for a three-year market transformation program for a major Southwest utility.

Summit Blue staff members have been at the leading edge of the development and implementation of energy efficiency and load management programs for electric and gas utilities in all customer sectors. Recently, staff members have been particularly active in load management and market transformation, assisting clients with bringing new and creative intervention strategies to the marketplace. Our staff is currently developing programs and services specifically formulated for the small to mid-sized commercial market. We have assisted clients from the concept stage to turnkey delivery of energy programs. Representative projects include:

- *Design of Load Management Offerings.* Summit Blue has recently developed utility offerings for active customer load management as hedges against price and quantity risks, and for regulated providers to meet power procurement prudency standards.
- *Design of Commercial Lighting Energy Efficiency Program.* Summit Blue recently developed a commercial lighting energy efficiency program for a midwestern energy cooperative that is focused on reducing load on overburdened feeders and substations.
- *Design and Implementation of Energy Efficiency and Market Transformation Programs.* Summit Blue staff members have been responsible for the design and turnkey implementation of many customer energy efficiency and market transformation programs. These programs have covered new construction and retrofit applications in the commercial, industrial, residential, and agricultural sectors.

Summit Blue professionals have conducted impact evaluations for more than 200 utility energy services programs and more than 40 utilities and energy agencies in North America. Summit Blue staff members have been the principal authors of EPRI guidebooks to the evaluation of utility DSM programs, and the application of engineering methods and end-use metering to energy analysis. Summit Blue professionals have also presented numerous seminars and workshops on the application of engineering and statistical methods to the impact evaluation of utility programs. Representative projects include:

- *Evaluation of Utility Demand-Side Management Programs.* Summit Blue professionals have conducted detailed impact, process, and market evaluations of a wide range of utility DSM programs, employing a full range of data collection and analytic techniques. We are currently deploying an innovative integrated evaluation approach where evaluation data collection and analysis are built into and integrated with the program implementation process.
- *Evaluation of a Demand Response Program.* Summit Blue developed and implemented an evaluation plan for a Southeastern utility to verify impacts on load from a direct load control program targeted at residential and small commercial programs. The approach used nested

sampling and data from kWh metering as well as information on duty cycles collected from data loggers.

- *Demand Buy-Back Program Impacts.* Summit Blue recently conducted a survey of innovative demand buy-back programs being conducted by utilities in the Midwest and in other states that have restructured. Assessments of program impacts were developed and linked to program design parameters.
- *Establishing Emission Baselines for Energy Efficiency Programs.* Summit Blue staff members principally authored a report for the International Energy Agency on the establishment of baselines for determining additionally from energy efficiency projects, as part of the Joint Implementation and Clean Development Mechanism protocols for reducing greenhouse gases.

VII.B. Subcontractors

This program relies on developing key partnering relationships with a) installation electrical/lighting contractors, and b) equipment manufacturers and distribution outlets. While we have not firmed up these relationships as of the time of the preparation of this proposal, our proposed approach involves rigorous screening of potential installation contractors and identification of best-in-class products. At the outset of the program, we will identify candidate installation contractors and solicit their participation in the program through a Request For Proposal process. The RFP's will be designed to provide the first level of screening in terms of breadth and quality of service by potential contractors. Subsequent to receipt and review of proposals, we will select the best candidates and submit them to further screening in terms of business record, proposed quality control procedures, and reference checks.

To effectively promote the features and benefits of the program, Summit Blue has selected The Matt Group as its marketing communications subcontractor. Summit Blue recently contracted with Meg Matt, owner of The Matt Group, to help the firm increase its visibility within the energy industry by revamping its Web site. Ms. Matt has a strong background in brand strategy, marketing communications and public relations for the utility industry. She had edited newsletters, developed collateral, written and presented speeches and programs to targeted audiences, produced educational videos, handled national, regional and local media and developed crisis communications programs.

VII.C. Resumes or Description of Experience

Resumes are provided in the Appendix for key project personnel.

SECTION VIII. BUDGET

The budget for this proposed program is included in the Excel files named 'Workplan - SBC Efficient High Bay Lighting – SCE.xls'. Exhibit VIII-1 below provides a summary of that budget.

Exhibit VIII-1: Program Budget

Summary Budget	$2,127,338	Net Projected Energy Effects		Projected Cost Effectiveness	
Administrative Budget	$329,563	*Net Coincident kW*	2,669	*Costs (TRC)*	$5,128,196
Marketing Budget	$142,000	*Net Annual kWh*	12,811,029	*Benefits (TRC)*	$10,713,209
Direct Implementation Budget	$1,441,292	*Net Lifecycle kWh*	256,220,580	*Net Benefits (TRC)*	$5,585,013
EM&V Budget	$75,312	*Net Annual Therms*	0	*TRC*	2.0891
Other Budget	$139,172	*Net Lifecycle Therms*	0	*PT*	5.7439
				TRC Levelized Cost Electric	$0.0381
				TRC Levelized Cost Gas	N/A

Details about installation cost assumptions (per fixture), for both labor and material are provided in Exhibits VIII – 2, 3, and 4.

Exhibit VIII-2: Material costs

Material Costs	
Fixture Cost	$160.00
Hardware	$5.00
8' metal clad, no plug	$8.00
Shipping	$5.00
Plug	$12.00
Tax at 8.75%	$16.63
Net Fixture Material Cost	***$206.63***
Optional control equipment	$83.20

Exhibit VIII-3: Gross installation costs ($/fixture)

Cost item	***3rd party Installlation cost estimates***	***Internal Installlation cost estimates***
Net Fixture Material Cost	$206.63	$206.63
install labor hourly rate	$75.00	$75.00
install hours / fixture	80%	80%
install labor	$60.00	$60.00
Net Contractor cost	$266.63	$266.63
Margin	30%	0%
Markup	143%	N/A
Gross install cost / fixture	$380.89	$266.63

Exhibit VIII-4: Average installation costs (80% contractor installed / 20% facility owner installed)

Average installed costs ($/fixture)	
Average installed cost without controls	$358.04
Average installed cost with controls	$457.88

APPENDIX

RESUMES OF KEY PERSONNEL

FLOYD KENEIPP, PE, MBA

AREAS OF QUALIFICATION

Mr. Keneipp is a registered professional engineer with extensive experience in identifying, developing, and managing energy projects for commercial enterprises and public and private institutions.

EMPLOYMENT HISTORY

- Summit Blue Consulting, 2001 - Present
- Enron Energy Services, 2000 – 2001
- Sempra Energy, 1997 –2000
- Unisys Corporation, 1989 – 1995
- General Dynamics Corporation, 1985 – 1989

EDUCATION AND PROFESSIONAL

- University of San Diego, MBA, Finance and Marketing, 1994
- Montana State University, BS, Industrial and Management Engineering, 1983
- Professional Engineers License, Industrial, State of California
- Certified Energy Managers Certificate (AAEE CEM)

PROFESSIONAL EXPERIENCE

Mr. Keneipp has over twenty years of experience in developing technical and business requirements for complex engineering projects. He has been responsible for developing strategic energy plans for government, non-profit, and private clients throughout California. He has an extensive background in developing specific energy efficiency projects for clients, and has been involved in the structuring and supporting project finance by identifying and acquiring incentive funds from State and Municipal agencies and private utilities.

Evaluation of Residential and Commercial Programs, Louisville Gas & Electric

Developed tools for an impact evaluation of a low income residential efficiency program, and conducted an impact analysis of a commercial audit program.

Evaluation of the Focus on Energy Program, State of Wisconsin

Conducted surveys of various building industry professionals to identify market barriers to the use of energy efficient design principles in commercial building applications.

City of San Francisco Public Utilities Commission

Program Manager for subcontractor of multiyear energy consulting services to the San Francisco Public Utilities Commission. Manage on an 'as-needed' basis subcontractors working in various distributed resource projects such as new power generation development, regulatory analysis and requirements, energy risk management and load monitoring and forecasting.

Energy Efficiency Project Development and Installation. Designed, sold, and managed the installation of energy efficient lighting retrofits for industrial clients in Northern California. Responsible for all aspects of the project cycle, from initial client contact through final commissioning and measurement and verification of installed systems.

California State University Campus in Stockton, CA. Led development team from initial customer contact through construction contract signature on a $3.4 million project to refurbish the mechanical system. This project involved installing local HVAC and control systems that allowed for the closure of a central plant, saving $700,000 annually in natural gas and direct plant operating costs.

University of California and California State University Strategic Energy Plan. Headed a team to develop Strategic Energy Plans for 17 (UC/CSU) campuses in Northern California. Project functional requirements involved directing the technical audits of staff mechanical / electrical engineers, reviewing campus construction, development, and budgeting policies and establishing both baseline and enhanced case energy usage profiles. Worked with and led presentations to senior campus and UC/CSU system executives regarding energy usage and management issues. Project identified over $200 million in viable energy related projects, system wide. Partial implementation of recommendations has begun on a campus by campus basis.

The Industrial Lighting Company. Solicited, designed and managed the installation of energy efficient lighting retrofits for industrial clients in Northern California. Responsible for all aspects of the project cycle, from initial client contact through final commissioning and measurement and verification of installed systems.

Sempra Energy. Established Industrial and Commercial accounts for a new division of a Fortune 500 Energy Company. Originated and secured $500,000 multi-facility contract to install energy efficiency projects with national manufacturing firm. Consistently ranked top among all company representatives in soliciting customer participation in a San Diego Gas & Electric lighting program for small commercial facilities. Efforts yielded an average of 3 installations per week during the programs 26 week operating period. Developed new product offerings and cross sales activity with energy commodity trading groups including bundling energy supply with demand side offerings.

Unisys Corporation. Project manager for the consolidation of semiconductor assembly operations in California. Responsibilities included developing the financial justification, conceptual design, and installation plan for $8,000,000 of new semiconductor assembly facilities. Project completed in 1994. Conceived and implemented a materials requirement planning and control system which saved $5.0 million annually in cycle time and material loss at a $3.0 billion annual revenue semiconductor fabrication facility.

General Dynamics Corporation. Initiated, designed, and managed a $5.0 million project to re-engineer several aircraft component manufacturing operations. Project reduced cycle time by 60% with similar reduction in indirect cost on over 600 major aircraft machined parts and subassemblies. Conceived, developed, and implemented tooling and process improvements in machining and chemical processing that reduced indirect costs on the manufacture of over 30,000 aircraft part numbers.

MARSHALL KENEIPP, PE

AREAS OF QUALIFICATION

Mr. Keneipp is a registered professional engineer with extensive experience in the development, implementation and evaluation of utility energy service programs, end-use energy systems analysis and engineering, end-use metering, and technology assessment.

EMPLOYMENT HISTORY

- Principal, Summit Blue Consulting, Boulder, CO, 1999-present
- President, Tesser Consulting Group, Boulder, CO, 1996-1999
- Managing Consultant, EDS Management Consulting Services, Utilities Practice — Regulatory, Economic, & Energy Service, Denver, CO, 1994-1995
- Principal Consultant, XENERGY, Inc., Boulder, CO, 1994
- Principal, RCG/Hagler Bailly, Boulder, CO, 1988-1994
- Associate Engineer, ANCO Engineers, Culver City, CA, 1985-1988
- Mechanical Engineer, Flack and Kurtz Consulting Engineers, San Francisco, CA, 1984-1985
- Mechanical Engineer, Frederick H. Kohloss and Associates, Consulting Engineers, San Francisco, CA, 1984

EDUCATION AND PROFESSIONAL

- University of Colorado, BSME, Engineering, 1982
- Registered Professional Engineer, Mechanical Engineering, State of Colorado

PROFESSIONAL EXPERIENCE

Mr. Keneipp has extensive experience in the development, implementation and evaluation of utility customer energy service programs and new product development. Most recently he has conducted an in-field research study to identify ideas for new energy products and services. Mr. Keneipp has also recently assisted a southwest utility with the design of four residential and small commercial sector market transformation programs, and managed with the implementation of the residential programs. His areas of expertise include utility customer energy services program design, implementation and evaluation, performance measurement, in-field data collection and end-use metering, energy engineering and technology assessment.

Energy Services Program Planning and Implementation Projects

Design and implementation of four residential and small commercial sector market transformation programs. Project manager for the design of two residential and two small commercial programs intended to transform the market for energy efficiency in residential HVAC and commercial HVAC and lighting applications; currently managing the implementation of the residential programs.

Preparation of a Policy and Procedures Manual, Pacific Gas & Electric. Assisted with the development of a detailed implementation policy and procedures manual for SCE's commercial and industrial sector DSM programs.

Design of Agricultural Sector Energy Efficiency Programs and Agricultural Audit Tool, Northern States Power. Responsible for the design of an agricultural rebate program designed to encourage the installation of energy efficiency measures in agricultural facilities. The project also included the development of an automated electronic agricultural audit tool to be used by field representatives to identify and report on energy management options.

Design of a Commercial Sector New Construction Program, Wisconsin Power & Light. Managed the design of a computerized incentive and design awards program for encouraging the "whole building" approach to designing energy efficient commercial buildings. The project included a design awards software purchase.

Design of a C/I Customer Rebates Program, Consumers Power Company. As part of a program design team, managed the design and development of Consumers Power's Reduce the Use C/I Custom Rebates Program, including incentive design, development of implementation plan, worksheets and application forms, draft marketing plan, quality control plan, evaluation plan, and tracking system data specification.

Design of a Residential Sector New Construction Program, Northern States Power. Managed the development of a residential sector new construction program, which was performance-based and provided incentives to encourage the design and construction of super-efficient homes. Both electric and natural gas conservation was encouraged through the program.

Design of a Commercial Sector New Construction Program, Northern States Power — Wisconsin. Managed the design and development of an innovative program for encouraging the design and construction of highly efficient, new commercial buildings. The program design included direct incentives, a points-based design awards program, and implementation handbooks.

Documentation of C/I Smart Money Program, Wisconsin Electric Power Company. Managed the development of a complete reference set documenting the energy and demand impacts, net benefits, and customer incremental cost for all of the conservation and load management measures.

Design of Existing and New Construction Customer Rebate Programs, Wisconsin Electric Power Company. Oversaw identification of appropriate agricultural and Commercial and

Industrial sector energy conservation and load management measures; collection of energy use, demand use, and installed cost data; rebate format design; determination of dollar per unit rebates for each measure consistent with the utilities' criteria; back-up documentation; coordination with utility staff, in-house technical staff, and consultants' assistance to utility communications department in production of marketing materials (i.e., brochures and fact sheets); development of Customer Service Representative Handbook for program implementation, including measure description, calculation worksheets, and procedural instructions; field staff support; field energy auditing; and report writing.

Customer Rebate Program for a Major Northeastern Utility, Consolidated Edison of New York. Assisted in the development of a customer rebate program to provide local area network peak summer demand reduction of 10 MW in a selected area of the utility's service territory. The program would offset the need for a distribution system expansion through the implementation of a direct customer rebate program, directed at commercial and industrial customers.

Evaluation Projects

Evaluation of Residential and Commercial Programs, Central Hudson Gas & Electric (CGH&E). Managed the impact analysis of CGH&E's residential and commercial DSM programs.

Evaluation Planning and Impact Evaluations, Southwestern Public Service Company. Project manager for planning and implementation of a detailed impact evaluation of residential and commercial programs.

Impact and Process Evaluations, Montana Power Company. Project manager for the evaluation of MPC's residential CIA sector DSM programs, including evaluation planning, survey activities, end-use-metered data collection, engineering analyses, and statistical analyses of billing data.

Process and Impact Evaluation of Remodel and Equipment Replacement Programs, Boston Edison Company. Managed process and impact evaluations of the C/I Remodel and Equipment Replacement Programs. The targeted customers were those replacing HVAC, motors, refrigeration, water heating, cooking, process, and lighting equipment at the end of its useful life, or as part of a major remodeling project. Data was collected from program files, on-site visits and interviews, nonparticipant and trade ally interviews, trade ally focus groups, and selected end-use monitoring studies.

Impact Evaluation of Residential Sector DSM Programs, Florida Power and Light. Managed the engineering analysis of the impacts of FPL's six residential DSM programs. Analysis included detailed modeling of program measures using DOE-2 and engineering algorithms, including the calibration of engineering models to load research and end-use-metered data, and is segmented by weather region, home type, and key energy drivers.

Seminars and Workshops

Evaluation Seminars and Workshops, EPRI. Presented numerous seminars and workshops on the application of engineering methods to the impact evaluation of utility DSM programs.

Energy EXPO, Pacific Gas and Electric. Responsible for locating potential speakers and authors for each technical session; soliciting their participation in the EXPO; directing, coordinating, and tracking the progress of each author's paper; reviewing and preparing papers for publication; coordinating authors' and speakers' EXPO schedules; and follow-up contact with authors and speakers.

Market Research and Technology Assessments

Technology Assessment the Small Commercia Market, Public Service Company of Colorado. Conducted an assessment of lighting, HVAC, refrigeration and water heating energy efficiency technologies to be included in a small commercial market resource bidding program including energy and demand savings, economic and cost-effectiveness analyses.

Assessment of Agricultural Sector Energy **Management Technologies, Ontario Hydro.** Responsible for identifying and screening agricultural sector energy efficiency measures and technologies for Ontario Hydro, including development of technology descriptions, performance characteristics and costs.

Consumers Power, Market Research Study of Industrial Customers. Principal analyst for a project to profile manufacturing activities, energy use characteristics, and attitudes of small- to medium-sized industrial customers and included a detailed telephone and follow-up mail survey of 500 customers.

Case Study Project for Energy-Efficient Restaurants, EPRI. Responsible for identifying candidate electrical technologies that might be installed in restaurants to improve energy efficiency and the competitiveness of electricity as the fuel source for these technologies. Project identified potential case studies to install and monitor energy efficiency improvements to restaurants. Options included high-efficiency lighting, heat recovery, heat pump water heaters, HVAC system modifications, and high-efficiency electrical cooling equipment.

Comprehensive Field Audit Pilot Program, Boston Edison. Supervised all audit activities and data collection, contact with utility representatives, coordination of analysis and data reduction, DOE-2.1b simulation of building, report writing, and design staff support. Project identified, designed, installed, and monitored energy conservation and management measures in the largest commercial buildings for Boston Edison's Design Plus Program.

Commercial Audit Program, Bonneville Power Administration. Conducted audits in a service-territory-wide audit program to determine energy conservation potential in the commercial sector. Responsible for detailed field audits of seven large commercial facilities, including office buildings, supermarkets, and retail facilities. Oversaw detailed computer modeling of each building, using an hourly code similar to DOE-2.1b. Compared model to utility bills and

estimated energy conservation potential. Identified energy conservation opportunities. Oversaw data reduction and report writing.

DOE-2 Modeling Support for Daylighting Rebate Program, Southern California Edison. Assisted in project to provide support to the program project manager in terms of using PC-DOE to model the demand reduction potential due to the implementation of daylighting control. Responsible for building simulation and parametric studies using daylight controls, data reduction to determine peak demand reduction during utilities' peak demand window, report writing, and support to other staff.

Technical Briefs for Commercial Good Cents Program, Gulf Power. Responsible for writing and providing assistance to others in the preparation of 21 technical briefs that covered a wide range of end-use and commercial energy management technologies. Los Angeles Department of Water and Power, Mechanical Engineer, Los Angeles, CA, 1982-1984.

SELECTED PUBLICATIONS

End-Use Performance Monitoring Handbook, EPRI. Project manager for the development of a handbook for field measuring, monitoring and quantifying the energy performance of electrical end-use systems. This handbook compliments the three volume engineering methods series.

Performance Impacts: Methods for the Non-Residential Sector, EPRI. Project manager for the development of a state-of-the-practice guidebook to conduct impact assessments of DSM programs in the non-residential customer sector. The guidebook examines recent developments in analytic methods, as well as the application of methods and insights in an era of increased utility competition.

Impact Evaluation Handbook, EPRI. Co-authored a handbook conducting impact evaluation of utility DSM programs. Handbook presented detailed methods, references for project design, sample selection, statistical methods, and engineering methods.

Engineering Methods for Estimating the Impacts of Demand-Side Management Programs, EPRI. Co-authored a handbook to the application of algorithm-based engineering methods to DSM program impact analysis and case studies.

Lessons Learned in Commercial Sector Demand-Side Management, EPRI. Co-authored a volume presenting case studies and lessons learned from the implementation of commercial sector DSM programs. Volume examined the experiences of eight utilities implementing retrofit and new construction programs in the commercial sector.

EMPLOYMENT HISTORY

- Principal and Founder, Summit Blue Consulting, Boulder, CO, 2000-present
- Vice President, Economics and Analytics, Hagler Bailly Consulting, Inc., Boulder, CO, 1995-2000
- Principal, A.T. Kearney/EDS Management Consultants, Boulder, CO, 1994-1995
- Sr. Vice President, XENERGY Inc., Boulder, CO, 1992-1994
- Sr. Vice President, RCG/Hagler Bailly, Inc., Boulder, CO, 1987-1991
- Cofounder and Sr. Vice President, Energy and Resource Consultants, Inc., Boulder, CO, 1979-1987
- Economist, Energy and Environmental Analysis, Inc., Boulder, CO, 1977-1979

EDUCATION

- University of Colorado, PhD, Economics, 1980
- University of Colorado, MS, Economics, 1974
- Arizona State University, BS, Economics, 1973

PROFESSIONAL EXPERIENCE

In his 20 years of consulting experience, Dr. Violette has conducted assignments for clients across North America related to the design, implementation and evaluation of energy efficiency and energy services products. He also served as the co-chair for retail settlements subcommittee of the Ontario Market Design Committee (MDC).

Internationally, Dr. Violette has conducted energy strategy projects for the International Energy Agency in Paris and for Eastern European countries. He also helped develop energy strategies for industry in Pakistan. Dr. Violette has published over 40 papers in journals and books, made over 60 contributions to published conference proceedings, and contributed to reports to the U.S. Congress prepared by the National Acid Precipitation Assessment Panel (NAPAP) and by the National Commission on Air Quality (NCAQ).

SELECTED ASSIGNMENTS

Designed peak load curtailment programs for Louisville Gas & Electric Company and developed evaluation plans for a portfolio of energy efficiency programs.

Led a number of projects for the Electric Power Research Institute, including developing and conducting training courses on performance measurement, data collection for decision making, authoring a handbook for assessing the performance of energy services programs.

Led a three-year in-field metering and monitoring for a consortium of seven gas utilities in New England estimating the impacts of energy efficiency equipment in the residential and commercial

sectors. Led an effort for a consortium of five New England utilities to examine the influence of utility actions on regional energy use and the markets for energy products.

Co-authored a "White Paper" for the National Association of Regulatory Utility Commissioners on regulatory issues in the evaluation of energy services programs.

Managed the analytic tasks of an EPRI tailored collaborative project examining the integration of information from short-term metering of technologies with longer term billing analyses of customers. The participating utilities were Northern States Power and Madison Gas and Electric Company.

Performed a number of assignments for utilities assessing their customer information systems and how they can be used for performance measurement and market research. These efforts often included the development of strategies for the collection of customer data and market intelligence.

Designed and conducted training programs and workshops on market and resource planning, as well as performance measurement for a number of utilities. These seminars and workshops have been conducted for professionals at San Diego Gas and Electric Company, Ontario Hydro, Bonneville Power Administration, Hydro Quebec, Public Service Electric & Gas, Arizona Public Service Company, and other utilities. Dr. Violette has also produced and conducted six training seminars on behalf of the Electric Power Research Institute.

Developed environment strategies, including environmental externality valuation and integration of externalities in utility plans, as well as a number of assignments related to Clean Air Act compliance, including emissions trading, conservation as a compliance strategy, and the evaluation of compliance plans.

SELECTED PUBLICATIONS IN CONFERENCE PROCEEDINGS

"Cost Effective Evaluation of Mass Market Load Management Programs" In P*roceedings of the 2001 International Energy Program Evaluation Conference*, Salt Lake City, UT, NTIS Pubs., Washington, DC, Forthcoming, July 2001.

"Opportunities for Load Management in Mass Markets," EEI Retail Energy Services Conference**,** Chicago, Ill., March 29, 2001

"Innovative Sales and Pricing Structures — Riding the Waves!", presented at EMACS '98: The 1998 Energy Marketing and Customer Service Conference, The Westin Horton Plaza, San Diego, California, October 15, 1998.

"Convergence of Markets Opportunities and Risks," presented at the American Gas Association's (AGA) Workshop on Unbundling and Affiliate Transactions, Ritz-Carlton Hotel, Arlington, VA, July 9, 1998.

"Convergence - reality or hype?," presented at the Electric Utility Consultants conference on Electric Utility Business Environment, Westin Hotel, Denver, CO, June 24, 1998.

"Stranded Cost Recovery — Understanding the Legislation Affecting New Jersey and States Around the Country," presented at the IBC's Fourth Annual Industry Forum on Developing and

Negotiating Strategic Mechanisms for Stranded Cost Recovery, Renaissance Washington DC Hotel, Washington, DC, June 23, 1998.

"Electricity Price Forecasts and the Forward Price Curve for Electricity," presented at the EPRI 1998 Innovative Approaches to Electricity Pricing Conference, Washington, DC, June 18, 1998.

"The Business Process Challenges of Retail Competition: Organizational Structures Will Change," Pacific Cost Gas Association's (PCGA) Deregulation Conference, Portland, OR, May 13, 1998.

"Changing Times: Business Opportunities and Risks in the Gas and Electric Industries." Presented at the American Gas Association's (AGA) Marketing and Communications Conference: Betting On Our Customers, Las Vegas, NV, April 27, 1998.

"The Ten Year Perspective: What Actions Need to be Taken Today for Your Firm to be Successful 10 Years From Now?" Presented at *The Fourth Annual Power Industry Forum, Panel Four: Marketing — Heart of the New Power Company*, Infocast, Carlsbad, CA, March 7, 1997.

"North American Energy Measurement & Verification Protocols (NEMVP)." Presented at the AEE Chapter, Budapest, Hungary, November 26, 1996.

"Evaluation of Energy Efficiency Activities: The Keys to Success." Conference materials presented at the *2nd International DSM & Energy Efficiency Strategies Conference*, Copenhagen, Denmark. November 20-21, 1996.

"An Introduction to the Principles and Applications of Market Research for Electric Power Companies." In *Infocast Conference Proceedings — Market Intelligence for Utilities: Obtaining and Analyzing Critical Customer and Competitor Data.*" Denver, CO, July 29, 1996.

"Customer Decision Making." Presentation for *Infocast Conference — The Marketing Institute for the Electric Power Industry*, Atlanta, GA, March 5, 1996.

"Creating Market Opportunities through Energy Services." Opening Plenary Session, *Proceedings of the 1995 Association of Energy Services Professionals Annual Member Meeting*, Association of Energy Services Professionals Pubs., Boca Raton, FL, December 4-6, 1995.

"Customers' Speak — What Customers Need from Energy Suppliers." In *Proceedings of the 1995 Association of Energy Services Professionals Annual Member Meeting*, Association of Energy Services Professionals Pubs., Boca Raton, FL, December 4-6, 1995.

"Assessing Marginal Costs for Competitive Pricing." In *Proceedings of Conference on Competitive Analysis & Benchmarking for Electric Power Companies*, Center for Business Intelligence Pubs., Burlington, MA, November 1995.

"Performance Measurement Concepts and Framework." In *The 1995 Performance Measurement Workshop: Measuring the Performance of Utility Products and Services in an Era of Increasing Competitiveness*, Denver, CO, Electric Power Research Institute Pubs., Palo Alto, CA, November 1995.

"Setting a Research Agenda for Assessing Market Transformation and Spillover," In *Proceedings of the 1995 International Energy Program Evaluation Conference*, Chicago, IL, NTIS Pubs., Washington, DC, #CONF-950817, August 1995, p. 9.

"Evaluation in the Age of Anxiety." In P*roceedings of the 1995 International Energy Program Evaluation Conference*, Chicago, IL, NTIS Pubs., Washington, DC, #CONF-950817, August 1995, p. 859.

"Data Collection and Information Systems: What We've Learned from the DSM Experience." In *Proceedings: Delivering Customer Value — 7th National Demand-Side Management Conference*; Electric Power Research Institute Pubs., Palo Alto, CA, #EPRI TR-105196, June 1995, p. 25.

"Energy Efficiency Evaluation." In *Proceedings — IEA Experts Panel Meeting on Evaluation*, Sponsor: International Energy Agency/Organization for Economic Co-operation and Development, Washington, DC, November 1994.

"Evaluation: Issues, Methods, and Direction." In *Proceedings of Asian Pacific Economic Community (APEC) Inter-Utility Demand Side Management Liaison Group*, Julia Shaver, ed., Oak Ridge National Laboratory, Oak Ridge, TN, October 1994.

"Addressing Uncertainty and the Value of Flexibility in the Second Generation of IRP." Published in the *Proceedings of American Council for an Energy Efficient Economy — 1994 Summer Workshop***,** ACEEE vol. 6, p. 231, August 1994.

"The Treatment of Outliers and Influential Observations in Regression-Based Impact Evaluation." Published in the *Proceedings of American Council for an Energy Efficient Economy — 1994 Summer Workshop***,** ACEEE vol. 8, p. 172, August 1994.

"Addressing Uncertainty and the Value of Flexibility in Utility Planning." In *Proceedings of the 1994 Integrated Resource Planning Conference*, Electric Utility Consultants, Inc. Pubs., Denver, CO, April 1994, p. 1.

"Discrete Choice Models for Planning and Evaluation of Electric Utility Demand-Side Management Programs," *Proceedings TIMS/ORSA Joint National Meeting*, Chicago, IL, May 1993.

"Data Quality in Program Tracking Systems: The Impact on Evaluation." *Proceedings of the 6th National Demand-Side Management Conference*; Electric Power Research Institute Pubs., Palo Alto, CA, #EPRI TR-102021, March 1993.

"Impact Evaluation and Program Tracking Systems." *Proceedings — 6th National Demand-Side Management Conference: Making a Difference.* Sponsors: Electric Power Research Institute, Edison Electric Institute, and U.S. DOE, Electric Power Research Institute Pubs., Palo Alto, CA, #EPRI TR-102021, March 1993, p. 41.

"Uncertainty in an IRP Process." *Proceedings of the Integrated Resource Planning Conference*, Sponsor: Electric Utility Consultants, Inc., Denver, CO, March 18-19, 1993, p. 289.

"Estimating the Impacts of DSM Programs for Use in IRPs." *Conference Proceedings — Long Range Forecasting for Gas Utilities*, New Orleans, LA. Sponsor: American Gas Association, Washington, DC, March 11-13, 1992.

"A Framework for Evaluating Environmental Externalities in Resource Planning — A State Regulatory Perspective." In *Proceedings of the NARUC National Conference on Environmental Externalities* in Jackson Hole, WY. National Association of Regulatory Utility Commissioners, Washington, DC, October 1990.

"Five Steps through the Clean Air Act — Developing an Acid Rain Compliance Strategy." In *Proceedings of the 1990 Energy and the Environment Conference*. Sponsor: Electric Utility Consultants, Inc., Denver, CO, September 1990.

"Using Billing Data to Estimate Energy Savings: Specifications of Energy Savings Models, Self-Selection and Free-Riders." Published in the *Proceedings of American Council for an Energy Efficient Economy (ACEEE) — 1990 Summer Workshop*, ACEEE, Washington, DC, August 1990, Vol. 6, p. 131.

"Evaluation of a New Home Construction Program: Combining Load Research, Billing Data, and Engineering Estimates in a Consolidated Framework." Published in the *Proceedings of American Council for an Energy Efficient Economy (ACEEE) — 1990 Summer Workshop*, ACEEE, Washington, DC, August 1990, Vol. 6, p. 167.

"Use of End-Use Load Research Data in Statistical/Econometric Evaluations of DSM Programs." *Proceedings — Conference on End-Use Load Information and its Role in DSM* in Irvine, CA. Sponsor: The Fleming Group, July 1990.

SELECTED PUBLICATIONS — JOURNALS AND BOOKS

"An Initial View on Methodologies for Emission Baselines: Energy Efficiency Case Study," OECD and IEA, June 2000

"Conventional Pricing Wisdom Not Competitive: Riding Customer-Choice Wave with Innovation Creates Margin, Attracts Customers," for *Energy Marketing; Forecasting the Future of the Energy Marketplace*, February 1999/Volume 2.1.

"Chapter 16: Implications of Retail Customer Choice for Generation Companies." In *Customer Choice: Finding Value in Retail Electricity Markets*, Public Utility Reporting (PUR) Press, January 1999.

"Evolving Business Processes for Gas Utilities: The Impacts of Retail Choice," for the Gas Research Institute, Market Analysis and Information Technology Business Unit, May 1998.

"Retail Choice and Energy Convergence: Implications for Gas Utilities," *Natural Gas*, Pubs., John Wiley & Sons, Inc., August 1998.

"Viable Business Models for Generation in an Era of Competition and Retail Choice," Public Utilities Report, Forthcoming, September 1998.

"Evaluation, Verification, and Performance Measurement of Energy Efficiency Programmes." *International Energy Agency Publication*, Paris, France, Forth Draft, April 25, 1996.

Editor, *Performance Impacts: Evaluation Methods for the Nonresidential Sector***,** Electric Power Research Institute Pubs., Palo Alto, CA, EPRI TR-105845, Research Project 3269, December 1995.

Editor, Inaugural Issue of the Energy Services Journal, Lawrence Erlbaum Associates Pubs., Vol. 1, Issue 1, October 1995.

"Chapter 6: Estimating Spillover and Market Transformation." In *Performance Impacts: Evaluation Methods for the Nonresidential Sector*, Electric Power Research Institute Pubs., Palo Alto, CA, EPRI TR-105845, Research Project 3269, December 1995.

Evaluation and Verification of Energy Efficiency Programmes: Issues and Methods, International Energy Agency Pubs., Paris, France, October 1995.

"A Convergence of Concepts: The Coming Wave of Change Management and Strategic Benchmarking." President's Column, *STRATEGIES: A Publication of the Association of Energy Services Professionals*, Spring 1995, p. 9.

"Demand-Side Management at the Crossroads," *Natural Gas Journal*, Pubs: John Wiley & Sons, Inc., December 1994, pp. 13-18.

"DSM in the Crystal Ball." President's Column, *STRATEGIES: A Publication of the Association of Energy Services Professionals*, Fall 1994, p. 7.

Regulating DSM Program Evaluation: Policy and Administrative Issues for Public Utility Commissions. National Association. of Regulatory Utility Commissions, (NARUC), Washington, DC, NTIS Pubs. #ORNL/Sub/95X-SH985C, April 1994.

"Comments on Applying Ratio Estimation Methods." *Evaluation Exchange*. Synergic Resources Corporation and the International Energy Program Evaluation Conference Pubs., Bala Cynwyd, PA, September/October 1993, Vol. 3, No. 2, p. 3.

"Chapter 4: Value of a Statistical Life in Wrong Death Cases," *Hedonic Methods in Forensic Economics*, J. Ward Ed., University of Missouri Press Pubs., 1992.

"Setting Evaluation Accuracy Standards: What Will and Will Not Work." *Evaluation Exchange.* Synergic Resources Corporation and the International Energy Program Evaluation Conference Pubs., Bala Cynwyd, PA, November/December 1992, Vol. 2, No. 6, p. 9.

Approaches for Synthesizing DSM Program Evaluations: The Wisconsin DSM programs Evaluation Database and a Review of Meta-Analysis, Electric Power Research Institute Pubs., Palo Alto, CA, #EPRI, TR-100697s, Vols. 1-3, June 1992.

"Chapter 5: Data Analysis for DSM Program Evaluation," in the *Handbook to DSM Program Evaluation*, Eric Hirst and John Reed, eds., NTIS Pubs., Washington, DC, # ORNL/CON -336, December 1991.

"Chapter 9: Integrated Resource Planning and the Clean Air Act, in *Energy Efficiency and the Environment: Forging the Link*," E. Vine, D. Crawley and P. Centolella, eds., ACEEE Series on Energy Conservation and Energy Policy, Pubs: American Council for an Energy-Efficient Economy Pubs., Washington, DC, 1991, pp. 177-188.

Impact Evaluation of Demand-Side Management Programs — Volume 2: Case Studies and Applications, Electric Power Research Institute Pubs., Palo Alto, CA, #EPRI CU-7179 V2, September 1991.

Impact Evaluation of Demand-Side Management Programs — Volume 1: A Guide to Current Practice, Electric Power Research Institute Pubs., Palo Alto, CA, #EPRI CU-7179, Vl, February 1991.

Integrated Planning, Evaluation and Cost Recovery Issues for Gas Distribution Utilities. Planning and Analysis Group, American Gas Association Pubs., May 1991.

TESTIMONY

Prepared testimony and testified before the New Jersey Board of Public Utilities concerning GPU's Restructuring Petition, Docket No. EO97060396, March 20, 1998. Corresponding report is entitled "Review of GPU's Restructuring Petition, GPU Energy Docket No. EA97060396, February 24, 1998.

Prepared testimony and testified before the New Jersey Board of Public Utilities concerning GPU Energy Unbundled Rates Petition, Docket No. EO97070458," January 12, 1998. Corresponding Report is entitled "Review of GPU's Unbundled Rates Petition," GPU Energy Docket No. EA97060396, December 15, 1997.

Prepared testimony in the Joint Application of Central Power and Light Company, West Texas Utilities Company and Southwestern Electric Power Company for Approval of Preliminary Integrated Resource Plans and for Related Good Cause Exceptions, before the Public Utility Commission of Texas, Docket No. 16995, January 1997.

Participated in rate case testimony and support for Central Light and Power Company for the rate case, Docket No. 14965, before the Texas PUC, March 1996.

Prepared testimony for three utilities in Iowa on DSM evaluation, incentives and IRP.

Authored testimony on behalf of El Paso Electric Company examining the efficacy of its supply planning process as part of an ongoing rate case concerning in part, the cost recovery of the Palo Verde 3 Nuclear Power Plant.

Prepared testimony for Peoples Natural Gas concerning the impact evaluation of five energy efficiency programs, November 1993.

Provided litigation support for the Municipal Electric Association of Canada, in hearings in Ontario concerning Ontario Hydro's commitments to nuclear facilities, utility planning methods, and load forecasting. This multiyear assignment involved the most thorough review of Ontario Hydro's planning process, the future of nuclear power in Canada, and the role of independent power producers. The hearings were presided over by a Ontario province supreme court justice.

Rebuttal testimony on behalf of Arizona Public Service Company involving utility planning and rate increase procedures, before the Arizona Corporation Commission, January 1991, Docket Nos. U-1345-900007 and U-1345-89-162.

Prepared testimony on behalf of El Paso Electric pertaining to its planning and resource acquisition process, filed in October 1990 before the Texas Commission.

Testimony on cost of service, innovative rates, and rate design before the Connecticut Department of Public Utility Control RE: United Illuminating Company, Docket No. 89-08-11 and 12.

Surrebuttal testimony for the staff of the Delaware Public Service Commission, "Concerning the Power Plant Perfo rmance Program of Delmarva Power & Light Company," Docket No. 88-16, March 1989.

Testimony for the staff of the Delaware Public Service Commission, "Review of the Delmarva Power & Light Company Power Plant Performance Program," Docket No. 88-16, November 1988.

Testimony on Arizona Public Service Company, Cost of Service and Rate Design, for the staff of the Arizona Corporation Commission, Docket No. U-1345-85-150, January 1987.

Between 1983 and 1987, testified in eleven regulatory proceedings covering a wide-range of topics.

PROFESSIONAL AFFILIATIONS AND HONORS

Completed third year as elected President of the Association of Energy Services Professionals (AESP), 1994, 1995, and 1996

Editor of the inaugural issue of the *Energy Services Journal*, Lawrence Erlbaum publishers, 1995

Member of the National Commission on Air Quality Benefits Estimation Panel

Member of the editorial board of *Evaluation Exchange*

Awarded *Highest Distinction* on both PhD Comprehensive Field Exams, University of Colorado

Recipient of University of Colorado Regents Fellowship

Graduated *summa cum laude*, Arizona State University, 1973

Male Scholar of the Year, Arizona State University, 1973

Athlete/Scholar of the Year, Western Athletic Conference (WAC), 1972

Resume for Meg Matt

Meg Matt has provided integrated marketing communications to the energy industry for more than 25 years, including 13 years with Arizona Public Service, a large investor-owned utility.

The Matt Group, a Phoenix-based firm formed in March 1999, provides integrated marketing solutions to a variety of clients within the energy industry. Services include market and brand strategy, marketing communications, competitive market assessments, customer satisfaction studies and public relations. Clients have included Southern California Gas, Chartwell, Syntegra USA (a division of British Telecomm), Enercom, Food and Energy Management Association, Association of Energy Services Professionals, Austin & Williams, Summit Blue Consulting and others.

THE SECOND OPINION (1998-1999)

Prior to forming The Matt Group, she was president and principal of the Second Opinion, a marketing and brand strategy firm based in Atlanta. The Second Opinion worked with some of the country's top Fortune 100 firms, as well as new organizations entering the retail market. Second Opinion offerings included:

- Syndicated market research and analysis studies to understand the consumers' acceptance of buying non-traditional products and services from their utility; customer awareness and acceptance of deregulation in California before and after the state deregulated and the role trade associations play in aggregation of energy and services.
- Brand studies for several U.S. investor-owned utilities and industry-related manufacturers.
- Co-authored an in-depth report on brand identity for E Source entitled, *Perrier or Plain Water? Branding in the New Energy Marketplace* (released January 1999).

A&C Enercom/EcoGroup (1991-1998)

Ms. Matt's experience also includes providing marketing and consulting services to several national consulting firms specializing in the energy industry.

Arizona Public Service (1977-1991)

Positions and responsibilities at this investor-owned utility included:

- **Manager of Shareholder Relations** – extensive crisis communications experience as a result of the suspension of the company's common stock dividend and an attempted, but unsuccessful, hostile takeover by PacifiCorp.
- **Director Nuclear Power Information** – handled community/public relations, media relations, employee communications and consortium relations for three-unit nuclear power station.

- **Energy Affairs Representative** – extensive research and writing of white papers, educational material, speeches and video scripts on the subjects of production and distribution of electricity, fuel mixes, rate information, etc.
- **Video Producer** – researched, wrote and produced a wide range of videos for internal and external audiences.

Education/Industry Organizations

- B.S. in Management (cum laude) from Western International University, Phoenix, Arizona.
- President of the Association of Energy Services Professionals Board of Directors

Industry Presence and Awards

- Ms. Matt is a frequent speaker on the subjects of market planning, new products and services, brand strategy and assessing competitive risk. In addition, she conducts an annual workshop for Chartwell on new products and services in the energy industry.

- Ms. Matt is the recipient of several awards including:
  - AESP's Outstanding Contributor of the Year – 2000
  - AESP's Contribution to Member Educational Development Award -- 2000
  - Gold Anvil Award for Outstanding Employee Communications Video by Public Relations Society of America – 1982

PAUL MONKMAN, MS

EMPLOYMENT HISTORY

- Senior Consultant, Summit Blue Consulting, LLC, Ithaca, NY, 2000-Present

EDUCATION AND PROFESSIONAL

- University of Colorado, Boulder, MS, Summa cum Laude, Building Energy Systems,
- Clarkson University, BS, with Great Distinction, Mechanical Engineering,

PROFESSIONAL EXPERIENCE

Mr. Monkman has nine years of experience in project management, electric utility demand side management program (DSM) implementation, measurement and verification, and evaluation. Some recent activities include the following:

- Evaluating the comfort and electrical demand impacts of a residential direct load control program for Louisville Gas and Electric (2002).
- Performing energy audits at over seventy commercial and industrial facilities as part a of a DSM potential studies for Xcel Energy (2002) and Ottertail Power (2001).
- Designing evaluation strategies for Louisville Gas and Electric's residential direct load control program (2001).
- Leading the design and implementation of a residential air conditioning direct load control program for Public Service Company of Colorado (1997).
- Estimating the achievable potential of industrial demand side management for Texas Utilities (1999).
- Providing measurement and verification due diligence technical oversight services for a number of Texas and California utilities' competitive bidding and Standard Performance Contract (SPC) DSM programs (1997-1999).

While at Summit Blue, Mr. Monkman has performed comfort and electrical impact analysis for a residential direct load control program at Louisville Gas and Electric. In addition to his work doing analysis for LG&E, he wrote evaluation plans and detailed engineering algorithms for evaluating their residential, commercial and industrial DSM programs. He has conducted energy audits at over 70 commercial and industrial facilities for Ottertail Power and Xcel as part of detailed DSM potential studies. On an engagement with Arizona Public Service, he helped to research and design energy conservation brochures for the small business sector.

Mr. Monkman's engagements while a project manager at Schiller Associates include providing technical support services to Texas Utility Electric Company's and Houston Lighting and Power's competitive DSM bidding programs. He co-authored their measurement and verification procedure manuals, programmed Microsoft Access databases for project management and electric impact tracking, and reviewed commercial and industrial energy conservation projects. Project reviews included assessing the feasibility of the projects, reviewing the measurement and verification plans for technical soundness, arranging for subcontractor's to perform on-site inspections and metering, and writing submittal disposition correspondence. Projects encompassed a wide range of commercial and industrial energy conservation measures affecting HVAC, lighting, refrigeration, and motors. In addition to this work with these Texas utilities, Mr. Monkman worked with Public Service Company of Colorado to establish the measurement and verification requirements for their Bid 2000 competitive bidding DSM program.

Prior to Mr. Monkman's association with Schiller Associates, he was employed by Electronic Data Services. There, he was the project manager for the impact evaluation of several Central Hudson Gas and Electric residential and commercial DSM rebate programs. He created a Microsoft Access database to perform the engineering calculations and provided the tool to the client so future projects could be automatically included in the evaluation results.

Prior to Mr. Monkman's association with Electronic Data Services, he was employed by Xenergy Inc. While there, Mr. Monkman worked on site at Public Service Company of Colorado providing implementation services for the Bid II competitive bidding DSM program. During this engagement, Mr. Monkman helped to streamline program policy, developed standardized form sets for program implementation, modified the Microsoft Access program tracking database as needed, evaluated projects for contractual consistency, reviewed measurement and verification plans, oversaw subcontractor metering and verification efforts, performed verification inspections, recommended bidder payments, and handled much of the day to day bidder communications.

With RCG Hagler/Bailly, Mr. Monkman helped to evaluate a wide variety of DSM programs. Using DOE2 building simulations and engineering algorithms, he analyzed the energy and demand savings associated with complex HVAC, industrial, and energy efficient lighting projects and their controls.

Prior to working with RCG Hagler Bailley, he worked for General Electric's Machinery Apparatus Operations as a project engineer overseeing the production of reactor plant equipment for nuclear submarines.

KURT VELGUTH, MS

AREAS OF QUALIFICATION

Mr. Velguth is an energy industry analyst with expertise in simulation modeling, engineering analysis, onsite building audits, program evaluation, market research, and database design.

EMPLOYMENT HISTORY

- Senior Consultant, Summit Blue Consulting, Boulder, CO, 2000-present
- Consultant, PHB Hagler Bailly Consulting, Boulder, CO, 1998-2000
- Research Assistant, E Source, Boulder, CO, 1997-1998

EDUCATION AND TRAINING

- Stanford University, MS, Civil (Energy) Engineering
- Stanford University, BS, Civil (Environmental) Engineering
- Received both Stanford degrees after four years combined study, placing in the top five students in the class for each degree
- Certified building energy auditor

PROFESSIONAL EXPERIENCE

Mr. Velguth's project work has involved simulation modeling, market and technology research, and onsite field work in buildings. He has researched diverse topics, including load management programs, building automation systems, and alliance opportunities for electric co-ops. Specific project work includes:

- Evaluating energy and demand savings impacts for all the DSM programs of two Southeastern utilities, including designing data tracking systems that allow for evaluation of impacts concurrent with program implementation, and extensive simulation modeling of residential home types.
- Performing more than 50 onsite "walk-through" energy audits of commercial and industrial customers of two Midwestern utilities.
- Researching strategic partnerships involving electric cooperatives for the NRECA.
- Researching investments in broadband technologies by electric cooperatives, and the corresponding impacts on business effectiveness of co-ops, for the NRECA.
- Evaluating energy and demand savings impacts for a DSM program of a Western utility.
- Working with a Southeastern distribution company to develop their bid package for energy services programs.
- Performing building simulation modeling for a Southwestern utility, using DOE-2 and ESPRE.

- Investigating utility load management programs for a Midwestern utility.
- Researching and evaluating building automation systems and energy management software products.
- Applying multi-region dispatch and generation expansion models to forecast future energy and capacity prices, and to assess the relative economics of new and existing plants.
- Researching and co-authoring multi-client studies addressing new energy products and services for high-tech manufacturing facilities, for schools and universities, and for hotels and motels.

At PHB Hagler Bailly Consulting, Mr. Velguth led the PROSYM modeling for the asset valuation group.