



Proposal to  
California Public Utilities Commission  
2004-2005 CPUC Energy Efficiency Programs  
Pursuant to Decision 03-08-067

## **Solid-State Signs Program: Enhancing the Market for LEDs in Commercial Signage**

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Making a World of Difference

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# I. Program Overview

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## A. Program Concept

Besides building brand image, increasing storefront visibility, and attracting customers, the electric signs that promote businesses across California also excel in another area: energy consumption. In fact, an estimate based on national usage data suggests that these signs consume approximately 2.0 TWh of electricity in California<sup>1</sup>. They therefore represent an enormous source of largely untapped potential energy savings. This proposal seeks to capture a portion of that potential within the next two years by providing rebates to California's commercial businesses that retrofit existing and planned channel letter and architectural signs with light-emitting diodes (LEDs). Offering energy savings in the range of 60- 90% over conventional lighting sources, LEDs are widely viewed as the emerging technology with the greatest potential to dramatically reduce building energy consumption in the long term. The proposal team--comprising Ecos Consulting, a company with significant experience in designing and implementing successful rebate programs, plus recent research into market opportunities for LEDs, and Navigant Consulting, a leading energy consulting firm that brings extensive experience in emerging energy-efficient technologies, including LEDs—will work closely with the market players that influence signage purchase decisions to encourage LED retrofits in commercial signs. Based on our experience and an analysis of the sign stock and LEDs' market potential, we project that this rebate program will lead to the retrofit of signs in over 1,000 locations throughout the state, resulting in close to 10,000 MWh in energy savings and a peak reduction of up to 1,500 kW.

## B. Program Rationale

### 1. Benefits and Challenges of Today's LEDs

Still emerging LEDs—simple semiconductors designed to generate light at very high efficiency—are among the most energy-efficient technologies ever developed. Incorporated into lighting systems, their energy-saving potential promises to dwarf that of other building technologies. According to Sandia National Laboratory, widespread use of LEDs (also called solid-state lighting) in broad-based lighting applications could cut worldwide electricity use for lighting by more than 50% and total electricity use by more than 10%. Truly innovative, LEDs reside in a premium category of energy-efficient building technologies.

Aware of the urgent need for high-performance, cost-effective LED lighting systems, the U.S. government is considering a provision of the draft Energy Policy Act of 2003 that establishes a Next Generation Lighting Initiative. Calling for \$500 million for LED research over the next decade, the Initiative will support activities at several national laboratories (including LBNL) and numerous academic institutions and manufacturers to accelerate the

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<sup>1</sup> D&R International estimates the national energy consumption of electric commercial signs to be approximately 17 TWh. Scaling this estimate to California based on population (12%), a statewide estimate of 2.0 TWh is prepared.

development of this technology. The objective is to build and maintain U.S. leadership in the field of solid-state lighting, the light source with the greatest potential to supplant all other less efficient sources.

While LED lighting for white-light environments (e.g., office and residential) is not yet ready for commercialization, LEDs for colored applications are commercially available, proven and cost-effective. Two particularly attractive applications are commercial channel lettering and architectural signage.

Briefly, architectural signage highlights the structure of a building, and channel letter signs are letter-shaped enclosures covered by a colored, translucent plastic. The letters spell the name and/or logo of the business advertised, such as Target, Trader Joe's or Starbuck's. The signs typically range from 1 to 2 feet high, but can be up to 4 feet and higher.

The neon tubes typically illuminate the letters and consume about 11 watts per foot. Commercially available LED replacement strips consume just 1 to 2 watts per foot and offer other significant benefits over conventional light sources:

- Estimates suggest that replacing today's neon, fluorescent, and incandescent sources with LEDs in channel lettering signs could lead to 60% - 90% lower energy use on average. Because business signs often operate 12 - 24 hours a day, the energy-use reductions will result in both energy savings (kWh) and peak reduction (kW).
- Highly flexible LEDs are much easier to install than brittle neon glass tubes and fit into small spaces and tight corners.
- Housed in an epoxy casing, LEDs are extremely robust. Therefore, they nearly eliminate the losses due to breakage during transport and installation incurred with neon.
- Operating at only about 12V, LEDs are a safer light source than neon, which requires 12,000V - 15,000V to operate.
- Thanks to their flexibility, toughness, and low-voltage operation, LEDs cost much less to install and maintain than neon. In particular, an electrician can perform LED installations, whereas neon installations require a highly trained neon expert.
- Longer projected LED lifetimes will also result in greatly lower maintenance costs for LEDs than for neon. According to market players, lower maintenance costs are the primary LED selling point, of greater concern to customers than the energy-savings benefit. Lab tests show the life expectancy of LED systems to be about 50,000 hours, compared to 1,000 hours for incandescent, 6,000 - 20,000 hours for fluorescents, and about 24,000 hours for high-pressure sodium. A recent UL requirement for ground-fault protection on transformers threatens to double or triple neon maintenance, furthering the attraction of LEDs.

Nonetheless, today's LEDs face several critical, specific barriers in the signage market:

- **Availability:** LEDs are commercially available in a growing number of colors: red, red-orange, yellow-amber, blue, green and cyan. However, some LED colors do not offer sufficient brightness for some sign applications, and the lack of a bright white LED is of concern to sign designers.

- **Awareness:** Commercial advertising signs in general, and LEDs in particular, are not solidly on the radar screen for energy efficiency upgrades. Energy services companies (ESCOs), the market players who typically help commercial customers achieve efficiency improvements, usually limit their activities to indoor lighting and HVAC and rely on older technologies that have long track records in the field but offer only modest energy savings. Furthermore, the existing utility LED sign programs have had limited participation, in part because of insufficient attention to some key market actors and lacked the outreach needed to address the unique market barriers that this emerging technology faces. (See below for an analysis of the utility programs.)
- **Accessibility:** Sign providers may not offer LED signs in their portfolio of products both because the providers may not be familiar with LEDs and because some wholesale distribution channels fail to supply LED products.
- **Affordability:** The first cost of LED signs is substantially higher than that of conventional signs, and users are reluctant to foot the bill unless they can be confident of a very short payback period.
- **Acceptance:** Though potential customers may be aware of LEDs, they often lack up-to-date performance information (best practice case studies) or express skepticism about the validity of laboratory data on the performance and life of LEDs. Like all new and emerging technologies, LED signs simply do not have the proven track record of real-world installations that many end-users prefer.

Despite these market barriers, high-performance LEDs are ready for many commercial advertising sign applications. By incorporating innovations that address the barriers discussed above, our proposed program will widen acceptance of LED signs and capture the attendant energy savings in the near term. However, before describing our program, it is instructive to examine the impact of the 2002/2003 LED rebate programs.

## 2. Shortcomings of Existing LED Programs

Through the Express Efficiency programs run by the state's investor owned utilities (IOUs), the Commission has offered rebates during 2002 and 2003 to small and medium commercial customers ( $\leq 500$  kW per service account) for retrofitting red neon channel signs with LEDs. We believe the low enrollment these programs experienced may be due to the following:

- **Challenging Target Market:** Small and independent medium businesses may not fit the early adopter profile for LEDs. These businesses are reluctant to invest in advanced technologies for an end use that accounts for only a small proportion of their total energy bill. They frequently lack cash for capital investments and sufficient understanding of, or confidence in, new technologies.
- **Contractor/Vendor Reluctance:** Many smaller sign design and installation companies that influence this sector are often disinclined to recommend LEDs. As mentioned above, they are reluctant to guarantee performance under real-world conditions. Furthermore, because LEDs are easier to install and maintain than neon signs, these companies worry that LEDs will erode their core business, largely based on their expertise with neon and other conventional technologies.

- **Limited Marketing and Outreach:** The LED rebates were offered as part of a list of other rebates, and were not the subject of much individual promotion. This emerging technology requires substantial marketing and outreach to make a compelling case for its merits to potential customers.
- **Narrow Focus:** The LED rebate programs focused mainly on the affordability market barrier. The other areas critical to the market success of a new product—availability, awareness, accessibility, and acceptance—were not successfully addressed.

### 3. Innovative Program to Overcome Challenges

Our proposed program offers innovations designed to overcome these problems and thus offer a much higher probability of yielding substantial energy savings goals:

#### Adjust the target market

This program focuses on the customers most likely to view signage as a significant portion of their energy and maintenance bill and to consider energy-savings concepts with multi-year payback periods: large commercial customers and medium-sized customers, particularly those that are part of a larger chain. These customers appreciate the value of adopting energy-saving and lower-maintenance tactics as part of their overall cost-reduction strategies and are comfortable adopting advanced energy savings technologies. They recognize the numerous signs within their network as a natural target for energy savings and have the capital to invest in projects with a longer-term payback.

#### Actively engage the participation of market influencers

Our experience has shown us that the most effective and efficient way to reach customers is to tap into the market mechanisms already in place. Therefore, rather than attempt to build relationships with customers from scratch, the Ecos team will work through the market actors who already influence the sign purchase decision: national-account sign manufacturing design firms, architecture/engineering (A/E) firms, LED manufacturers, and electric utilities. Unlike the small sign installation companies, these organizations understand the potential of LEDs and are anxious to promote this technology. Like our program, these organizations have already targeted medium and large commercial customers—especially retail stores, restaurants, convenience shops, grocery stores, and strip malls—as the most likely early adopters of LEDs. The Ecos team will piggyback on this momentum by actively recruiting and enlisting the support of these players. We'll work with them to promote the LED rebate, while aggressively supporting their promotion efforts. In addition, we will rely on their expertise to fine-tune our rebate program and look to them to co-fund the development of marketing materials.

We have already spoken to many market players who confirmed the effectiveness of this approach, including national sign manufacturer Icon Identity Solutions and numerous LED manufacturers. Further, we have a tradition of working well with the IOUs and expect that they will support our efforts to enhance the success of this rebate program. We'll also cooperate with other emerging market players, such as Community Choice Aggregators (CCAs), Flex Your Power, and other publicly funded outreach efforts as appropriate.

## Design an incentive that makes economic and practical sense

Our research shows that a rebate level of \$6 per linear foot can provide a one-year or less payback period for red and yellow, the most predominant sign colors. At the start of the program, we will gather information from industry expert to review color costs and to help determine if the single rebate amount has deterred customers from blue/green retrofits. If so, we will make a recommendation on a cost-effective rebate amount for those colors, and possibly, reducing the rebate for the red and yellow LEDs.

## Develop a robust marketing program

No program, no matter how well designed, will succeed without promotion. We will develop and implement a marketing program that will make our target audience aware of the rebate and its benefits to their companies. In particular, we will develop case studies and other pieces to document performance under real-world conditions. To ensure that the program targets customer information needs, we will solicit advice from our partners, and to aid in cost-effectiveness, we will set a goal of obtaining co-funding in the range of 50% for production of marketing materials. We will also work with utilities, CCAs, other local and national initiatives (DOE), and the Flex Your Power campaign to develop cooperative marketing when appropriate. Specifically, the program plans to tap into the following elements of Flex Your Power:

- Outreach to the commercial sector as appropriate, especially on the website, [www.fypower.com](http://www.fypower.com). In addition to general information on the program, we will work with Efficiency Partnership to include case studies and links to program partners and other relevant resources.
- Outreach to our target markets via the eNewswire service.

## Operate the program statewide under a single team

Businesses will find it easier to take full advantage of the rebate for every sign retrofit throughout California if they can work with a single program administrator.

Beyond these innovations, the Ecos team brings a wealth of experience in designing and executing programs that introduce customers to new energy-efficient technologies—helping not only create immediate energy savings, but also build a self-sustaining market for the beneficial technology.

- Delivering a ground-breaking statewide lighting program through the 1998 - 1999 California Statewide Lighting and Appliance Program (CRLAP), which helped develop the essential retailer infrastructure that later supported the efforts to combat the 2001 energy crisis.
- Designing and implementing the CPUC's 2002-03 ENERGY STAR<sup>®</sup> CFL Program for Small Hardware and Grocery Retailers, which is projecting to exceed its energy savings goal of 30.2M kWh by over 38%. If the no-cost extension request is granted, Ecos expects to exceed the original goal by over 46%.
- Designing and implementing LiteVend, an innovative CPUC program designed to improve the energy efficiency of both new and existing cold beverage vending machines. LiteVend is the first in the country to directly and comprehensively address vending machine energy consumption, and it successfully engaged Coca-Cola



Bottling of Southern California and Pepsi Bottling, Southern California Business Unit, to participate in the program.

- Supporting LiteWash, a program that provided prescriptive rebates to the commercial, institutional and multi-family sectors for high efficiency commercial washers, as well as a lighting element for comprehensive efficiency services to this exceptionally hard-to-reach market segment.
- Supporting CEC and DOE in energy efficiency efforts, including technology and market assessments, development of appliance efficiency standards, technology roadmapping, and strategic planning.
- Creating a stakeholders working group (“Northern Lights”) with Natural Resources Canada to create market-based programs for energy-efficient lighting products in Canada.
- Preparing *U.S. Lighting Market Characterization*, a DOE publication of the national installed base and energy consumption estimates of all light sources in the United States.
- Ongoing work for DOE to develop a comprehensive report examining solid-state lighting (SSL) and the industrial changes necessary to facilitate a market shift to SSL sources.
- Performing a three-year study that evaluated building audit data and end-use metered fixtures to estimate the installed base of lighting technologies and their associated energy consumption.
- Supporting the development of a national lighting market model that estimates the energy savings possible if solid-state lighting achieved certain price and performance targets.

Our analysis, outlined in detail in the workbooks that accompany this narrative, show that the program we propose meets all of the criteria developed by CPUC:

### Cost-Effectiveness

The cost-effectiveness calculations demonstrate that the proposed program provides significant and cost-effective energy savings. Using the methodology provided by the Commission, we calculated that this program provides a TRC of 1.65 and a participant test benefit to cost ratio of 2.29. The results of the cost-effectiveness calculations are shown below in Table 1 below.

**Table 1. Cost-Effectiveness Test Results**

Test	Program Costs	Program Benefits	Ratio
TRC	\$3,263,071	\$5,390,371	1.65
Participant	\$1,400,000	\$3,200,000	2.29

An electronic copy of the Commission’s cost-effectiveness spreadsheet is submitted with this proposal. The results contained in the table above were taken directly from that spreadsheet. This cost-effectiveness model was used with no modifications. However, because the



program is introducing a number of newly available energy-efficient measures, we have used a number of assumptions, which are summarized in Section IV.

## Annual Long-Term Savings and Peak Demand Savings

Based on our experience and an analysis of the sign stock and LED's market potential, we project that this program will lead to the retrofit of signs in over 1,000 locations throughout the State, resulting in over 9,800 MWh in energy savings and a peak reduction of about 1,500 kW. Table 2 below contains a summary of estimated program saving goals for 2004 and 2005.

**Table 2. Program Goals**

	Goal (ft)	Incentives	kWh Savings	kW Savings
2004	80,000	\$480,000	3,942,000	600
2005	120,000	\$720,000	5,913,000	900
<b>Total</b>	<b>200,000</b>	<b>\$1,200,000</b>	<b>9,855,000</b>	<b>1,500</b>

## Equity

Equity issues are generally not raised in the medium and large commercial sector. However, by helping ensure the viability of LEDs with medium-to-large commercial segments, this program lays the groundwork for future promotion to small commercial markets including hard-to-reach segments.

## Innovation

This program focuses on a highly innovative product—one that, when fully mature, promises far greater energy savings than ever before achieved through a single technology. However, today's LED signage is in an earlier stage of market acceptance than most other rebated technologies and requires exceptional measures to move it one step closer to meeting that potential. Recognizing that gap, our program introduces innovations over previous programs by adjusting the target market, redefining the rebate, working with market influencers to promote the program, and focusing on supplying potential customers with real-world performance information—with an eye to vastly increasing the program's energy savings payoff. Simply put, this program melds innovation with proven implementation and market actor engagement methods to lay the groundwork for ensuring that LEDs eventually enjoy robust success throughout the electric sign market.

## Coordination with Others

Our project team is already speaking with market players and has obtained letters of support from DOE and numerous national account sign design firms and LED manufacturers. We will also seek the cooperation of the IOUs and CCAs, and where appropriate, we will piggyback on the marketing inroads made by Flex Your Power and other local and national marketing efforts. To make sure that this coordination translates into cost savings, we will set the objective of obtaining at least 50% co-funding for the production of all marketing materials and will seek matching funds for marketing from Flex Your Power and others as appropriate.

In addition, because members of our team provide ongoing strategic planning support to CEC and DOE in the buildings energy efficiency field, we are well positioned to offer input to these groups to foster LED technology and market development.

What's more, this program sets the stage to overcoming some of today's market barriers to LEDs.

### **Availability**

Current utility rebates focus on red LEDs, as they provide the commercial retrofit sign market with acceptable brightness and costs. By encouraging the adoption of this technology, our program will speed the development of better products in a wider variety of colors, specifically, blue, amber, and green, and possibly bright white.

### **Awareness**

Our marketing, information, and technical support program will increase customer awareness of the benefits and characteristics of LED technology and of the rebate program. In particular, we will supply the market with up-to-date information on this rapidly advancing product, and supplement laboratory data with case study information to overcome concerns over real-world performance.

### **Affordability**

This program addresses affordability at two levels. First, the rebate makes LEDs more affordable to early adopters. Second, the economies of scale made possible by volume production needed to meet the greater demand created through this program will lead to more cost-effective products more quickly.

## **C. Program Objectives**

Our program will provide energy savings of close to 10,000 MWh and peak reduction of about 1,500 kW over the next two years. By encouraging the demand for LEDs, this program also intends to speed the development of lower-cost, brighter sources in a wider variety of colors, making LEDs a much more viable choice for small- and medium-sized commercial customers. In turn, a greater LED adoption rate will provide California with a long-term, sustainable means of whittling away at the 2.0 TWh currently required to illuminate commercial signs in our state.

## **II. Program Process**

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### **A. Program Implementation**

As described above, our proposed program overcomes the limitations of the existing LED sign retrofit program by making innovative modifications that address real market conditions. A detailed program description follows.

## 1. Program Kick-off

The purpose of this task is to plan for all the activities needed to run a successful LED sign retrofit program. Because coordination with the market influencers is crucial to success, much of this early work will focus on bringing these industry partners up-to-speed on the program elements and goals and gathering their ideas on improving the program. We will also develop work with other groups to find areas for coordination. Steps to be taken include:

### **Program kick-off meeting with assigned IOU administrator**

This meeting will bring our team together to plan the program logistics, focusing on goals, strategy, time-line, and budget, as well as roles, actions, and responsibilities.

### **Initial program outreach to key market players**

This process, which has already begun, includes identifying, recruiting, and enlisting the participation of key market players: national-account sign design firms, A/Es, ESCOs and LED manufacturers. A member of our team will meet with each of these actors to present our plan, gather their recommendations on how to refine the plan based on their knowledge of the market and their customers, and obtain their commitment to promote the program. Issues that these players could comment on include:

- Rebate amount
- Rebate processing procedures and forms
- Product and installation specifications
- Marketing and outreach strategies
- Customer information needs
- Best media outlets for marketing and advertising
- Opportunities for co-funded marketing and cooperative PR
- Identification of key potential customers
- The value of adding other sign applications, such as message center reader boards, to the program

### **Coordination with other marketing efforts**

We will contact national and local publicly funded energy-efficiency marketing programs to identify opportunities for cooperating to both save money and avoid exposing the public to a confusing array of energy-efficiency programs. We will also work with the IOUs to determine ways to coordinate with their Express Efficiency programs—again to maximize funding and avoid confusing the market. In addition, we will seek out other commercial and retail programs, including those operated by third parties and CCAs.

A major issue to explore with the IOUs and publicly funded efforts is whether it makes more sense to brand this program with a unique identity or to present it under the existing Express Efficiency brand. Both options raise issues that can only be addressed and resolved with inputs from these partners.

### **Task 1 Deliverables**

- Minutes from the program kick-off meeting
- Memo documenting partner ideas and refinements to the program elements
- A memo outlining areas of cooperation with the Express Efficiency statewide program and other commercial programs offered by third parties and CCAs

## **2. Establish Program Infrastructure**

The purpose of this task is to put in place all of the infrastructure and materials required to ensure that the program runs smoothly and is easy for commercial customers to join. This will involve a number of steps.

### **Finalize the incentive amount and measure**

We expect the final rebate to be \$6/linear foot. However, we will propose modifications as necessary based on a review of the most current cost/performance information and the input of our industry partners.

### **Finalize hardware and installation specifications**

With our partners, we will review the fairly simple technical specifications for the existing LED channel sign rebate program (which basically require use of only red LED retrofit kits or replacement signs that use 20% or less of the actual input power of the sign replaced) to determine if changes are needed. In particular, we will determine which additional colors are feasible in terms of cost and performance. We will also examine the need for installation specifications. However, because LEDs are very easy to install, we doubt that detailed specifications will be required.

### **Draft final program participation agreements**

We will prepare memos of understanding (MOUs) that outline the commitments expected from our program partners. Specifically, the MOUs will require partners to commit to meeting outreach and sales targets, providing co-funding for marketing activities, assuring the quality of their product or service, and responding proactively to customer complaints. Program participants will have to sign these MOUs to become eligible to offer and deliver incentives to commercial clients.

### **Adapt our rebate processing procedures and forms to meet the needs of this program**

We will adapt our existing processes as needed to facilitate customer participation, while ensuring that all necessary data are captured and tracked for accurate energy-savings verification.

### **Establish customer service line and technical support services systems**

Ecos will set up a unique phone line dedicated to serving the partners and customers of this program. We will also develop the technical support services needed to help our partners promote the program to their customers. In particular, an Ecos team member will be available to accompany partners on their marketing calls to answer technical questions about the program and the rebate and to respond to the need for additional technical support materials.

## **Complete the marketing strategy and produce program marketing materials**

The marketing strategy will define the key audiences and messages for this program, outline outreach tactics, identify coordination opportunities with the Flex Your Power campaign, and define needed marketing and PR materials. Additionally, we will develop a “program kit” to help our partners promote the rebate. It will also include a budget and timeline for producing and delivering materials, identify opportunities for co-funded/cooperative marketing, and define a mechanism for cost-sharing. We will then initiate production of the program kit and other marketing materials. Production of marketing materials will take place on an ongoing basis to meet the information needs of our partners and their customers. For more on the marketing plan, see section B below.

## **Identify an EM&V contractor**

The project team will develop an RFP to identify interested EM&V contractors and select a contractor to develop and implement the EM&V element of the program. The contractor will be selected based on experience, costs and quality of past work.

### **Task 2 Deliverables**

- Customer participation sheets outlining final rebate amount, hardware and installation technical specifications, and enrollment procedures
- Technical support materials (as needed)
- Marketing plan
- Program kits and marketing and PR materials
- Agreement with selected EM&V contractor

## **3. Program Implementation**

The purpose of this task is to conduct the activities needed to enroll customers in our program and begin achieving energy savings. Throughout the implementation period, we will emphasize working with our partners to maximize the cost-effectiveness of our efforts and attain high enrollment and success rates. This task will include the steps below. (More details on these activities are also found in the sections that follow.)

### **Enlist/sign-up major program partners**

We will enlist industry partners, including national account sign companies and LED manufacturers, to promote the program to their customers and obtain their signatures on the MOUs that define their commitment.

### **Support promotional efforts of program partners**

The Ecos team will actively support the promotional efforts of our partners. This support will include providing program kits with information and marketing tools to help customer make good decisions, creating new marketing materials as needed, providing technical support on the rebate, and developing new materials or procedures to respond to our partners’ needs. We will also monitor and track the efforts of our partners on a regular basis to ensure that they are achieving their commitments, and will assist in remedying any shortfalls in their promotion process. While we will depend on our partners to optimize their relationships to

promote the rebate, ultimately, Ecos is responsible for the success of this program. As such, we are prepared to respond creatively to any problems, such as eliminating non-performing partners. If needed, we will take over some customer outreach to ensure that customers are aware of and benefiting from the rebates, thereby providing California with a high level of kWh and kW savings.

### **Implement marketing/advertising/PR activities with partners**

We will augment our partners' efforts by executing a marketing/advertising/PR program designed to create visibility and build awareness of the rebate program. We will work with partners to ensure that we are providing customers with the information and calls to action that will lead enrollment. As noted, these actions will be co-funded and cooperatively marketed when appropriate. Additionally, we will tap into the Flex Your Power campaign to help build awareness around the program. Specifically, we will make certain to promote the program on [www.fypower.com](http://www.fypower.com) with a program listing, links to program partners and placement of case studies as they become available. Additionally, we will work with the Flex Your Power coordinators to ensure our program is mentioned in all other appropriate communication vehicles, such as eNewswire.

### **Provide customer service and technical support**

This will include responding to queries via the toll-free telephone line and offering program and technical information assistance to partners and customers as needed.

### **Verify installations at a sampling of sites**

Random inspections will help ensure that installations are being performed correctly and providing the projected energy savings.

### **Process rebates**

As customers enroll, our program staff will process the forms quickly and effectively, following the procedures outlined, and ensure that rebates are provided to customers in a timely manner.

### **Task 3 Deliverables**

- Signed MOUs from program partners
- Marketing and technical support materials
- Monthly memo documenting program status (including progress, problems and remedies, key customer contacts, marketing/PR/tech support activities, rebates processed, costs incurred, and projected monthly kWh savings)

## **4. EM&V and Reporting**

The purpose of this task is to ensure that the Commission and other interested parties receive complete documentation on the progress and success of the rebate program. This will involve the following steps:

### **Develop a final EM&V plan**

Ecos will instruct the EM&V contractor to develop an EM&V plan. Ecos will then review then it thoroughly to ensure it covers all needed elements, and will present the final plan to the Commission.

## **Conduct monthly reporting and analyze findings**

Each month, the Ecos team will provide its Task 3 progress memos to the EM&V contractor, along with any other needed information, to allow the contractor to track progress and analyze progress versus goals. The contractor will report findings to the Ecos team, which will make any program/implementation changes deemed necessary to ensure that the program is on track to achieve the desired energy use and peak reduction objectives.

## **Report to CPUC on a regular basis**

The Ecos team will report on program status and progress toward goals at the intervals specified in the program contract. We will use the format and content for these reports found in the reporting instructions issued by the Energy Division.

In addition, the Ecos team will respond to any requests for information from the contract administrator or the Commission as quickly as possible—certainly, within five days, unless a request to extend the response time beyond five days has been granted.

## **Make necessary adjustments to the program at end of Year 1**

In January 2005, we will review the market situation and our program and make any adjustments needed to ensure that the program continues to achieve the desired energy savings. In particular, we will review our internal processes and plans, and we will interview our partners (LED manufacturers, national sign design firms, utilities, etc.) to determine:

- If LED technology has changed and if prices are lower
- How customers are responding to outreach strategies, marketing materials and rebate processing procedures
- Whether to adjust the rebate amount in response to market and technology changes. This would include possibly reducing the rebate for red and yellow LEDs and/or increasing the rebate for blue and green LEDs.

As needed, we will adapt program elements to make it more effective for program partners to garner additional energy savings.

## **Submit a final report**

In addition to creating periodic reports, the Ecos team will file a final report at the end of the program, following the format and content requirements found in the reporting instructions. We will also make any changes required by the Commission to ensure that the final report is complete and correct.

### **Task 4 Deliverables**

- Final EM&V plan
- Monthly internal reporting and analysis
- Regular reports to CPUC
- Memo proposing any needed changes at end of Year 1
- Final report



## B. Marketing Plan

Working with our partners and drawing on our extensive experience designing and executing effective rebate marketing plans, we will develop a marketing plan (under Task 1 above) that:

- Defines our branding strategy (i.e., whether to co-brand with an existing program or develop a unique brand);
- Identifies needed materials, emphasizing cost-effectiveness;
- Sets a development and deliver schedule for those materials;
- Identifies co-funders and secures approximately 50% co-funding for the production of marketing material; and
- Incorporates Flex Your Power where appropriate.

Summarized below are some of the elements we will include to market the LED sign rebate to large commercial customers.

### **Assist and Support Market Actor Activities**

Personalized contact and relationships are essential to closing deals with commercial customers. Therefore, we will work with our partners to identify key customer targets and develop an outreach strategy that builds on existing relationships with those customers. In addition, Ecos will support our partners' outreach by, providing technical support on implementing the rebate, and creating a "program kit."

While we will depend on our partners, the Ecos team will be responsible for ensuring that contacts and follow-through take place. To this end, we will develop a contact-tracking database to effectively monitor these activities. Should any partner be unable to follow through with a key target, Ecos will assume the lead for that potential customer if appropriate.

### **Marketing/Advertising/PR Outreach with Partners**

While individual contacts will be essential, we will also create visibility and build awareness of the rebate program through a targeted marketing campaign. This will include developing collateral to support the campaign. Examples include:

- PowerPoint presentations
- Leave-behinds
- A simple calculating tool to help customers perform back-of-the-envelope cost/benefit analyses for both energy and non-energy economic benefits (including maintenance)
- Templates and boilerplate copy that allow partners to co-brand the marketing materials
- Information on [www.fypower.com](http://www.fypower.com) and Express Efficiency marketing channels
- Case studies

- Fact sheets
- Articles/press releases in trade publications/trade websites
- Advertising in trade publications
- Direct mail, email, and fax materials
- Presence/materials/booths at industry trade meetings
- Web banner advertising

This is not a mass-market campaign, since our target audience is relatively small. We therefore anticipate the need for relatively low quantities of printed materials—hundreds or possibly a few thousand of each item, rather than tens of thousands. To ensure cost-effective production, we will choose printing and reproduction methods that are economical in smaller quantities and that allow for printing on demand. In addition, we will seek at least 50% co-funding from partners on any collateral produced for the program and take advantage of co-funding from other groups, such as Flex Your Power.

## C. Customer Enrollment

The proposed program is designed to work within the existing market actors, so most customer enrollment will occur through the leading sign manufacturers and designers who sign on to promote the program to their existing and target customers.

Due to its focus on medium to large commercial accounts and working through partners, this program will not require the extensive tracking systems needed for campaigns that target mass-market consumers. We will therefore scale and customize our processing system to accurately process enrollments and ensure timely payments without creating an undue administrative burden.

## D. Materials

The current LED sign rebate specifications are fairly simple, calling for the use of red LED retrofit kits or replacement signs that use 20% or less of the actual input power of the sign replaced. With our partners, we will review these specifications against the current state of the technology to determine if changes are needed. In particular, we will identify whether additional colors are feasible in terms of cost and performance. We will also examine the need for installation specifications. Because LEDs are very easy to install, we doubt that detailed specifications will be required.

## E. Payment of Incentives

Ecos has a complete processing system in place for high volume campaigns and to date has processed more than \$23 million in incentives for its clients. We have developed internal procedures and protocols that help identify fraud and ensure timely payments to program participants. The Ecos team will ensure that incentives are paid to the end customer (or a third party they designate) in a timely and accurate manner. To further verify energy savings,

we will also conduct post-field inspections at a sampling of sites to ensure that the hardware is properly installed and operating correctly so that the expected energy savings are achieved.

## F. Staff and Subcontractor Responsibilities

Ecos will implement the project in partnership with Navigant Consulting Inc. (NCI). Ecos typically procures printing and translation services vendors who we use on a consistent basis for much of our program work. An EM&V contractor will be selected once we have received a notice to proceed from the CPUC’s contract administrator.

Ecos will provide overall program management, oversee the outreach and marketing activities and provide program infrastructure including database, incentive processing, customer service and reporting. NCI will provide technical expertise and program design guidance through its DOE solid-state lighting consulting team, as well as program outreach in Northern California.

An Ecos Senior Program Manager will oversee the project. A Management Supervisor will oversee and assist the outreach component of the program and a Field Manager will perform outreach activities in the SCE and SDG&E territories. Ecos’ Marketing Director will work with the Ecos and NCI program management team to develop the marketing materials necessary to support the program partners in selling the program. Ecos’ IT Director will oversee rebate processing, customer service and the database.

An NCI Principal will work with a team of his Consultants to provide technical and program design assistance using the expertise they provide to the DOE in support of federal solid-state lighting assessments. NCI’s Sacramento office will provide Consultants and Program Analysts who will perform outreach for program delivery in the PG&E territory.

## G. Work Plan and Timeline for Program Implementation

The Program Implementation section above describes the key activities in a set of Tasks 1-4. These Tasks and key activities are outlined in the program timeline in Table 3 below.

**Table 3. Timeline of Tasks and Completion Dates**

<b>Task</b>	<b>Completion Date</b>
<b>1. Program Kick-off</b>	<b>January 2004</b>
Program kick-off with utility program manager	January 15, 2004
Initial outreach to key market players	January 15-30, 2004
Initial outreach and coordination with Flex Your Power (FYP) and Express Efficiency	January 15-30, 2004
<b>2. Establish Program Infrastructure</b>	<b>Feb - March, 2004</b>
Finalize incentives and specifications	March 30, 2004

Program participation MOUs completed	February 15, 2004
Establish rebate processing procedures and forms	March 15, 2004
Establish customer service and tech support	March 30, 2004
Marketing plan and initial materials, kits (including FYP, Express Efficiency, third party or CCA elements)	March 30, 2004
EM&V contract	March 30, 2004
<b>3. Program Implementation</b>	<b>March 30, 2004 – Dec. 31, 2005</b>
Sign up program participants	March 30, 2004 – June 30, 2005
Technical support/materials	March 30, 2004 – Dec. 31, 2005
Marketing/PR support/materials	March 30, 2004 – June 30, 2005
Coordinate with FYP, Express Efficiency, third parties and CCAs	Ongoing
Process rebates and maintain customer service	March 30, 2004 – Feb. 28, 2006
Verify installations/Quality Assurance	July 2004 – March 2006
<b>4. EM&amp;V and Reporting</b>	<b>Ongoing through March 2005</b>
Develop final EM&V plan	March 30, 2004
EM&V activities and reporting	March 30, 2004 - Ongoing
Design and implement program adjustments	January 2005
Monthly reports to utility program manager	February 10, 2004, and the 10th of each month thereafter
Quarterly reports to CPUC	April 15, 2004 July 15, 2004 October 15, 2004 January 15, 2005 April 15, 2005 July 15, 2005 October 15, 2005 January 15, 2006
Final program report to CPUC	March 15, 2006

# III. Customer Description

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## A. Customer Description

This program will target large, single-facility commercial customers and small to medium commercial customers that have multiple retail outlets in California's electric IOU service territories. Our research shows that the most likely target businesses are retail outlets, restaurants, convenience stores, grocery stores and strip malls.

### Customer Size

This represents a significant customer base. According to the 2002 California Statistical Abstract, in 1992 there were about 162,100 retail businesses in California, recording total sales of \$225 billion, and roughly 224,500 service industry establishments, claiming \$198 billion in sales. In total, the three IOUs sold 115,384,947 MW of electricity to nonresidential customers in 2001.

### Customer Energy Purchasing Characteristics

According to LED manufacturers and the national account sign design firms that we have contacted, large commercial customers are among the most sophisticated energy buyers within their client base. These companies are under enormous pressure to bring down their bottom line and do extensive research and analyses to identify and determine the benefits of energy-saving measures. They typically work through engineering and architectural firms to learn about and access LED products.

To date, large retail chains appear to be the most likely candidate for LED signs. One manufacturer reports that about 40% of these customers retrofit their signs, while 60% did new sign construction.<sup>2</sup>

As noted above, we will use marketing strategies to appeal to this market as a whole, via promotions with program partners in appropriate media, and will employ more personal strategies for key targets within this customer base that are recommended by our partners.

## B. Customer Eligibility

This program will be open to all nonresidential customers with business outlets located in the service area of any one of California's three investor-owned utilities (PG&E, SCE, and SDG&E) who retrofit or replace a channel letter sign or architectural signage currently using neon, fluorescent, or incandescent sources with LEDs or who select LEDs for planned new signage.

Customers may receive retrofits for more than one sign, provided all signs retrofit are at business outlets within an IOU service territory. To avoid double-dipping, customers who receive an incentive or service from another state or local program will not be eligible for this rebate. Rebate dollar amount limits per customer will be established to be in line with limits for similar programs.

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<sup>2</sup> Personal communication, Karim Kanani, Marketing Manager, TIR Systems, September 9, 2003.

## C. Customer Complaint Resolution

Our goal is to minimize complaints by setting up systems to help resolve customer issues before they become problems. In the past, we have used toll-free numbers and Internet information sites. This project is unique in the level of personal contact needed to bring customers on-board and the strong role that our market partners will play in “selling” the program to customers. With our partners, we will determine how best to provide customers with information upfront to avoid confusion or conflicts.

Should complaints occur despite these efforts, we will follow the process outlined in the MOUs, which will require these partners to provide quality assurance for their product or service and to handle customer complaints. Because our partners have a long-standing interest in upholding the integrity of their products and services and in maintaining excellent relationships with their customers, we anticipate that they will prefer to interact with the customers personally to resolve any problems. The Ecos team will only become involved in individual customer complaints as arbitrators should the partner fail to resolve the problem to the customer’s satisfaction. Our goal will be to ensure that customers are satisfied and that the equipment is generating the projected energy savings.

## D. Geographic Area

The rebate will apply only to signs retrofit at business outlets within the service areas of one of California’s three investor-owned electric utilities (PG&E, SCE, and SDG&E). A large commercial customer who retrofits numerous signs can receive a rebate only for signs within an IOU service area.

# IV. Measure and Activity Description

## A. Energy Savings Assumptions

Ecos Consulting worked with Navigant in narrowing the wide range of LED and neon energy consumption and savings that are currently reported by manufacturers and other research organizations. According to LED manufacturers iLight and TIR, the energy consumption for LEDs range from 1.4W to 2.4 W per linear foot for red and amber to 1.9W to 4.0 W per linear foot for green and blue LEDs. For neon, the average neon system consumes about 10W per linear foot. Based on this information, we used an average of 10W per linear foot for neon and 2.5W per linear foot for LED in estimating program savings. Peak and energy savings values are contained in Table 4 below:

**Table 4. Energy Savings Assumptions**

Measure	Unit	W	Peak Demand Reduction (kW per foot)	Est. Annual kWh Savings @18 hrs/day
Red Neon	Linear Foot	10	0	0
Red LEDs	Linear Foot	2.5	0.0075	49.3

## B. Deviations in Standard Cost-effectiveness Values

We used the CEC's recommendations for net-to-gross ratio for an emerging commercial program of 0.80. With respect to measure life, we used a conservative value of 15 years. With respect to incremental measure cost, we have use \$7 per linear foot, based on a range of \$5 to \$14 per foot gathered from our research.

## C. Rebate Amounts

For the rebate amount, we have determined that cost-effective incentives can cover a range from \$3 to \$9 per linear foot, depending on the LED types and colors, as well as the type of application. Initially, the program will be offering \$6 per foot for red LEDs. Following the Program's approval, the we will determine the appropriate amount of incentive for each LED color, based on input from industry participants.

## D. Activities Descriptions

Important program activities that may not result in direct energy savings include the following:

- Customer education
- Technical support (including technical and product review)
- Coordination with national efforts
- Generation of case studies and successes

## V. Goals

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This program's goal is to capture energy savings in the next two years by providing rebates to California's commercial businesses to retrofit existing and planned channel letter and architectural signs with LEDs. The program will work closely with the market players that influence signage purchase decisions to encourage LED retrofits in commercial signs. Based on our analysis of the sign stock and LEDs' market potential, we project that this program will lead to the retrofit of signs in over 1,000 locations throughout the state, resulting in close to 10,000 MWh in energy savings and a peak reduction of up to 1,500 kW.

The program will also aim to increase customer awareness of energy-efficiency in general and LEDs signage in particular. Working with industry leaders, the program aims to accelerate the introduction of LEDs into the sign market, and assist early adopters with technical issues, thus paving the way for other adopters of this technology. Table 5 below summarizes our goals, incentives and energy savings.



**Table 5. Goal Summary**

	<b>Goal (ft)</b>	<b>Incentives</b>	<b>kWh Savings</b>	<b>kW Savings</b>
2004	80,000	\$480,000	3,942,000	600
2005	120,000	\$720,000	5,913,000	900
<b>Total</b>	<b>200,000</b>	<b>\$1,200,000</b>	<b>9,855,000</b>	<b>1,500</b>

## **VI. Program Evaluation, Measurement, and Verification (EM&V)**

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The project team will develop an RFP to identify interested EM&V contractors and select a contractor based on experience, costs and quality of past work. This contractor will develop the final, detailed EM&V plan and Ecos will review and finalize the plan to ensure that it adequately addresses all relevant evaluation issues.

Specifically, we will ensure that the EM&V plan includes mechanisms to provide the following information:

- Energy and peak demand savings achieved
- Cost-effectiveness
- An assessment of the market, including a baseline analysis
- Ongoing feedback to correct and fine-tune the program implementation
- Measurement of program effectiveness, including testing of the assumptions underlying the program theory and approach
- Assessment of the overall performance and success of the program
- Input on compensation and final payment

Although the plan will not be finalized until we undertake this task, we believe that our budget allocation of \$94,394 for the EM&V program is sufficient, based on our experience conducting EM&V for similar programs.

We will hire one of the following two firms to perform the outside program evaluation tasks: Quantec or Itron (RER). Both of these firms are experienced with performing evaluations of utility and third party programs and are known to the IOUs and the CPUC.

## **VII. Qualifications**

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### **A. Primary Implementer**

Ecos Consulting (Ecos) was founded in 1997 by four principals from the utility industry, environmental community, government, and academia. The company specializes in researching opportunities for energy efficiency in the marketplace and in the application of market-based methods to encourage increased use of environmentally beneficial

technologies. Our client list includes investor-owned utilities, municipal utilities and regional market transformation organizations in the Pacific Northwest, California, Nevada, the Midwest and the Northeast. We have offices in Covina, California, Portland, Oregon, and Durango, Colorado. Ecos maintains a staff of more than 40 employees and supplements its capabilities, as needed, with affiliated expert consultants.

Ecos is a key player in designing and implementing residential and commercial energy efficiency programs, and its research team has an established track record of supporting emerging technologies in the marketplace, including ENERGY STAR<sup>®</sup> torchieres and fixtures. Areas of expertise as it relates to this project include:

### **Research**

Ecos' research activities focus on identifying new market opportunities for products and services that address energy efficiency and pollution prevention. By demonstrating the economic and environmental benefits of new approaches, the company's technology research and assessment has driven market acceptance for energy efficient residential lighting and appliances. Specific to this project, Ecos recently completed *LED Technologies and Potential for Near Term Applications*, a report to the Northwest Energy Efficiency Alliance that outlined key opportunities that the organization might consider supporting in future lighting program efforts.

### **Program Design, Management and Implementation**

Ecos has significant experience designing and managing programs including many multi-year, multi-million dollar programs in the Northwest and California, including CRLAP, LiteVend and the ENERGY STAR<sup>®</sup> CFL Program for Small Hardware and Grocery Retailers. The company has developed a number of award-winning programs, most recently capturing ACEEE's 2002 Exemplary Programs award and an ENERGY STAR<sup>®</sup> award for its work on the Northwest Energy Efficiency Alliance ENERGY STAR<sup>®</sup> Residential Lighting Program. Ecos-managed energy efficient lighting programs have resulted in installations of 9,720,654 CFLs, 424,579 fixtures (indoor and outdoor combined), 491,631 torchieres, and 65,017 LED exit signs. Ecos managers have designed commercial and residential lighting, appliance, residential retrofit and new construction programs.

### **Project and Program Tracking**

Ecos currently manages the Energy Trust of Oregon's Home Energy Savings program serving the single family, multifamily and manufactured homes markets. Additionally, Ecos tracks retail, marketing, and utility program activities of over 1,700 retailers and 130 utilities for work with the Northwest Energy Efficiency Alliance and Bonneville Power Administration. In this region alone, Ecos manages the retail and data collection activities of 12 field representatives who cover the 390,000 square miles from the California and Nevada borders to Canada. In addition to these Northwest programs, Ecos has supervised programs for the California PUC (currently the ENERGY STAR<sup>®</sup> CFL Program for Small Hardware & Grocery and the LiteVend Program), Pacific Gas & Electric, San Diego Gas & Electric, Southern California Edison, Nevada Power, Sierra Pacific Power, Los Angeles Department of Water and Power, the Midwest Energy Efficiency Alliance, the Illinois Department of Commerce and Consumer Affairs, and various clients in New England.

### **Incentive Fulfillment Services**

Efficient clearinghouse functions are essential for a successful program, and Ecos has developed a system to minimize and eliminate fraud opportunities and ensure timely payments to program participants. To date, Ecos has processed over \$23 million in incentives for its clients. The database Ecos uses to house all pertinent information is contained within a highly secure, fault-tolerant, and scaleable infrastructure. Ecos can easily provide regular tracking summaries detailing the number of incentives processed and any other relevant invoice or payment information required by a client. Ecos currently manages incentive fulfillment services for the CPUC LiteVend program, the CPUC ENERGY STAR® CFL Program for Small Hardware and Grocery Retailers program, the Energy Trust's Home Energy Savings Program, Puget Sound Energy, Idaho Power, Nevada Power, Sierra Pacific Power Company and other utilities in the Pacific Northwest.

### **Marketing and Education Outreach Activities**

Ecos has designed and implemented more than 50 marketing programs over the past six years. Working closely with clients to determine communication goals, Ecos develops the most effective tools to address these needs. Notable strengths include marketing strategy development, market research, stakeholder coordination, collateral production, media relations and industry outreach. Moreover, Ecos creates comprehensive and cost-effective marketing campaigns through a targeted approach with key market actors, including upstream (manufacturers) and midstream (contractors, distributors, and retailers). These experiences and capabilities, coupled with our established utility, government, community, and economic development relationships, enhance the development of effective marketing and education outreach programs for projects.

In the commercial and new construction arenas, Ecos developed the marketing strategy for the Northeast Energy Efficiency Partnership's DesignLights™ Consortium to encourage adoption of energy-efficient lighting in commercial buildings. Additionally, Ecos assessed the residential new construction market in the Pacific Northwest on behalf of the Northwest Energy Efficiency Alliance, and was able to identify key strategies for addressing the market actors.

## **B. Subcontractors**

Navigant Consulting Inc. (NYSE:NCI) is a leading energy consulting firm with more than 1,000 professional staff located in 34 cities, serving the utility industry, state and federal government agencies, and equipment manufacturers. NCI's clients include the 50 largest electric utilities, the 20 largest gas distribution companies, the 20 largest non-utility power generators and marketers, numerous new market entrants to the converging energy and electric power industries, and a host of large institutional and industrial energy consumers. NCI also provides extensive support to various government energy agencies, such as the U. S. Department of Energy (DOE), the California Energy Commission (CEC), the California Department of Water Resources, and the New York State Energy Research and Development Authority (NYSERDA).

The following long-term program activities are particularly relevant to the proposed project:

## **EERE Support**

For the DOE Office of Energy Efficiency and Renewable Energy (EERE), NCI is a lead contractor responsible for supporting the development of appliance efficiency standards for lighting, water heating, HVAC, refrigeration, and other products. Other activities for EERE over the past decade have included facilitating technology roadmaps, developing RD&D plans for building equipment, developing appliance testing procedures, preparing strategic plans, and performing financial, market, and technology assessments of products for the building market.

## **PIER Support**

NCI provides ongoing analytical and technical support for CEC's Public Interest Energy Research (PIER) program, including for building end-use energy efficiency issues, energy-related environmental research, distributed energy resources (DER), and renewable energy technologies. NCI has assisted CEC in assessing stakeholder needs, developing R&D portfolios and various analytical tools, reviewing proposals, selecting projects, and balancing the project portfolios. We are currently leading a project to assist the CEC PIER Buildings program in reviewing and revising their strategic plan.

The following individual projects are particularly relevant to the proposed program:

### **Lighting Market Transformation Working Group in Canada**

Working with Natural Resources Canada, NCI helped create a stakeholders working group to facilitate market transformation for energy-efficient lighting products in Canada. As part of this project, Navigant Consulting developed the five As barrier analysis and classification tool, identifying availability, awareness, accessibility, affordability, and acceptance as barriers associated with the introduction of new products into the market. The five As tool facilitates barrier identification and thus, market transformation program design, by shedding light on market hurdles and dynamics.

### **U.S. Lighting Market Characterization—Inventory and Energy Consumption Estimate**

In September 2002, DOE published *U.S. Lighting Market Characterization*, an NCI study of the national installed base and energy consumption estimate of all light sources in the United States. To prepare these estimates, NCI analyzed data from thousands of building audits and end-metering, coupled with building inventory databases. Continuing this effort, NCI is developing a comprehensive list of energy-efficient technology options in lighting.

### **Energy Star Technical Analyses**

NCI provides DOE with technical analyses to update Energy Star specifications and estimate program impacts on the marketplace and on national energy usage. This work provides information necessary to make program decisions for Energy Star, accurately characterize the program, develop quality metrics, and assist DOE in targeting new frontiers for voluntary programs.

### **Energy Savings Potential of Solid-State Lighting**

In April 2001, DOE published a study of the energy savings potential of various price and performance improvement scenarios for solid-state light (SSL) sources. This generated energy savings estimates through a simulation of the lighting market based on competition between the conventional and SSL sources. This competition evaluates substitution technology options based on simple payback periods. DOE has asked NCI to evaluate new

price and performance scenarios and prepare a more comprehensive report detailing the model, the results, and the industrial changes necessary to facilitate a market shift to SSL sources.

## C. Description of Management Experience

### My Ton, Senior Program Manager

My Ton, who will serve as the Senior Program Manager for this program, is one of the co-founders of Ecos. He conducts research and provides senior project oversight for both commercial and residential programs. Experience specific to this project includes:

- As a researcher, he has led a number of projects from a variety of perspectives, including technical evaluation of environmental and energy-efficient technologies, product specification and labeling efforts, and product-testing programs. Of particular note, he is one of the lead authors of the 2003 report to the Northwest Energy Efficiency Alliance, *LED Technologies and Potential for Near Term Applications*.
- As Senior Program Manager, he is responsible for program direction and field activities for projects in the Pacific Northwest, California, Idaho and Nevada. He currently directs the CPUC LiteVend program and also supports LiteWash. His typical responsibilities include research and strategic guidance, staff supervision, client interface and budget management.
- In the lighting arena, he performed the technology research and market-segmentation efforts in support of the Department of Energy and Environmental Protection Agency's ENERGY STAR<sup>®</sup> Residential Light Fixtures program (under a grant to the Natural Resources Defense Council).
- While at Green Seal, he led the research for the environmental standards program. The program identified environmentally preferable product categories and set criteria to define, as well as label, such products. He drafted product standards based on product life-cycle analysis, energy efficiency, technology evaluation, and market assessment. This included working with stakeholders to finalize standards in each product category, including manufacturers, trade associations, environmental organizations, and government agencies.

My holds a M.S. in engineering and public policy from Washington University and a B.S. in electrical engineering and history from Carnegie Mellon University.

### Therese M. Fisher, Management Supervisor

Therese Fisher brings over 15 years of project management experience to Ecos and serves as the lead for the California office. She is the Senior Program Manager for the current ENERGY STAR<sup>®</sup> CFL Program for Small Hardware and Grocery Retailers. Under her astute leadership, the program is projected to exceed its energy savings goal by 38%, and up to 46% if the program is granted its extension request. Additionally, Therese led the California IOU-funded ENERGY STAR<sup>®</sup> Residential Lighting Programs with PG&E and SCE in 2001. She also provided oversight for the 2002 - 2003 CPUC LightWash Program.

Therese's ability to manage multi-million dollar programs stems from her wealth of experience as a project manager for highly technical programs, including researching and

implementing projects designed to incorporate clean transportation technologies into government fleets. Previous employers include CALSTART, Acurex Environmental, and Allegheny County Health Department's Division of Air Quality.

Therese holds B.S. in mechanical engineering from Temple University.

### **Marlene Sealey-Frey, Assistant Program Manager**

Marlene Sealey-Frey is currently the Program Manager for the LiteVend project and will continue to serve the program in this capacity. Marlene brings over eight years of marketing experience to the program, four of which she spent as Project Manager at San Diego Gas & Electric. While her background is in the California utility industry, Marlene's understanding of how to implement an energy efficiency program has been key to the success of the LiteVend program.

In addition to her work on LiteVend, Sandy works with the Covina office team on the ENERGY STAR<sup>®</sup> CFL Small Hardware & Grocery Retailer Program. Her roles for these projects include:

- Program strategy and implementation of program activities for LiteVend.
- Development of key account business relationships with the bottling industry, most notably Pepsi and Coke.
- Coordination of the EM&V plan with Quantec to monitor and collect energy data from the field to set a baseline for LiteVend as well as effectively implementing the measurement and evaluation plan for LiteVend.
- Providing assistance on the project and working in the field to encourage Ethnic Grocery and Rural Hardware market to participate in the project.

While at SDG&E Marlene was a member of the California Residential Lighting and Appliance Committee that led California in its first statewide project budgeted at 26 million dollars. While on the committee Marlene worked with EPA & DOE to identify technology standards, environmentally preferable product categories and set criteria to define, as well as label, such products. This included working with the California investor owned utilities, industry manufacturers, retailers, trade associations, environmental organizations and government agencies.

### **David Weigel, Marketing Director**

David Weigel, Marketing Director for Ecos, has successfully promoted multi-million dollar energy-efficiency programs across the region and the nation for the last five years. He will serve the program in this capacity as well, being directly responsible for developing marketing strategy, evaluating its effectiveness, and incorporating revisions to ensure success.

- With more than 13 years experience in marketing and promotions in a variety of industries ranging from print media to the recording industry, David offers fresh and creative approaches to marketing energy-efficiency programs. Of note, he was instrumental in developing the marketing strategy for NEEP's DesignLights<sup>™</sup> Consortium to encourage adoption of energy-efficient lighting designs in commercial buildings.



- Furthermore, David manages a comprehensive advertising and point-of-sale (POP) campaign for the Northwest Energy Efficiency Alliance Residential ENERGY STAR® Lighting program, developing materials for large-scale incentive programs, including those coordinated with BPA, Puget Sound Energy, Portland General Electric, Idaho Power, Nevada Power, Sierra Pacific Power and Sacramento Municipal Utility District programs.

David holds a B.A. in marketing communications from Lewis and Clark College.

### **David Weisong, Information Technology Director**

David Weisong, Information Technology director for Ecos Consulting, will serve as the lead for establishing processing and tracking systems.

- He has spent nearly a decade managing information technology systems for small to large companies. A self-made entrepreneur and technology specialist, David now focuses on technology infrastructures that increase productivity and enhance communication for developing and growing organizations.
- Currently he is working closely with the Energy Trust for the Home Energy Savings program on call center functions, IT infrastructure and complex incentive processing requirements.
- He also recently managed the development of a database to track and fulfill product-specific incentives for the Nevada Power and Sierra Pacific Power Company Appliance Rebate programs.
- Past clients include Apple Computer, Deloitte & Touche, Nike, InFocus Systems and Legacy Health Systems.

### **Michael Scholand, Senior Technical Consultant**

Michael Scholand, who will serve as a Senior Technical Consulting on this program, is a Senior Consultant at NCI, where his work focuses on supporting government and industry activities related to building energy efficiency. His recent work includes:

- Leading the market and technology assessments, technology screening analysis, and engineering analysis to support DOE's development of minimum efficiency standards for distribution transformers.
- Supporting DOE's development of a roadmap for lighting controls technology, as a submap of *Vision2020*, DOE's overall lighting technology roadmap. This activity involves collaboration with top experts from the lighting industry, buildings sector, and research to identify the appropriate R&D path to facilitate greater market penetration of lighting controls.
- Performing a three-year study that evaluated building audit data and end-use metered fixtures to arrive at an estimate of the installed base of lighting technologies and their associated energy consumption. The resulting report characterizes conventional and emerging lighting technologies; describes lighting markets; estimates disaggregated lighting-related energy consumption; estimates the energy savings potential of lighting RD&D; and identifies barriers to lighting energy conservation and efficiency.



- Managing a review process to identify lighting technology options that hold great promise for energy savings. This activity started with a comprehensive review of the measures, programs, and technologies that could improve the energy efficiency of lighting. It then summarized and analyzed the best opportunities to prepare an estimate of the energy savings potential.
- Supporting the development of a national lighting market model that estimates the energy savings possible if solid-state lighting achieved certain price and performance targets. This market model simulates consumer-purchasing behavior in selecting more efficient solid-state technology over conventional light sources and then calculates the energy savings that would accrue.
- Developing a market barrier analysis tool for the Canadian government called the *Five As*. This tool examines the circular consumer thought process when making a purchasing decision: Availability, Awareness, Accessibility, Affordability, and Acceptance.
- Advancing market transformation activities in Canada. Michael helped create a Canadian lighting stakeholders group with representatives from all parts of the value chain, and used the Five As analysis tool to design a market transformation program for energy-efficient lighting.
- Supporting NYSERDA in evaluating minimum purchasing standards for lighting products, including traffic signals and fluorescent lamps, ballasts, and fixtures.

Michael received a double major B.S. Degree Magna Cum Laude in Mechanical Engineering and Environmental Studies and an M.S. in Civil and Environmental Engineering from Tufts University.

### **Philip Toth, Program Outreach, PG&E Territory**

Phillip Toth, who will serve as the Program Outreach Manager for the PG&E Territory, is a Senior Consultant at NCI's Sacramento office. Formerly a Senior Market analyst at SCE, Philip brings nearly 10 years of utility experience, including background in performing market assessments and targeting DSM products and services to specific regional populations within California. Other experience includes spot municipalization mitigation, market strategy development, defending IOU franchise against competitive threats, GIS, and market research. Relevant experience includes:

- Participating in DSM-related programs, including energy-efficiency/DSM program market assessment and target marketing. He performed a market assessment that analyzed and calculated market potential to determine potential savings for a third-party initiative aimed at servicing room and central A/C units in the Coachella Valley. He also estimated the size of the under-served energy efficiency market in conjunction with CPUC's requirement to target this market.
- In order to achieve program marketing cost savings, Philip identified segments of SCE's customer base most likely to own specific equipment or products (e.g., older air conditioners, a swimming pool) or to exhibit certain behaviors, such as a propensity to use rebate programs or use more electricity than regional norms. He also identified areas/regions with above average new construction and identified the construction firm(s).

- Creating customer energy and demand profiles for varied land uses and customer types using environmental impact reports and DOE building energy simulation models. Structuring and constructing a target market database designed to track and target OBMC program participants.

Philip holds a B.S. in Marketing from California State University, Chico.

### **William Goetzler, Senior Program Advisor**

William Goetzler, Senior Program Advisor for the program, is a Principal in the Advanced Energy Systems Practice of NCI. He has 15 years of experience in building energy-efficiency and related fields. His work focuses on providing technology and market assessments as well as strategic planning assistance for public sector organizations and manufacturers of products such as HVAC and refrigeration equipment, building controls, lighting, appliances, and distributed energy systems.

Prior to joining NCI in January 2003, William was an Associate Director at Arthur D. Little, Inc., where he was responsible for managing the HVAC and Building Energy Systems unit, a group of 10 professionals focusing on energy-efficiency in buildings and related equipment and systems. In that capacity, he led and participated in a wide variety of activities, ranging from applied research and product development to market and technology assessments and corporate strategic planning. Relevant project activities include:

- For DOE, directing a project to analyze the energy savings, emissions reductions, and economics associated with combined cooling, heat and power (CHP) for commercial building applications.
- In support of DOE appliance efficiency standards program, serving as a technical expert and directing the engineering analysis for new efficiency standards for residential and commercial unitary air conditioners. This involved analyzing design options to improve efficiency and evaluating their cost impact.
- Managing ongoing efforts to analyze the potential for efficiency standards development for commercial refrigeration products for DOE and developing testing standards for these products.
- For CEC, leading the effort to develop a methodology to evaluate the energy savings potential of new technologies for buildings. The methodology is designed to facilitate benefits comparisons of proposed R&D projects, support project and portfolio management, and market the benefits of the program to various stakeholders.
- For the CEC, leading a project to assist the PIER Buildings Program in reevaluating and revising their strategic plan for RD&D activities.
- Under a program funded by the Connecticut Light & Power RD&D Program, managing the development of a wireless occupancy sensor for lighting control.

William holds a B.S. from MIT and an M.S. from Stanford University, both in Mechanical Engineering.

### **Eugene Hong, Technical Consultant**

Eugene Hong, who will serve as a Technical Consultant on this program, is a Consultant in NCI's Advanced Energy Systems Practice, providing support on lighting technologies to

DOE EERE. Relying on his background as an electrical engineer and his education and research experience at Rensselaer Polytechnic Institute's (RPI's) Lighting Research Center, Mr. Hong helps DOE identify energy savings opportunities and develop cost-effective energy-efficiency standards. Recent relevant activities include:

- Supporting DOE's High Intensity Discharge (HID) determination analysis to assess whether significant energy savings are technically feasible and economically justified. On this project, Eugene prepared the Market and Technology Assessment, evaluating shipments, applications, distribution channels, fixtures, lamps, and ballasts associated with HID lighting.
- Reviewing energy consumption and analyzing the market for lighting products, including reflector lamps and torchiere fixtures.
- Participating in the DOE Lighting Market Characterization project to identify and evaluate research opportunities and technologies where government involvement could result in cost-effective energy savings.
- Serving as an electrical engineer for Lights of America, where he designed integral and remote ballasts for both linear and compact fluorescent lamps. He was responsible for the redesign of all electronically ballasted products, in addition to developing prototype ENERGY STAR CFL torchieres, outdoor security luminaires, and linear fluorescent luminaires.

Eugene received a B.S. in Electrical Engineering from California State Polytechnic Institute of Pomona and a M.S. from the Lighting Research Center at RPI.

## VIII. Budget

Table 6 provides a budget summary for Program Year 2004, Table 7 provides a budget summary for Program Year 2005 and Table 8 provides a budget summary for the full Program.

**Table 6. Program Budget Summary Program Year 2004**

	2004 Budget			Total
	PG&E	SCE	SDG&E	
Program Design & Planning				
Ecos Labor	18,365	14,094	5,552	38,012
Navigant Labor	7,489	5,747	2,264	15,500
Total Program Design & Planning	25,854	19,842	7,816	53,512
Program Management & Administration				
Ecos Labor	145,699	111,816	44,049	301,564
Navigant Labor	42,358	32,508	12,806	87,672
Total Program Management & Administration	188,058	144,323	56,855	389,236
Program Marketing & Outreach				
Ecos Labor	136,697	104,907	41,327	282,932
Navigant Labor	39,295	30,157	11,880	81,332
Total Program Marketing & Outreach	175,993	135,064	53,207	364,264
Program Direct Implementation				
Ecos Labor	41,630	31,948	12,586	86,164
Navigant Labor	5,981	4,590	1,808	12,380
Total Program Direct Implementation	47,611	36,539	14,394	98,544
EM&V				
Ecos Labor	12,713	9,756	3,843	26,312
Navigant Labor	6,493	4,983	1,963	13,440
Sub-Contractor Labor	22,836	17,525	6,904	47,265
Total EM&V	42,042	32,265	12,710	87,017
Direct Expenses				
Ecos Directs	27,420	21,043	8,290	56,753
Navigant Directs	11,425	8,768	3,454	23,647
Total Direct Expenses	38,845	29,811	11,744	80,400
Marketing & Education Expenses	16,427	12,607	4,966	34,000
Incentives	231,910	177,978	70,112	480,000
<b>Total</b>	<b>766,740</b>	<b>588,428</b>	<b>231,805</b>	<b>1,586,973</b>

**Table 7. Program Budget Summary Program Year 2005**

	2005 Budget			Total
	PG&E	SCE	SDG&E	
Program Design & Planning				
Ecos Labor	5,497	4,219	1,662	11,378
Navigant Labor	7,788	5,977	2,355	16,120
Total Program Design & Planning	13,285	10,196	4,017	27,498
Program Management & Administration				
Ecos Labor	146,704	112,587	44,352	303,643
Navigant Labor	44,053	33,808	13,318	91,179
Total Program Management & Administration	190,756	146,394	57,671	394,821
Program Marketing & Outreach				
Ecos Labor	140,859	108,101	42,585	291,545
Navigant Labor	40,867	31,363	12,355	84,585
Total Program Marketing & Outreach	181,726	139,464	54,940	376,131
Program Direct Implementation				
Ecos Labor	43,958	33,735	13,290	90,983
Navigant Labor	6,221	4,774	1,881	12,875
Total Program Direct Implementation	50,179	38,509	15,170	103,859
EM&V				
Ecos Labor	12,698	9,745	3,839	26,283
Navigant Labor	6,753	5,183	2,042	13,978
Sub-Contractor Labor	22,770	17,475	6,884	47,128
Total EM&V	42,222	32,403	12,765	87,389
Direct Expenses				
Ecos Directs	27,420	21,043	8,290	56,753
Navigant Directs	11,425	8,768	3,454	23,647
Total Direct Expenses	38,845	29,811	11,744	80,400
Marketing & Education Expenses	10,146	7,787	3,067	21,000
Incentives	347,865	266,966	105,169	720,000
<b>Total</b>	<b>875,024</b>	<b>671,530</b>	<b>264,542</b>	<b>1,811,097</b>

**Table 8. Budget Summary**

	Total Program			Total
	PG&E	SCE	SDG&E	
Program Design & Planning				
Ecos Labor	23,862	18,313	7,214	49,390
Navigant Labor	15,277	11,724	4,619	31,620
Total Program Design & Planning	39,139	30,037	11,833	81,010
Program Management & Administration				
Ecos Labor	292,403	224,402	88,401	605,207
Navigant Labor	86,411	66,315	26,124	178,851
Total Program Management & Administration	378,814	290,718	114,525	784,057
Program Marketing & Outreach				
Ecos Labor	277,556	213,008	83,912	574,477
Navigant Labor	80,162	61,520	24,235	165,917
Total Program Marketing & Outreach	357,719	274,528	108,148	740,395
Program Direct Implementation				
Ecos Labor	85,588	65,684	25,875	177,147
Navigant Labor	12,202	9,364	3,689	25,255
Total Program Direct Implementation	97,790	75,048	29,564	202,403
EM&V				
Ecos Labor	25,411	19,501	7,682	52,595
Navigant Labor	13,247	10,166	4,005	27,418
Sub-Contractor Labor	45,606	35,000	13,788	94,394
Total EM&V	84,264	64,668	25,475	174,406
Direct Expenses				
Ecos Directs	54,840	42,087	16,580	113,506
Navigant Directs	22,850	17,536	6,908	47,294
Total Direct Expenses	77,690	59,622	23,488	160,800
Marketing & Education Expenses	26,573	20,393	8,034	55,000
Incentives	579,775	444,944	175,281	1,200,000
<b>Total</b>	<b>1,641,764</b>	<b>1,259,959</b>	<b>496,347</b>	<b>3,398,070</b>