



## **PIER Lighting Research Program**



**California Energy Commission  
Contract # 500-01-041**

# **Residential ENERGY STAR® Fixture Prototype Report Deliverables 4.2.3 and 4.2.4**

**February 17, 2004**

Submitted To:  
Accounting Office, MS-2  
California Energy Commission  
1516 Ninth Street, 1<sup>st</sup> Floor  
Sacramento, CA 95814

Submitted By:  
Architectural Energy Corporation  
2540 Frontier Avenue, Suite 201  
Boulder, Colorado 80301

## Table of Contents

Introduction .....	3
Background.....	3
Prototype Development.....	4
Features.....	4
Maxlite.....	5
American Fluorescent .....	6
PowerLux.....	7
Fire & Water .....	8

### Contact Information:

Subcontract Project Manager  
 Janet Leishman  
 Applied Proactive Technologies, Inc.  
 1242 Main Street  
 Springfield, MA 01103  
 8 00-278-7661 - Voice  
 413-827-8752 - Fax  
[janet@appliedproactive.com](mailto:janet@appliedproactive.com)

AEC Program Director  
 Judie Porter  
 Architectural Energy Corporation  
 2540 Frontier Avenue  
 Boulder, CO 80301  
 303-444-4149 - Voice  
 303-444-4304 - Fax  
[jporter@archenergy.com](mailto:jporter@archenergy.com)

THIS REPORT WAS PREPARED AS A RESULT OF WORK SPONSORED BY THE CALIFORNIA ENERGY COMMISSION (COMMISSION). IT DOES NOT NECESSARILY REPRESENT THE VIEWS OF THE COMMISSION, ITS EMPLOYEES, OR THE STATE OF CALIFORNIA. THE COMMISSION, THE STATE OF CALIFORNIA, ITS EMPLOYEES, CONTRACTORS, AND SUBCONTRACTORS MAKE NO WARRANTY, EXPRESS OR IMPLIED, AND ASSUME NO LEGAL LIABILITY FOR THE INFORMATION IN THIS REPORT; NOR DOES ANY PARTY REPRESENT THAT THE USE OF THIS INFORMATION WILL NOT INFRINGE UPON PRIVATELY OWNED RIGHTS. THIS REPORT HAS NOT BEEN APPROVED OR DISAPPROVED BY THE COMMISSION NOR HAS THE COMMISSION PASSED UPON THE ACCURACY OR ADEQUACY OF THE INFORMATION IN THIS REPORT.

©2004, APPLIED PROACTIVE TECHNOLOGIES, INC.  
 ALL RIGHTS RESERVED.

# Residential ENERGY STAR<sup>®</sup> Fixture Prototype Report

## Introduction

The objective of this project is to increase the availability of high-efficiency residential lighting fixtures in the California marketplace. In order to meet this objective, the project will work with selected manufacturers to develop and test four to eight residential ENERGY STAR<sup>®</sup> table and/or floor lamp fixtures.

Through the PIER LRP funding, the selected manufacturers have been able to reduce their costs of research and development (R&D) and testing by up to 50 percent. This provides a springboard for them to produce quality, reliable, efficient ENERGY STAR<sup>®</sup> rated lighting fixtures that will be introduced into the California market in spring 2004. Once the products are commercially available, the market penetration will be tracked through the manufacturers' records as a part of this project.

For typical high-use fixtures, replacing a 120-watt incandescent fixture with a 30-watt ENERGY STAR<sup>®</sup> fixture yields a savings of approximately \$11.33 per year and \$113.30 over the proposed life of the fixture. If the projected 20,000 fixtures enter the market in the first year as a result of this program, California residents would realize savings of over \$226 thousand on their electric bills in the first year.

## Background

Applied Proactive Technologies (APT) is the prime contractor on this project. The first task of the project included assembling a Technical Review Committee (TRC) to provide guidance and input. The TRC is comprised of members of the American Lighting Association (ALA), a representative from the United States Environmental Protection Agency (EPA), and a representative from APT.

The TRC developed the selection process, which is described in the Invitation to Participate document (deliverable 4.2.1e), that was used to recruit the four manufacturers shown in **Table 1**.

**Table 1: Selected Manufacturers**

#	Company	Address	Town	State	Zip	Contact
1	PowerLux	2588-F El Camino Road #333	Carlsbad	CA	92008	Ken Lau
2	Fire & Water Lighting	241 Eldridge Street	New York	NY	10002	David Berman
3	MaxLite	19 Chapin Road	Pine Brook	NJ	07058	Greg Murphy
4	American Fluorescent Corp.	2345 N. Ernie Krueger Circle	Waukegan	IL	60087	Stephen Blackman

## Prototype Development

The next two tasks of this project involve APT and the TRC working with the four selected manufacturers regarding the development of prototype fixtures for ENERGY STAR® certification. Each manufacturing partner agreed to develop one or more prototypes that meet the following ENERGY STAR® performance specifications:

- Power factor  $\geq 0.5$ .
- Lamp current crest factor  $\leq 1.7$ .
- Lamp start time less than or equal to 1 second.
- CRI  $\geq 80$ .
- Rated color temperature of 2700K to 3000K.
- For dimmable lamps, provide dimming capability down to 30 percent of full light output.
- Class A sound rating.
- For outdoor applications, provide automatic shutoff during daylight hours via a controlled circuit.

Prototype designs from the manufacturers have been received and reviewed by the TRC and are presented on the following pages. Comments from the TRC regarding each of the manufacturers' designs are also provided.

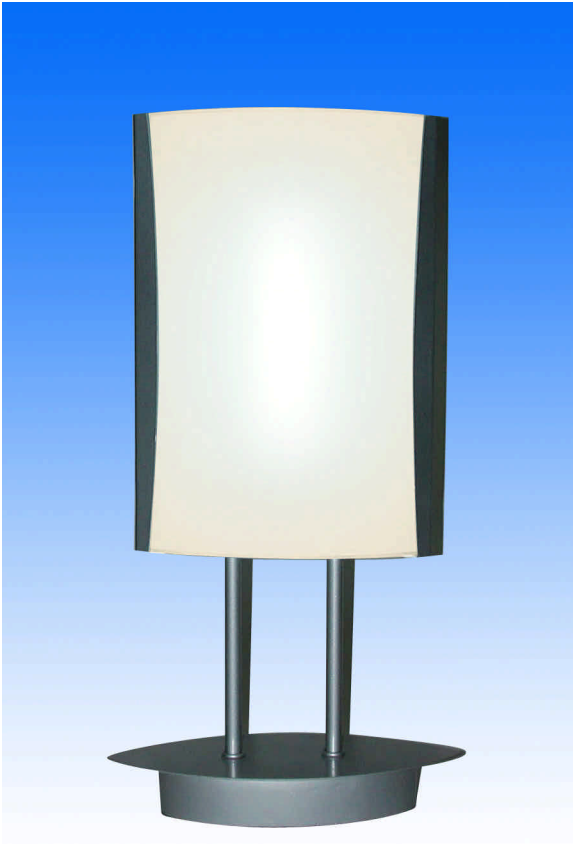
## Features

**Table 2** provides a comparison of the technical aspects of the prototypes. All of the lamps will be pin-based and the CFLs should be readily replaceable. Documentation for ENERGY STAR® compliance information is still needed from all four manufacturers and APT is working to gain the documentation. It should be also noted that comments on the Styrofoam packaging, the electrical plug type, and the lamp CCT apply to all the individual lamps. Although, the packaging is of no real consequence at this point, since it is only for the prototypes.

**Table 2: Comparison of Technical Aspects**

Company	Ballast	Controls	Lamp	CRI	CCT	Other
American Fluorescent Corp	Electronic with program start	No dimmer	55 watt circular	82	2700	
Fire & Water	Electronic	No dimmer	26 watt CFL	82.3	2648	Energy Star Certification Received
MaxLite	Electronic	No dimmer	18 watt CFL	84	2800	Two dimensional
PowerLux	Electronic	Dimmable	57 watt CFL 55 watt circular	82 82	3000 3000	

## Maxlite



### Recommendations

- Styrofoam as packing material is awful. Reconsider packing material.
- Lamp image is somewhat pronounced, but diffusion of the glass is good. Moving glass just slightly further away from the lamp surface would result in a significant improvement in the appearance of the luminous area.
- Would like to see what a 3000K lamp would look like – might be better match with “cool” metal finish of the frame.
- Energy Star Certification material needed.

### Suggestions and Questions

- A dimmer switch would be an improvement over the current cord switch. Is this possible?
- Is it an 18 watt bulb?
- Seems a bit heavy - magnetic or electronic ballast?
- What’s the intended application? Appears to be more decorative than functional. Would not work particularly well as a task light.
- Once design is finalized, how soon before production and distribution can begin?

## American Fluorescent

Lamp prototype reviewed is the Halifax Task Lamp.



### Recommendations

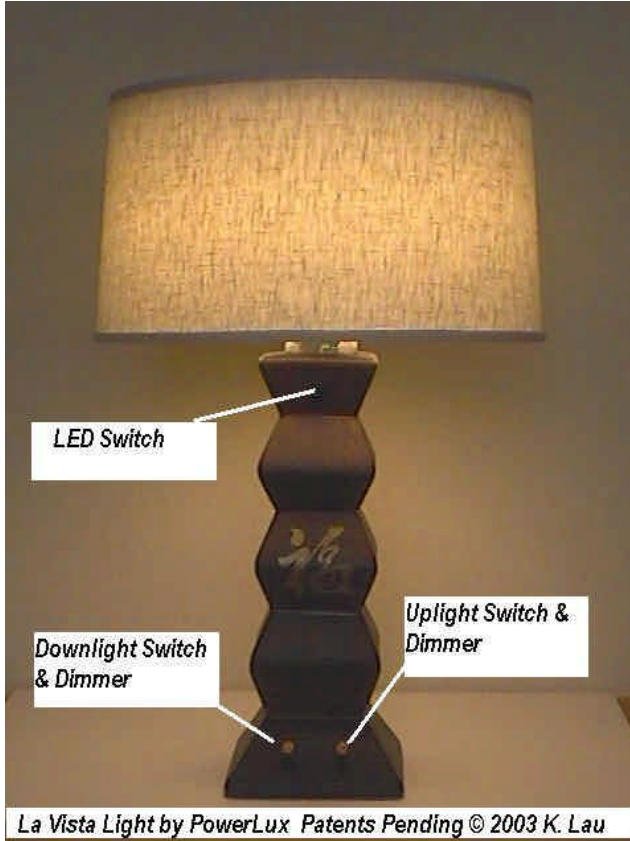
- Light source needs to be centered better.
- Is a three-prong plug needed?
- Use a 3000 Kelvin lamp (warm color).
- Do not want to see outline of lamp through the plastic; soften lamp image so it is not as apparent.
- Hide lamp from above/do not want to see lamp surface, possibly extend the post and put finial on top.
- Energy Star certification material needed, did not seem to meet the second Energy Star criterion.
- What is the suggested retail/wholesale price?

### Suggestions

- Look into dimming capabilities.
- Light distribution and glare might benefit from a thicker profile.
- Look into weight, could cause shipping problems.
- Magnetic or electronic ballast? Suggest using electronic ballast.

## PowerLux

Lamp prototype reviewed is the La Vista Task Lamp. The function of the LED on the PowerLux fixture is somewhat of a night light, it is red and plays into the new sleep information regarding melatonin.



## Recommendations and Suggestions

- Energy Star Certification material needed.
- The cardboard base just above the LED needs to be made to stand up better.
- Add additional wattage to LED.
- Harp needs to be better stabilized.
- Lengthen out the dimming mechanism so that it doesn't dim as quickly.
- Make a simpler base, cylinder, minimum decoration.
- What is the suggested retail/whole-sale price?
- Lengthen shade.
- Fix color distortion on shade.
- Use warm colors rather than use cool color lamps.
- Also, with regard to the LED, if only the top light was on and the daylighting mechanism was turned on for the LEDs, the LED would light, so consider making the switch to the LED a manual decision.

## Fire & Water

Lamp prototype reviewed is the Fibonacci Series table lamp.



### Comments and Suggestions

- This prototype has more the look of an early design model in which the form, hardware, materials and assembly have not been completely developed. It appears to be a “work in progress” and considerable effort would be needed to prepare this design for production.
- While there are several nice features that work very well such as the base, the choice of lamp, lamp color and base/shade scale, the overall construction and finish are disappointing.
- The design notion of basing the shape of the shade on Fibonacci numbers is clever. The shape is pleasing and natural, but it appears to be imperfectly rendered and the wide opening between the outer end of the shade and the inside layer looks out-of-scale. Light through this opening could be used to accent an object or brighten a wall simply by positioning the shade, but the effect doesn’t work well because of the dimensions and the serious lack of a white reflecting surface on the inside of the shade. The suggestion by David Bergman that a white paper liner “may” be added should be changed to a mandatory requirement if the flow of light is to work through the labyrinth pathway of the shade properly.
- The light source seems well chosen for this lamp and in my view dimming is not essential. Actual light and diffusion is excellent.
- The shade material diffuses fairly well and the addition of a white liner would further improve the situation.
- The socket assembly seems to be much larger than needed. It is difficult to position the lamp to easily insert the 4 pins into the socket, which may be frustrating.
- The shade is tall enough so that even on a fairly low table, there is not a glaring direct view of the bright lamp surface – a nice touch.

- Very unbalanced look, due to open back its placement would be limited. Overall awkward look.
- The warmth of the color would be lost if the reflective material mentioned in the letter were added, and if the swirled, open design of the shade were kept, the reflective lining may look peculiar. Not sure the added light gain would be worth it. Instead, Fire & Water might consider a higher wattage lamp.
- Some members of the TRC did not like the base.
- Neither the base, the decorative shade, nor the overall construction provides confidence that the finished product would be marketable.
- When do you expect to receive Energy Star certification?
- What will the price be?
- How long once you are given the go ahead before you can hit the markets?