LIGHTING RESEARCH PROGRAM

Project 4.2 The ENERGY STAR® Residential Light Fixture Advancement Project

FINAL REPORT

Prepared For:

California Energy Commission

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Arnold Schwarzenegger, *Governor*

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Preface

The Public Interest Energy Research (PIER) Program supports public interest energy research and development that will help improve the quality of life in California by bringing environmentally safe, affordable, and reliable energy services and products to the marketplace.

The PIER Program, managed by the California Energy Commission, annually awards up to $62 million to conduct the most promising public interest energy research by partnering with Research, Development, and Demonstration (RD&D) organizations, including individuals, businesses, utilities, and public or private research institutions.

PIER funding efforts are focused on the following six RD&D program areas:

- Buildings End-Use Energy Efficiency
- Industrial/Agricultural/Water End-Use Energy Efficiency
- Renewable Energy
- Environmentally-Preferred Advanced Generation
- Energy-Related Environmental Research
- Strategic Energy Research

What follows is the final report for Project 4.2 under the Lighting Research Program, Contract #500-01-041, conducted by Architectural Energy Corporation. The report is entitled The ENERGY STAR® Residential Light Fixture Advancement Project. This project contributes to the PIER Lighting Research Program.

The key deliverables for each project, in the form of guidelines and technical reports, are attachments to this report and are listed and described at the start of the attachment section. Due to market dynamics and the normal passage of time between the completion of research and the publication of research results, products anticipated for market delivery in this report may not necessarily reflect the actual array of products as delivered, or planned for delivery, by manufacturers. Therefore, the reader is advised to contact the lighting product manufacturers directly to ascertain the current status of products.

For more information on the PIER Program, please visit the Commission's web site at www.energy.ca.gov/research/index.html or contact the Commission's Publications Unit at (916) 654-5200.

Executive Summary

Introduction

The introduction of energy-efficient compact fluorescent lamps (CFLs) into the residential and commercial hospitality markets has had some success over the last 15 years, primarily in the hotel and motel industry. Generally, the CFL used has had an Edison-base socket, making it easy for the consumer to switch back to a less-expensive, but much less efficient, incandescent lamp. If the lamp fixture has a pin-based socket, only pin-based CFLs can be used, thereby ensuring that the fixture will remain an energy-efficient one throughout its lifetime. However, there are very few pin-based portable lamp fixtures currently on the market, and manufacturers are reluctant to spend the R&D money necessary to serve this market niche. By sharing the development costs of new ENERGY STAR®-certified portable fixtures, California will realize significant savings in both energy and electricity demand.

Project Objectives

The specific objectives for this project are:

- To develop at least four new portable, energy-efficient, ENERGY STAR®-certified, pin-based CFL fixtures that will be suitable for both the residential and commercial hospitality markets.
- To have these lamp fixtures produced in quantity for the California market.
- To obtain data on the production and sales of these new lamp fixtures in California.

Project Results

The project has achieved its goal of developing four new portable, energy-efficient, pin-based CFL fixtures. Three of the fixtures have received ENERGY STAR® certification for their lamp/ballast platform, and the fourth is in the process of obtaining this certification. Two of the lamps are currently in production, with the third expected to be in production in March 2005 and the fourth in June 2005. Data on lamp production and sales in California have not yet been developed.

Primary results of the project are:

- Defined the necessary criteria required for the new ENERGY STAR®-certified CFL pin-based portable lamp fixtures, formed a Technical Review Committee, and selected four lamp fixture manufacturers to fabricate the new lamps.
- Developed, reviewed, and recommended changes to the four prototype fixtures developed by the manufacturers.
- Developed four new portable lamp fixtures that have considerable potential for sales in the mid- to high-end portable lamp markets for both residential and commercial hospitality applications.
- Obtained ENERGY STAR® certification on three of the new lamp/ballast platforms, and expect certification on the fourth fixture by March 2005.
- Began production on two of the new fixtures in January 2005, with production on the third fixture expected in February 2005 and on the fourth fixture in June 2005.

- Provided the four manufacturers with lists of lamp showrooms in California that will help them market the new fixtures and developed a color brochure for showroom use.

Conclusions

The research, development, and market introduction of four new ENERGY STAR® portable lamp fixtures has nearly been completed. Two lamps are in production, and one additional lamp will be in production by March 2005. The fourth lamp should be in production by June 2005. With the introduction of these lamps into the California market, substantial energy and demand savings will be realized and consumers will be given a more energy- and environmentally-friendly choice for their home and hotel lighting needs. By helping fixture manufacturers develop these energy-efficient lamps on a faster pace than normal, the market introduction and concomitant energy and demand savings will be realized years earlier than would otherwise occurred. For the small monetary investment required by this project, the dividends to California will be many times the project cost.

It is important to mention that support from the U.S. EPA, the American Lighting Association (ALA), and the Consortium for Energy Efficiency (CEE) contributed to the success of the project.

Recommendations

Based on the experience gained in conducting this project to develop several new ENERGY STAR®-qualified portable lamp fixtures, the following recommendations are made:

- Continue to follow the commercialization of the new lamp fixtures after the contract end date. The ability of the manufacturers to control suppliers of new lamp-ballast platforms was severely compromised by the limited number of such platforms currently in the market. This extended the time it took to get the new lamp fixtures certified as ENERGY STAR® fixtures, and impacted the time required to begin production and have products delivered to California warehouses. Consequently, no data on actual new fixture sales in California are available, but these data are very important in judging the overall success of the project.
- Continue to supply lamp showrooms and electric utilities in California with the marketing brochures describing the new lamps. Education of both showroom personnel and consumers is required to build this new market, and should not be left to chance. Placement of the new fixtures in utility lobbies and technology centers will also aid in the education process.
- Consider sponsoring a trade-in program for college/university students to trade incandescent portable lamps for new ENERGY STAR® portable lamps, possibly at a subsidized cost. Since students have their portable fixture lights on for long periods of time, and those in dorms have the energy to run these lamps paid by the school, this could be an excellent way to raise interest in the new fixtures.

Benefits to California

Each new ENERGY STAR® portable lamp sold into California will save approximately $11.33 in annual energy costs when compared to a similar lamp using an incandescent bulb. If 20,000 new ENERGY STAR® lamps are sold in California in the first year of availability, then California residents will realize a savings of over $226,000 on their electric bills in that first year. In addition, the 20,000 new lamps represent a demand reduction of 1.8 MW. If the market grows linearly over time, in 10 years California will have annual energy savings of $2,260,000 and a demand reduction of 18 MW from the sales and use of ENERGY STAR® portable lamps.

Abstract

This report describes the results of a research effort to develop and introduce to the marketplace new, energy-efficient portable lamp fixtures that require pin-based compact fluorescent lamps (CFLs) and which have obtained ENERGY STAR® certification from the U.S. Environmental Protection Agency. The specific steps taken in this project were to: (1) develop a list of technical specifications for the new fixtures, (2) form a Technical Review Committee to provide project review, (3) invite lamp fixture manufacturers to submit proposals on their specific design(s), (4) select four manufacturers for contract negotiation, (5) obtain and review prototype fixture products from the manufacturers, (6) provide feedback to the manufacturers on the prototype designs, (7) obtain final fixture products from the manufacturers, (8) have the manufacturers obtain ENERGY STAR® certification on their final products, (9) begin production on the new fixtures and have products shipped to California warehouses, and (10) place the new fixtures in California lighting showrooms and track new fixture sales.

Of the four manufacturers involved in this project, two are currently in production and have lamps in showrooms in California. The other two manufacturers should begin production between February and June 2005.

Introduction

Background and Overview

The introduction of energy-efficient compact fluorescent lamps (CFLs) into the residential and commercial hospitality markets has been partially successful over the last 15 years. In both of these markets, the CFL used has had an Edison-base socket, making it easy for the consumer to switch back from the CFL to a less expensive but much less efficient incandescent lamp. One solution to this problem, to ensure that the portable fixture remains an energy-efficient one, is to require the fixture to use a pin-based CFL. At this time, however, there are very few pin-based portable lamp fixtures on the market, requiring that the manufacturers be encouraged to produce such fixtures in order to serve this market niche.

When lamp fixture manufacturers were contacted regarding the absence in the market of portable pin-based CFLs, they expressed some interest in developing these products, but cited the expense in performing the required R&D for this new product to be a significant drawback. Therefore, a plan was presented to the manufacturers whereby their R&D cost could be cost-shared on a 50/50 basis if they developed these new lamp fixtures that would be ENERGY STAR®-certified by the U.S. Environmental Protection Agency (EPA). The cost-sharing provisions would provide for payments if development milestones were met in a timely fashion.

In order to broaden the base of support for these new products, other organizations known to have an interest in energy-efficient lighting were contacted to solicit their interest in participation in such a project in an advisory capacity. Several individuals were identified for such participation, and the project was then planned.

It is important to mention that support from the U.S. EPA, the American Lighting Association (ALA), and the Consortium for Energy Efficiency (CEE) contributed to the success of the project.

Project Objectives

The specific objectives for this project are as follows:

- To develop at least four new portable, energy-efficient, ENERGY STAR®-certified, pin-based CFL fixtures that will be suitable for both the residential and commercial hospitality markets.
- To have these lamp fixtures produced in quantity for the California market.
- To obtain data on the production and sales of these new lamp fixtures in California.

Report Organization

This report presents the results of work performed by Applied Proactive Technologies, Inc. (APT) related to Project 4.2: The ENERGY STAR® Light Fixture Advancement Project. The Project Results section begins by describing the criteria required for the new fixtures and the method of selecting the manufacturers to provide these fixtures. Development steps for prototype fixtures and the necessity of obtaining ENERGY STAR® certification follow, with the production schedules for the new fixtures and their introduction into the California market completing the report.

Project Approach

Project Tasks

The specific development steps for this project are as follows:

- Define the necessary technical criteria required for the new lamp fixtures. Form a Technical Review Committee (TRC) to help establish the criteria and provide guidance on any fixtures developed in the project.
- Issue an Invitation to Participate in the development project to all lamp fixture manufacturers. Using the TRC as judges, review proposals received and identify the most promising concepts for development. Establish contracts with those manufacturers selected for the project.
- Based on the designs proposed by the manufacturers and reviewed by the TRC, have the manufacturers fabricate and test prototype fixtures.
- Present the prototype fixtures to the TRC for their review and comment. Provide comments on each new fixture to the respective manufacturer for incorporation into a refined prototype.
- Have each manufacturer test their refined prototype fixture for operation under the final design specifications. Present these final design specifications to the Project Manager for approval.
- Have each manufacturer develop and fabricate the final ENERGY STAR® lamp fixture. Test each new fixture for ENERGY STAR® criteria and performance.
- Each manufacturer will apply for ENERGY STAR® certification of their new fixture to the U.S. Environmental Protection Agency. This certification must be received prior to beginning production of the new fixture.
- Begin production of each new ENERGY STAR®-certified lamp fixture. Have the new fixtures delivered to California warehouses, and provide lamp showrooms with information on the new fixtures.
- Obtain manufacturer follow-up information on the production and market introduction of the new fixtures. Obtain sales data for new lamps sold in California.

Project Results

Summary of Project Results

The following are the primary results of this project:

- Defined the necessary criteria required for new ENERGY STAR®-certified CFL pin-based portable lamp fixtures, formed a Technical Review Committee, and selected four lamp fixture manufacturers to fabricate the new lamps.
- Developed, reviewed, and recommended changes to the four prototype fixtures developed by the manufacturers.
- Developed four new portable lamp fixtures that have good potential for sales in the mid- to high-end portable lamp markets for both residential and commercial hospitality applications.
- Obtained ENERGY STAR® certification on three of the new fixtures, and expect that certification on the fourth fixture by March 2005.
- Began production on two of the new fixtures, with production on the other third fixture expected in February 2005 and on the fourth fixture in June 2005.
- Provided the four manufacturers with lists of lamp showrooms in California that will help them market the new fixtures and developed a color brochure for showroom use.

These results are discussed in detail in the sections below.

Definition of New Lamp Fixture Criteria, Formation of Technical Review Committee, and Selection of Manufacturers (Tasks 4.2.1 and 4.2.2)

As the first step in the ENERGY STAR® Residential Light Fixture Advancement Project, four important steps were taken:

1. The necessary criteria to be met by the new lamp fixtures were described,
2. The Technical Review Committee was formed,
3. The Invitation to Participate was sent to all lamp fixture manufacturers,
4. Four manufacturers were selected for participation, based on their responses to the Invitation to Participate.

Definition of New Lamp Fixture Criteria

The new lamp fixture criteria required that the lamps to be developed will be high-end portable fixtures and ENERGY STAR® qualified. Prototype fixtures developed during the project must meet the most current ENERGY STAR® criteria and performance specifications for indoor residential lighting fixtures. If the prototypes did not utilize the NEMA/ALA Lamp and Ballast Matrix, the manufacturers were to provide the Project Manager with signed documentation that they were designing and developing the prototype in compliance with the current ENERGY STAR® criteria and performance specifications. For those prototypes utilizing the NEMA/ALA Lamp and Ballast Matrix, the manufacturers were to provide the Project Manager with the ENERGY STAR® Qualified Product Information Form and the Supplemental NEMA/ALA Matrix Form for Residential Light Fixtures.

Once prototype lamp fixtures are developed, the Technical Review Committee will review and comment on those prototypes. The manufacturers must respond to the suggestions made, and document their responses. The manufacturers must also submit formal ENERGY STAR® Approval

Letters from the EPA certifying that the lamp fixtures have been approved, and must demonstrate that the products are commercially available in California.

The Technical Review Committee

The Technical Review Committee (TRC) consists of five individuals intimately familiar with the lighting industry and the ENERGY STAR® program. The TRC was responsible for ranking the proposals received from the manufacturers, and for reviewing and providing comment on the prototype lamp fixtures developed by the manufacturers. Members of the Technical Review Committee are listed in Table 1.

Table 1. Technical Review Committee Members

Name	Affiliation and Address
David Shiller	ENERGY STAR® Marketing Manager U.S. Environmental Protection Agency 1310 L Street NW Washington, DC 20005-4113
Terry McGowan	American Lighting Association 3574 Atherstone Road Cleveland Heights, OH 44121
Brad Steele	President Energy Federation, Inc. 40 Washington Street Westborough, MA 01581
Janet Leishman	Applied Proactive Technologies, Inc. 1242 Main Street Springfield, MA 01103-1954
Michael Plasski	Applied Proactive Technologies, Inc. 1242 Main Street Springfield, MA 01103-1954

The Invitation to Participate

The Invitation to Participate document was prepared and reviewed by the TRC and others before being sent to all lamp fixture manufacturers. This document described the ENERGY STAR® Residential Light Fixture Advancement Project, presented the project timelines, detailed the manufacturer requirements and responsibilities, and described the Selection Process for award of contracts. The selection process and criteria for ranking the proposals were the responsibility of the TRC, and were based on the following:

- Adherence to Invitation to Participate format and willingness to comply with all requirements.
- Ability to meet or accelerate project guidelines.
- Experience with ENERGY STAR® qualification process and program.
- Experience and capabilities of producing a high end indoor residential ENERGY STAR® lighting fixture.
- Demonstrated familiarity and ability to distribute product into the California marketplace.
- Existing market penetration in California.
- Ability to partner with Lighting Show Rooms in California.
- Plans for marketing final product into California marketplace.
- Commitment to production levels.

- Manufacturer cost of design, development, and testing.

The complete Invitation to Participate document is shown in Appendix A.

Selected Manufacturing Partners

Using the ranking criteria described above, the TRC selected four manufacturers for participation in the project. The manufacturers and their principal contacts are shown in Table 2.

Table 2. Selected Manufacturers

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

Development and Review of Four Prototype Fixtures (Tasks 4.2.3, 4.2.4, and 4.2.5)

Each of the manufacturers identified in Table 2 agreed to develop one or more prototype lamp fixtures meeting the following ENERGY STAR® performance specifications:

- Power factor ≥ 0.5.
- Lamp current crest factor ≤ 1.7.
- Lamp start time ≤ 1 sec.
- CRI ≥ 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.

Each manufacturer provided one prototype design for review and comment by the TRC. A comparison of the features for the four prototype lamp fixtures is given in Table 3.

Table 3. Comparison of Prototype Lamp Fixtures

Company	Ballast	Controls	Lamp	CRI	CCT
American Fluorescent Corp.	Electronic with programmed start	No dimmer	55 Watt circline	82	2700
Fire & Water	Electronic	No dimmer	26 Watt CFL	82.3	2648
MaxLite	Electronic	No dimmer	18 Watt CFL	84	2800
PowerLux	Electronic	Dimmable	57 Watt CFL 55 Watt circline	82 82	3000 3000

All of the lamps identified in Table 3 are pin-based and should be readily replaceable. Photographs of each prototype and pertinent review comments from the TRC follow.

American Fluorescent Corporation

American Fluorescent provided a prototype of the Halifax Task Lamp, a portable table lamp.

Figure 1. Halifax Task Lamp by American Fluorescent

Comments from the TRC included the following:

- The light source needs to be centered better.
- Is a three-prong plug required?
- Use a 3000K lamp.
- The outline of the lamp shows through the plastic shade; soften the lamp image so it is not as apparent.
- Hide the lamp when viewing the fixture from above, possibly by extending the post and putting a finial on top.
- The lamp does not seem to meet the second ENERGY STAR® criterion.
- What is the suggested retail/wholesale price?
- Consider dimming capabilities.
- Light distribution and glare might benefit from a thicker profile.

Fire & Water

The prototype from Fire & Water is a portable table lamp in their Fibonacci Series.

Figure 2. Fibonacci Series Table Lamp by Fire & Water

The TRC review resulted in the following comments and suggestions:

- The prototype has the look of an early design model, and needs considerable effort to prepare the design for production.
- The prototype has several nice features, including the base, the lamp choice and lamp color, and the base/shade scale. However the overall construction and finish need work.
- The lamp shade shape is pleasing and natural, but the wide opening between the outer end of the shade and the inside layer looks out-of-scale. Light from the opening could be used to accent an object or brighten a wall simply by positioning the shade, but the shade dimensions and the lack of a white reflecting surface on the inside of the shade need to be carefully considered.
- The light source is well chosen for the lamp, and dimming is not essential. The actual light and diffusion are excellent.
- The socket assembly seems to be much larger than needed. It is difficult to position the lamp to easily insert the four pins into the socket.
- The shade is tall enough so that even on a low table there is no glaring direct view of the bright lamp surface.
- The lamp has an unbalanced look due to the open back, and its placement in a room would be limited.
- The base, the decorative shade, and the overall construction need additional work so the finished product will be more marketable.

MaxLite

The prototype from MaxLite is the Baja Table Lamp.

Figure 3. Baja Table Lamp by MaxLite

Comments made during the TRC review include the following:

- The lamp image is somewhat pronounced, but diffusion of the glass is good. Moving the glass slightly further from the lamp surface would result in a significant improvement in the appearance of the luminous area.
- A 3000K lamp might look provide a better match with the “cool” finish of the frame.
- ENERGY STAR® certification material is needed.
- A dimmer switch would be an improvement over the current cord switch, if possible.
- The lamp appears to be more decorative than functional. It may not work well as a task light.

PowerLux

The PowerLux prototype is the La Vista Task Lamp. In addition to the two CFLs listed in Table 3, this lamp uses a red LED as something of a nightlight. The La Vista lamp thus provides uplight, downlight, and nightlight.

Figure 4. La Vista Task Lamp (prototype) by PowerLux

Comments from the TRC on the La Vista Task Lamp included the following:

- ENERGY STAR® certification material is needed.
- The cardboard base just above the LED needs to be able to stand up more firmly.
- The LED needs additional Wattage.
- The harp needs to be better stabilized.
- Lengthen the dimming mechanism so the light doesn't dim so quickly.
- A simpler base with minimum decoration would be more attractive.
- Lengthen the lamp shade.
- Improve the color distortion on the shade.
- Use warm color lamps.
- Consider making the switch for the LED manual, rather than having it come on when the top light is on.

Following the review of the four prototype lamp fixtures, the manufacturers considered changes to their respective lamps and responded to the TRC comments and suggestions.

Development of Four Final Fixtures (Tasks 4.2.6 and 4.2.7)

The four lamp manufacturers reviewed the comments and suggestions made by the TRC on their prototype fixtures, and provided information back to the TRC. The manufacturers also continued their development efforts on the final products. Summaries of the responses from the manufacturers as well as the final product specifications for those lamps that are now completed follow.

American Fluorescent Corporation

- American Fluorescent discussed their ENERGY STAR® certification needs with Advance Transformer. They received preliminary information on a new lamp/ballast platform that they intend to use.
- American Fluorescent needs marketing support. They currently work with Loew's, and are interested in selling the new fixture through Loew's California stores.
- The projected price of the new fixture is $95 to $100. This cost is under review until the actual manufacturing costs are determined.
- A hotel chain has expressed an interest in the Halifax Task Lamp. Because of this interest from the hospitality industry, American Fluorescent is developing a second version of the Halifax Task Lamp. This one will have a slightly smaller base and will also have convenience outlets and dataports. American Fluorescent has also developed prototypes of a hanging pendant Halifax lamp, as well as a swing-arm floor lamp version.
- The final specifications for the residential version of the Halifax Task Lamp are:

    1. Lamp type – T6 circline, 40 Watts input power
    2. CRI – 82.81
    3. CCT – 2835.67K
    4. Ballast – Electronic
    5. Lamp current crest factor – 1.379
    6. Production date – January 2005 in China

Fire & Water

- Fire & Water modified some of the details in the appearance of the Fibonacci Table Lamp.
- The lamp/ballast platform that Fire & Water initially intended to use was ENERGY STAR® qualified and made by TCP. However, issues arose with regard to TCP's UL status for pin-based lamps. Therefore, the decision was made to use a different supplier. The most likely move is to the VIVA lamp/ballast platform that is already ENERGY STAR®-certified. Fire & Water has ordered 40 lamp/ballast platforms from VIVA to build second-generation prototypes.
- Fire & Water also needs marketing support to enter the California marketplace.
- The projected price of the new fixture is $250 to $400.
- If the VIVA platform is used in the final version of the Fibonacci Series Table Lamp, the final specifications are:

    1. Lamp type – 26 Watt CFL
    2. CRI – 81.41
    3. CCT – 2800K
    4. Ballast – Electronic
    5. Lamp current crest factor – 1.38
    6. Production date – Approximately March 2005

MaxLite

- MaxLite has devised a strategy for selling ENERGY STAR®-certified lamps. They have five platforms that are pre-approved through ENERGY STAR®, which they can use in combination with a wide variety of lamp appearances. Because of these pre-approved platforms, their ability to post a new lamp on the ENERGY STAR® web site is a matter of days, not months.

- MaxLite has been successful in selling their products to hotel chains, and expect the hospitality industry to be a good market entry point for the Baja Table Lamp.
- Pricing of the Baja Table Lamp has not been stated. A final price of $50 is possible.
- The final specifications for the Baja Table Lamp are:

    1. Lamp type – 18 Watt CFL
    2. CRI – 82.74
    3. CCT – 2682K
    4. Ballast – Electronic
    5. Lamp current crest factor – 1.56
    6. Production date –January 2005. Stock will be in West Coast warehouses by the end of February 2005.

PowerLux

- PowerLux is making its own electronic ballast. As a result, they will be submitting samples to UL and FCC for testing in February. After this testing is complete, they can apply for ENERGY STAR® certification.
- PowerLux has been actively promoting the La Vista Task Lamp to both residential and commercial hospitality markets. They have found significant interest.
- The La Vista Task Lamp is expected to have a price of $250 to $400.
- The final specifications for the La Vista Task Lamp are not available. Production of this lamp is not expected until June 2005. However, the appearance of the lamp has changed from that of the prototype, and is shown in Figure 5.

Figure 5. La Vista Task Lamp by PowerLux

Requesting and Obtaining ENERGY STAR® Certification for the New Fixtures (Task 4.2.8)

Once the manufacturers have decided on the final specifications for their lamps and have selected the lamp-ballast platforms they will use, they are ready to apply for ENERGY STAR® certification. Of the four lamp manufacturers, two have received ENERGY STAR® certification, one has received ENERGY STAR® certification if they decide to use the approved platform in their production lamp, and one is in the final stages of development and is manufacturing its own ballast. The status for the manufacturers is shown in Table 4.

Table 4. Status of ENERGY STAR® Certification for New Lamp Fixtures

Manufacturer	**Status of** ENERGY STAR® **Certification**
American Fluorescent Corp.	Received ENERGY STAR® Certification on August 20, 2004.
Fire & Water	Platform Letter of Qualification for ENERGY STAR® dated August 5, 2002. Must make final decision based on platform availability.
MaxLite	Received ENERGY STAR® Certification on January 14, 2005.
PowerLux	Developing own ballast; do not expect application for ENERGY STAR® Certification until April 2005.

ENERGY STAR® Certification information is shown in Appendix B for American Fluorescent Corporation, in Appendix C for Fire & Water, and in Appendix D for MaxLite.

Manufacturing Production of New Fixtures (Task 4.2.9)

Since manufacturing production of the new lamp fixtures cannot begin until ENERGY STAR® Certification is received and a final decision on the lamp/ballast platform to be used is made, Fire & Water and PowerLux have not yet begun production. American Fluorescent and MaxLite are both in production, however, and both will have product in their California warehouses in February 2005. Fire & Water is expected to be in production in February 2005, and PowerLux is expected to begin production in June 2005.

For the new lamp products qualified for ENERGY STAR®, the U.S. EPA will actively promote the products by:

- Direct notification of ENERGY STAR® pilot showrooms and electrical distributors in California.
- Broad promotion through the EPA's national utility fixture newsletter.
- If requested by the PIER LRP, large lamp showroom operators such as Lamps Plus will be directly approached.

Development of Marketing Information for the New Fixtures (Tasks 4.2.10 and 4.2.11)

Product Scenarios

Product features of the new energy-efficient portable indoor fixtures include energy saving when compared to the use of incandescent lamps, attractive new fixtures, and the use of long-life lamps. For

the residential customer, the attractive new fixtures would be promoted first, with energy savings used to demonstrate a very short (~4-year) payback. For the commercial market sector, the energy savings and long lamp life features would be most important, but the attractive fixture will help sell the products. It is important to note that very few pin-based lamp fixtures exist on the market, and energy-conscious customers are beginning to seek these products.

Supplier's Product Costs and Prices

Currently, the four manufacturers are considering prices that range from $50 to $400 per fixture. These prices place the fixtures in the mid- to high-end categories.

Energy and Demand Savings Potential

For typical mid-to high-end fixtures, replacing 120-Watt incandescent lamps with 30-Watt ENERGY STAR® CFLs yields savings of approximately $11.33 per year, or $113.30 over the proposed life of the fixture. The manufacturers have estimated that 20,000 fixtures will be sold in California in the first year of availability. If 20,000 units are sold, California residents will realize savings of over $226,000 on their electric bills in the first year. A 90-Watt demand savings also exists for each fixture in this scenario, which represents a 1.8 MW demand reduction for all 20,000 fixtures.

Payback Period

Each new fixture represents savings of approximately $11.33 in energy costs per year. Based on the energy savings for new fixtures costing $50, the payback period for a residential customer will be 4.4 years. Of course, the purchase of new lamp fixtures is generally an aesthetic decision, rather than a cost-saving one. In this case, a calculation of the payback period becomes meaningless. The objective of the project then becomes to make the new lamp fixtures attractive so they are purchased for aesthetic reasons and provide the benefits of lowered energy use. Therefore, if only replacement markets are considered, the payback is approximately 4.4 years or longer, depending on the new fixture's cost. If only new markets are considered, then the goal of lowered energy expenditures is realized instantly whenever a new fixture is purchased.

Market Outlets

This project is targeting the mid- to high-end market segments for new portable lighting fixtures. No current data on the market size is available, but with approximately 10 million households in California, and each household having at least five portable lamp fixtures, the replacement market alone can be considered to be in the millions annually. Listed below are potential distribution channels in Northern California.

COMPANY NAME	STREET	CITY	STATE	ZIP
A & A LIGHT FIXTURES	6700 FOLSOM BLVD.	SACRAMENTO	CA	95819
ACCENT LIGHTING	354 IDAHO-MARYLAND ROAD	GRASS VALLEY	CA	95945
ALL ABOUT LIGHTS INC	1080 BROADWAY	MILLBRAE	CA	94030
BAYSHORE LIGHTING	55-57 WATERLOO STREET	SAN FRANCISCO	CA	94124
BAYSHORE SUPPLY AND LIGHTS	501-507 INDUSTRIAL ROAD	SAN CARLOS	CA	94070
BEACON LIGHTING	2400 CHANTICLEER AVE	SUNNYVALE	CA	94087
BELLA LUCI	1130 LINCOLN AVE	SANTA CRUZ	CA	95062
BLAINES LIGHTING	12312 SARATOGA/SUNNYVALE RD	SAN JOSE	CA	95125
BLAINES LIGHTING	655 HIGH STREET	SARATOGA	CA	95070
BRIGHT PRODUCTIONS INC	1585 FOLSOM STREET	AUBURN	CA	95603
CALIFORNIA ELECTRIC SUPPLY	111 RHODE ISLAND	SAN FRANCISCO	CA	94103
CASELLA LIGHTING & DESIGNER	5561 W SAN MADELE	SAN FRANCISCO	CA	94141

COMPANY NAME	STREET	CITY	STATE	ZIP
HARDWARE				
CENTRAL DISTRIBUTING	580 EL CAMINO REAL	FRESNO	CA	93722
CITY LIGHTS	530 W FRANCISCO BLVD	SAN FRANCISCO	CA	94103
EICHEN'S LIGHTING	1081 S DEANZA BLVD	SAN BRUNO	CA	94066
ELECTRICS	1385 NEWELL AVE	SAN RAFAEL	CA	94901
GALAXY LIGHTING	216 BROADWAY	SAN JOSE	CA	95129
GALAXY LIGHTING	2690 AUBURN BLVD	WALNUT CREEK	CA	94596
HALOGENS	1300 PEARL STREET	MILLBRAE	CA	94030
HOBRECHT LIGHTING	838 W FRANCISCO BLVD	SACRAMENTO	CA	95821
HOUSE OF LIGHTS	3721 SANTA ROSA AVENUE	NAPA	CA	94559
JAMES & CO.	1808 4TH STREET	FRESNO	CA	93711
LIGHT EXPRESS	2522 MERRYCHASE	SAN RAFAEL	CA	94901
LIGHT POINT	4100 REDWOOD HIGHWAY	MENLO PARK	CA	94025
LIGHTING DESIGN CENTER	2121 J STREET	SANTA ROSA	CA	95407
LIGHTING STUDIO	185 ARKANSAS STREET	BERKELEY	CA	94710
LIGHTING UNLIMITED	220 EAST F STREET	CAMERON PARK	CA	95682
LIGHTS OF RAFAEL INC	1600 MANGROVE AVE	SAN RAFAEL	CA	94903
LITE LINE	2243 OLD MIDDLEFIELD WAY	LOS GATOS	CA	95030
LOFINGS LIGHTING	P.O. BOX 68	SACRAMENTO	CA	95816
MARS LIGHTING & DESIGN	301 TOLAND STREET	SAN FRANCISCO	CA	94107
NORTHERN LIGHTS	1700 MC HENRY AVENUE	OAKDALE	CA	95361
NORTHERN LIGHTS	TWO HENRY ADAMS	CHICO	CA	95926
NEW ERA LIGHTING SUPPLY	2990 GENEVA AVENUE	MOUNTAIN VIEW	CA	94043
ON THE LIGHT SIDE	3724 STANLEY BLVD	ARNOLD	CA	95223
PEER LIGHTS	300 SOQUEL AVE	SAN FRANCISCO	CA	94124
PHILLIPS LIGHTING AND HOME	18080 SAN RAMON VALLEY BLVD	MODESTO	CA	95350
POLICELLI	2975 JUNIPERO SERRA BLVD	SAN FRANCISCO	CA	94103
RAINBOW LIGHTING	301 HIGH STREET	DALY CITY	CA	94014
RAY'S ELECTRICAL AND PLUMBING	251 RHODE ISLAND	PLEASANTON	CA	94566
RIVERSIDE LIGHTING INC.	120 CENTRAL AVE	SANTA CRUZ	CA	95062
SAN RAMON LIGHTING	734 EL CAMINO REAL	SAN RAMON	CA	94583
SERVICE LIGHTING USA INC.	213 S. BROADWAY	DALY CITY	CA	94014
STANFORD ELECTRIC	1766 WEST SAN CARLOS STREET	PALO ALTO	CA	94301
STUDIO ONE		SAN FRANCISCO	CA	94103
THE HOMELIGHTER		PACIFIC GROVE	CA	93950
THE LIGHT SOURCE		DANVILLE	CA	94526
THE LIGHTHOUSE		SAN CARLOS	CA	94070
WINTERBURN'S LIGHTING		YREKA	CA	96097
WRIGHT LIGHTING & FIRESIDE		SAN JOSE	CA	95128

The list below shows possible commercial outlets in Southern California.

COMPANY NAME	STREET	CITY	STATE	ZIP
ACROPOLIS	3563 SUELDO STREET	SAN LUIS OBISPO	CA	93401
ALLIED LIGHTING INC	222 VICTORIA STREET	COSTA MESA	CA	92627
BIG SOFA.COM	9500 JEFFERSON BLVD	CULVER CITY	CA	90232
BROWN & GOLD LIGHTING	176 NORTH LA BREA AVENUE	LOS ANGELES	CA	90036
CAPITAL LIGHTING - SHOWROOM	5812 W WASHINGTON BLVD	CULVER CITY	CA	90232
COAST LIGHTING	246 PACIFIC COAST HIGHWAY	HERMOSA BEACH	CA	90254
COMMERCIAL LIGHTING	72650 DINAH SHORE DRIVE	PALM DESERT	CA	92260

COMPANY NAME	STREET	CITY	STATE	ZIP
INDUSTRIES				
CONCORD LIGHTING	1176 MORENA BOULEVARD	SAN DIEGO	CA	92110
DELIGHTVILLE	22766 VENTURA BOULEVARD	WOODLAND HILLS	CA	91364
ELEGANT LIGHTING	1561 WESTWOOD BLVD	LOS ANGELES	CA	90024
ELITE LIGHTING	4390 MORENA BLVD	SAN DIEGO	CA	92117
FIRE LTD.	639 N. FAIRFAX AVE.	LOS ANGELES	CA	90036
FREDRICK RAMOND INC/LAGUNA	23811 ALISO CREEK ROAD	LAGUNA NIGUEL	CA	92677
GALAXY LIGHTING	1617 S. BROADWAY	SANTA MARIA	CA	93454
GARRETT INTERIORS	31149 VIA COLINAS	WESTLAKE VILLAGE	CA	91362
HIGHLIGHTS	301 FOURTH AVENUE	SAN DIEGO	CA	92101
HIGHLIGHTS	2427 MAIN STREET	SANTA MONICA	CA	90405
INLAND LIGHTING	3393 DURAHART STREET	RIVERSIDE	CA	92507
KENRO LIGHT	8687 MELROSE AVE	LOS ANGELES	CA	90069
LA FORGE LIGHTING	22201 VENTURA BLVD	WOODLAND HILLS	CA	91364
LA JOLLA LIGHTING	5640 LA JOLLA BOULEVARD	LA JOLLA	CA	92037
LAMPA MOBLER	8317 1/2 BEVERLEY BLVD	LOS ANGELES	CA	90048
LIGHT BULBS ETC	401 NORTH TUSTIN	ORANGE	CA	92867
LIGHT BULBS ETC / MONTCLAIR	8955 CENTRAL AVENUE	MONTCLAIR	CA	91763
LIGHT BULBS ETC-LIGHTSTYLES	1920 NEWPORT BLVD	COSTA MESA	CA	92627
LIGHT BULBS UNLIMITED/S DIEGO	1017 MORENA BLVD	SAN DIEGO	CA	92110
LIGHT GALLERY	157 EAST GRAND AVENUE	ESCONDIDO	CA	92025
LIGHT HOUSE	2008 WESTWOOD BLVD	LOS ANGELES	CA	90025
LIGHTBULBS UNLIMITED	245 EL CAMINO REAL	ENCINITAS	CA	92024
LIGHTING ARTISTRY	18005 SKYPARK CIRCLE	IRVINE	CA	92614
LIGHTING EXPO	647 S LaBREA Ave	Los Angeles	CA	90036
LIGHTING ZONE	17354 HAWTHORNE BOULEVARD	TORRANCE	CA	90504
LIGHTS BEAUTIFUL	2650 EAST MAIN STREET	VENTURA	CA	93003
LIGHTWAVE	8211 MELROSE	LOS ANGELES	CA	90046
McCLELLAN FIXTURES INC	74-869 JONI DRIVE	PALM DESERT	CA	92260
MID-VALLEY LIGHTING	5961 SEPULVEDA BLVD	VAN NUYS	CA	91411
MODERN LIGHTING	9030-40 E LAS TUNAS DRIVE	TEMPLE CITY	CA	91780
MONAS ELECTRIC & LIGHTING	11137 EAST RUSH STREET	SOUTH EL MONTE	CA	91733
MPLA ASSOCIATES	7437 GIRARD AVENUE	LA JOLLA	CA	92037
PASADENA LIGHTING	731 E WALNUT STREET	PASADENA	CA	91101
PAT'S LIGHTING & LAMPS	73-605 HIGHWAY 111	PALM DESERT	CA	92260
PREMIER LIGHTING	4300 ASHE ROAD	BAKERSFIELD	CA	93313
SAN DIEGO LIGHT BULB	1655-A MORENA BLVD	SAN DIEGO	CA	92110
STOLLMEYER'S MAIN LIGHTING	3310 NORTH MAIN STREET	MORRO BAY	CA	93442
THE LIGHTING BOUTIQUE	590 E GUTIERREZ STREET	SANTA BARBARA	CA	93103
UPLAND LIGHTING	1174 WEST NINTH STREET	UPLAND	CA	91786
WEST COAST LIGHTING	3303 HARBOR BLVD	COSTA MESA	CA	92626
WIN SUPPLY COMPANY	3120 E GARVEY AVE SOUTH	WEST COVINA	CA	91791

Lamps Plus is one of the largest lighting showroom operators in California. This list identifies their stores throughout California.

COMPANY NAME	STREET	CITY	STATE	ZIP
Lamps Plus	11711 South St.	Artesia	CA	90701
Lamps Plus	956 E. Imperial Way	Brea	CA	92621
Lamps Plus	20250 Plummer St.	Chatsworth	CA	91360
Lamps Plus	20244 Plummer St.	Chatsworth	CA	91311
Lamps Plus	5347 Sunrise Blvd.	Fair Oaks	CA	95628
Lamps Plus	5347 Sunrise Blvd.	Fair Oaks	CA	95628
Lamps Plus	84 E. Shaw	Fresno	CA	93710
Lamps Plus	200 S. Brand Blvd.	Glendale	CA	91204

COMPANY NAME	STREET	CITY	STATE	ZIP
Lamps Plus	7262 Edinger St.	Huntington Beach	CA	92647
Lamps Plus	8375 Hercules St.	La Mesa	CA	92041
Lamps Plus	23451 Avenida Dr. La Carlota	Laguna HIlls	CA	92653
Lamps Plus	200 S. La Brea	Los Angeles	CA	90036
Lamps Plus	12206 Sherman Way	N. Hollywood	CA	91605
Lamps Plus	2598 Vista Way	Oceanside	CA	92054
Lamps Plus	805 W. Katella	Orange	CA	92867
Lamps Plus	3705 Huntington Drive	Pasadena	CA	91107
Lamps Plus	550 Contra Costa	Pleasant Hill	CA	94523
Lamps Plus	10357 Magnolia Ave.	Riverside	CA	92505
Lamps Plus	1650 South E St.	San Bernardino	CA	92408
Lamps Plus	1303 W. Morena Blvd	San Diego	CA	92110
Lamps Plus	4700 Geary Blvd.	San Francisco	CA	94118
Lamps Plus	1081 Blossom Hill Road	San Jose	CA	95123
Lamps Plus	4902 Stevens Creek Blvd	San Jose	CA	95129
Lamps Plus	15928 Hesperian Blvd.	San Lorenzo	CA	94580
Lamps Plus	2745 S. El Camino Real	San Mateo	CA	94403
Lamps Plus	610 Dubois St.	San Rafael	CA	94901
Lamps Plus	18989 Hawthorne Blvd	Torrance	CA	90504
Lamps Plus	1376 West 7th St.	Upland	CA	91786
Lamps Plus	4723 Telephone Road	Ventura	CA	93003
Lamps Plus	2012 Bundy Drive	W. Los Angeles	CA	90025
Lamps Plus	131 N. Azusa Ave.	West Covina	CA	91791

Market Size versus Annual Sales

The manufacturer's estimate of 20,000 new fixture sales in California from sales of these new products represents a market impact of approximately 1% in the first year. This is a realistic estimate of the market penetration that could be realized. An estimate of an additional 1% annual market share increase over the next four years should be achievable. Once other manufacturers see the new products gaining market support, they will add additional, similar products to the market choices. In addition, at least two of the manufacturers selected for this project are developing families of new energy efficient fixtures, not just a single portable lamp. This will also help increase market share in future years.

Conclusions and Recommendations

Recommendations

Based on the experience gained in conducting this project to develop several new ENERGY STAR®-qualified portable lamp fixtures, the following recommendations are made:

- Continue to follow the commercialization of the new lamp fixtures after the contract end date. The ability of the manufacturers to control suppliers of new lamp-ballast platforms was seriously compromised by the limited number of such platforms currently in the market. This extended the time it took to get the new lamp fixtures certified as ENERGY STAR® fixtures, and impacted the time required to begin production and have products delivered to California warehouses. As a consequence, no data on actual new fixture sales in California are available, but with two manufacturers now in production and a third nearly ready, lamp sales are about to begin and sales data will provide the necessary information to show that the project was successful. In addition, follow the progress of the lamp manufacturer that must still apply for and obtain ENERGY STAR® certification. Ensure that this lamp also reaches production.
- Continue to provide lamp showrooms and electric utilities in California with the marketing brochures describing the new lamps. The way to build this market is through education of the showroom personnel and their customers, and this important task should not be left to chance to occur. The placement of the new products in utility lobbies and technology centers will also aid in the education process, and the placement of new product articles in the local newspapers will also help build customer awareness.
- Consider sponsoring a trade-in program for college/university students to trade incandescent portable lamps for new ENERGY STAR® lamps, possibly at a somewhat subsidized cost. Since students have their portable fixture lights on for long periods of time, and those in dorms have the energy to run these lamps paid by the school, this could be an excellent way to raise interest in the new fixtures.

Benefits to California

As stated earlier, each new ENERGY STAR® portable lamp sold into the California market will save approximately $11.33 in annual energy costs when compared to a similar lamp using an incandescent bulb. If 20,000 new ENERGY STAR® lamps are sold in California in the first year of availability, then California residents will realize a savings of over $226,000 on their electric bills in that first year. In addition, the 20,000 new lamps represent a demand reduction of 1.8 MW. If the market grows linearly over time, in 10 years California will have an annual energy savings of $2,260,000 and a demand reduction of 18 MW from the sales and use of ENERGY STAR® portable lamps.

Conclusions

The research, development, and market introduction of four new ENERGY STAR® portable lamp fixtures has nearly been completed. Two lamps are in production, and one additional lamp will be in production by March 2005. The fourth lamp should be in production by June 2005. With the introduction of these lamps into the California market, significant energy and demand savings will be realized and consumers will be given a more energy- and environmentally-friendly choice for their home and hotel lighting needs. By helping fixture manufacturers develop these energy-efficient lamps on a faster pace than normal, the market introduction and concomitant energy and demand savings

will be realized years earlier than would otherwise have occurred. For the small monetary investment required by this project, the dividends for California will be many times the project cost.

Appendix A. Invitation to Participate

Appendix B. ENERGY STAR® Certification Information for American Fluorescent Corp.

Appendix C. ENERGY STAR® Certification Information for Fire & Water

Appendix D. ENERGY STAR® Certification Information for MaxLite