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Preface

In its April 2, 2008, Scoping Order, the Energy Commission's Efficiency Committee (Committee) established the scope of Phase I of the 2008 Appliance Efficiency Rulemaking regarding possible amendments to the Appliance Efficiency Regulations (Title 20, California Code of Regulations, Section 1601 through Section 1608). Phase I was divided into two, concurrent rulemakings, Part A and Part B. Later in April, the Committee established Part C to consider televisions and any additional topics separately. This staff report summarizes proposed amendments to the current regulations for topics being considered in Part A.

Part A includes standards for general purpose lighting and portable lighting fixtures and addresses the Committee's priority to carry out the mandates established in Assembly Bill 1109 (Huffman Chapter 534, Statutes of 2007)[1]. AB 1109 requires the Energy Commission to adopt minimum energy efficiency standards for general purpose lighting that, in combination with other programs and activities, reduce average statewide electrical energy consumption by not less than 50 percent from 2007 levels for indoor residential lighting and not less than 25 percent from the 2007 levels for indoor commercial and outdoor lighting by 2018. The Energy Commission is directed to adopt standards by December 31, 2008. Accelerated or new efficiency standards for general purpose lighting and portable lighting fixtures can provide significant indoor residential lighting energy savings.

Part B includes lighting efficiency standards for metal halide luminaires that can address the indoor commercial and outdoor lighting energy efficiency reduction requirements of AB 1109. Part B also includes consideration of a voluntary test procedure for battery charger systems, amendments to the current regulations for residential pool pumps (including requirements for replacement pool pump motors), clarification of the current test method for portable electric spas, and necessary updates and revisions to the overall Appliance Efficiency Regulations for consistency with federal law.

[1] Assembly Bill 1109 (Huffman, Chapter 534, Statutes of 2007), http://www.leginfo.ca.gov/pub/07-08/bill/asm/ab_1101-1150/ab_1109_bill_20071012_chaptered.pdf

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Abstract

This Staff Report contains proposed amendments to the Appliance Efficiency Regulations (California Code of Regulations, Title 20, Sections 1601 through 1608) to be considered as part of the 2008 Appliance Efficiency Rulemaking (Docket # 08-AAER-1A).

This report covers proposed standards for general purpose lighting and portable lighting fixtures (portable luminaires). This report presents staff analysis of the proposed standards, including legislative criteria, feasibility, cost-effectiveness, energy use and projected savings on a statewide basis, stakeholder comments and alternative proposals.

The proposed standards for general service lamps and portable luminaires respond to AB 1109. The proposed standards will contribute towards significant savings in lighting energy use in California.

Keywords: Appliance Efficiency Regulations, appliance standards, portable lighting fixtures, torchieres, luminaires, lamps, general purpose lighting, AB 1109, EISA, compact fluorescent lamps

CHAPTER 1: 2008 Appliance Efficiency Rulemaking – Part A, General Intent and Findings

Legislative Criteria

Section 25402 (c) (1) of the Public Resources Code requires the California Energy Commission to adopt standards for the energy efficiency of appliances whose use, as determined by the Energy Commission, requires a significant amount of energy on a statewide basis. New and upgraded standards must be feasible and attainable and must not "result in any added total costs to the consumer over the designed life of the appliance." The added total cost is obtained by comparing the cost and performance of a typical model that the consumer would be expected to purchase with the proposed upgraded or new standard in effect, to the cost and performance of a typical model that the consumer would be expected to purchase without the proposed upgraded or new standard in effect.

The California Lighting Efficiency and Toxics Reductions Act of 2007, enacted by AB 1109 and codified in Public Resources Code section 25402.5.4, requires the Energy Commission to adopt minimum energy efficiency standards for general purpose lighting that, in combination with other programs and activities, reduce average statewide electrical energy consumption by not less than 50 percent from 2007 levels for indoor residential lighting and not less than 25 percent from the 2007 levels for indoor commercial and outdoor lighting by 2018.

The proposed regulations contained within this staff report comply with Public Resources Code section 25402(c) (1) criteria. The proposed regulations will lead to feasible and attainable efficiencies, will reduce statewide electrical energy consumption, and will not result in any added costs to the consumer over the appliance's design life.

Background

The Energy Commission is undertaking a multi-phase proceeding to adopt efficiency standards for appliances. In its April 2, 2008, Scoping Order, the Committee divided Phase I of the 2008 Appliance Efficiency standards Rulemaking into two concurrent rulemakings, Part A and Part B. Later in April, the Committee established Part C to consider televisions and any additional topics separately. The Scoping Order also anticipated that there will be a Phase II appliance standards proceeding at a later time to consider other standards opportunities. This report addresses proposed amendments to the current regulations for the topics considered in Phase I, Part A.

The appliance types identified for consideration in Part A include general purpose lighting and portable luminaires and address the Committee's priority to carry out the mandates established

in AB 1109. The recently enacted federal Energy Independence and Security Act of 2007 [2] (EISA) established national lighting efficiency standards for general service lamps that will take effect beginning in 2012, with specific provision for earlier adoption of these standards in California. Accelerated efficiency standards for general purpose lighting and new standards for portable lighting fixtures can provide significant indoor residential lighting energy savings and, thus, are the focus of the Part A rulemaking to meet the AB 1109 mandate to adopt lighting efficiency standards by December 31, 2008.

Part B includes lighting efficiency standards for metal halide luminaires that can address the indoor commercial and outdoor lighting energy efficiency reduction requirements of AB 1109. Part B also includes a comprehensive voluntary test procedure for battery charger systems, amendment of the current regulations for residential pool pumps, clarification of the current test method for portable electric spas, and updates and revisions to the overall Appliance Efficiency Regulations necessary for consistency with federal law. Note that Part B is the subject of a separate staff report.

Proposed Regulations

The proposed regulations for Part A consist of two strategies:

1. Accomplish the early adoption in California of the EISA energy conservation standards for all types of general service incandescent lamps (both Tier I and Tier II), as provided by the federal law. This report shows that the use of general service lamps requires a significant amount of energy on a statewide basis, and the proposed standards are feasible, attainable, and cost-effective. Early adoption of the EISA provisions will allow California to maximize energy savings from these lamps to meet the AB 1109 lighting energy reduction requirements for indoor residential general purpose lighting.

2. Establish new regulations for portable lighting fixtures (portable luminaires). These portable lighting fixture regulations are feasible, attainable, and cost-effective. The proposed regulations allow multiple compliance options that are technically feasible, save similar amounts of energy, and offer flexibility. None of the technologies specified in the proposed regulations are required as the only compliance option. Another important reason for mandating specific technologies for portable luminaires is to protect the California economy by reducing electrical demand.

[2] ''Energy Independence and Security Act of 2007.'' http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=110_cong_bills&docid=f:h6enr.txt.pdf

Significant Energy Use on a Statewide Basis

The estimates of statewide energy use for each of the appliance categories under consideration are provided in Table 1. They represent a "significant amount of energy on a statewide basis."

Table 1 – Annual Statewide Energy Use by Appliance Type

Category	Statewide Annual Energy Use (millions of kWh)
All General Service Incandescent Lamps (Tier I) and General Service Lamps (Tier II)	17,893
Portable Luminaires	3,063

The value of 17,893 million kWh for annual statewide energy use for residential general service incandescent lamps for both Tier I and Tier II is based on the information from the *Lighting Efficiency Technology Report, California Baseline*[3] that reported that 59 percent of the installed medium screw base socket light fixtures in California are populated by general service incandescent lamps. Pacific Gas and Electric (PG&E) has estimated that California has 437 million medium screw base light sockets in residential dwellings in 2007. The annual statewide energy use is calculated by multiplying the average energy used per lamp by the number of lamp sockets and by the average hours of operation per year.

Annual statewide energy use for portable luminaires is calculated by multiplying the average energy use per luminaire, by the estimated number of portable luminaires in use, and by the numbers of hours of operation per year.

Feasible Alternative Proposals

The alternative to early adoption of the federal EISA lighting efficiency standards for general service lamps is not to exercise the provisions explicitly allowing California to do so. The effect of California not adopting an early effective date of the federal standards would result in forfeited energy savings and increased costs to the state's residential consumers.

The proposed regulations for portable luminaires include five compliance options providing a range of feasible alternative compliance paths.

[3] Heschong Mahone Group, *Lighting Efficiency Technology Report, California Baseline*, September 1999.

Cost-Effectiveness and Projected Statewide Savings

Chapters 2 and 3 of this report contain the information that demonstrates the cost-effectiveness and statewide energy savings associated with each of the proposed standards.

CHAPTER 2: State Standards for Federally Regulated General Service Incandescent Lamps, Modified Spectrum General Service Incandescent Lamps, and General Service Lamps

Background

AB 1109 was signed by Governor Schwarzenegger in October 2007. In December 2007, the federal EISA was signed into law, including provisions for future lighting efficiency standards. In particular, EISA includes two "tiers" of new energy conservation standards for general service incandescent lamps. The federal Tier I standards begin going into effect on January 1, 2012, and are phased in over the next three years. EISA specifically allows California to accelerate the effective dates of the federal Tier I standards by one year without changing the standards structure, to be effective beginning January 1, 2011. The federal Tier II standards were not specified in EISA, but are to be developed by the Department of Energy (DOE) to be effective on January 1, 2020, and achieve efficiency levels equivalent to or better than 45 lumens/watt. EISA specifically allowed California (and Nevada) to adopt state Tier II standards effective two years earlier, on January 1, 2018, and specifically stated that in the case where no federal Tier II standard had been adopted, California could adopt "…any California regulations related to these covered products…". Staff proposes that California adopt a standard of 45 lumens/watt, consistent with the expected federal standards or backstop requirements.

PG&E with Ecos Consulting submitted an initial *Proposal Information Template for General Purpose Lighting* on January 30, 2008[4] (later modified on April 7, 2008[5]). Subsequently, on May 20, 2008, PG&E submitted "*Analysis of Standards Options for General Services Incandescent Lamps*[6]" that analyzed and supported the Energy Commission's proposed early adoption of the new federal lighting standards.

PG&E estimated medium screw-base general service incandescent lamp sales for California make up 11 percent of national sales, based on data collected from lighting manufacturers and importers. The growth in the total number of households will expand the number of medium screw base sockets in California. These new sockets and the 437 million general service sockets currently in residential use combine to represent a significant amount of energy use now and in the future.

The Tier I standards for general service incandescent lamps and modified spectrum general service incandescent lamps will be phased in over three years on the following schedule.

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[4] Pat Eilert, Gary Fernstrom and Ed Elliot, *Proposal Information Template for General Purpose Lighting*, January 30, 2008.
[5] Pat Eilert, Gary Fernstrom and Ed Elliot, *Proposal Information Template for General Purpose Lighting*, April 07, 2008.
[6] Pat Eilert, Gary Fernstrom and Ed Elliot, *Analysis of Standards Options for General Service Incandescent Lamps*, May 20, 2008.

- Lamps with a federal effective date of January 1, 2012, will be effective in California on January 1, 2011.
- Lamps with a federal effective date of January 1, 2013, will be effective in California on January 1, 2012.
- Lamps with a federal effective date of January 1, 2014, will be effective in California on January 1, 2013.

Beginning on January 1, 2018, the proposed Tier II standards for all general service lamps will take effect (two years in advance of when federal standards would be in effect), and resulting energy savings will occur in those two years. Early adoption of Tier I standards will result in a 28 percent decrease for each wattage bin of general service incandescent lamps and modified spectrum general service incandescent lamps from 2007 levels. An additional 27 percent decrease in general service lamp wattage for each bin type would result from implementing the proposed state Tier II standards in 2018. As a result of accelerating the implementation of the federal Tier I standards and implementing the state Tier II standards as allowed in federal law, California will realize substantial energy savings from the stock turnover of lamps in an estimated 437 million medium screw-base sockets.

The proposed standards are also expected to reduce peak electrical demand by 64 megawatts (MW) for Tier I and an additional 106 MW for Tier II. The accelerated implementation of the federal Tier I standards and the implementation of state Tier II standards would reduce peak demand by 170 MW in 2020.

Staff reviewed PG&E's market analysis, methods, and assumptions, concluding that PG&E's assessment is reasonable. The early adoption of the new federal standards can be expected to produce significant lighting energy savings, which will contribute toward achieving the residential lighting energy consumption reductions required by AB 1109 by 2018.

Savings and Cost Analysis

Based on PG&E's analysis, the combined first-year energy savings is estimated at 1,186 gigawatt-hours (GWh) for Tier I. Tier II is expected to save 3,378 GWh over its two-year effective life. The Tier I standards will be phased in over a three-year period with estimated savings for the first, second, and third years at 416 GWh, 275 GWh, and 495 GWh, respectively. Staff combined the first-year savings for the three separate years for the Tier I total, whereas the calculation for Tier II represents two years of savings.

Table 2 — Energy Savings and Reduced Costs for General Service Incandescent Lamps – Tier I and Tier II

Tier	Design Life (Hours)	Annual Unit Energy Savings (kWh)	Annual Unit Energy Cost Savings ($)	Annual Sales (millions of units)	First-Year Statewide Energy Savings (GWh)	Incremental Cost of Improve-ment Per Unit ($)	Reduced Total Cost over the Design Life ($)	Simple Payback Period (Hours)
I	1,000	29.63	$2.27	72.3	1,186	$1.00	$2.27*	625
II	1,000	42.24	$3.22	72.3	1,689	$2.00	$3.22*	625

* Energy cost assumed to be $0.14 per kilowatt hour. Composite residential electricity prices used in residential demand forecast, Source: California Energy Commission Energy Demand Forecast 2008-2018.

The design life for general service incandescent lamps is based on the EISA minimum rated lifetime of 1,000 hours. The estimated incremental cost per unit (rounded) of $1.00 for Tier I and $2.00 for Tier II is taken from the PG&E CASE study of May 20, 2008. Annual unit energy savings are calculated by multiplying the average annual reduction in energy use per unit by the energy price. The first-year statewide energy savings were calculated by multiplying the average annual unit energy savings by the total number of unit sales. In its April 7, 2008, submittal PG&E estimated that California had 437 million general service light sockets in dwellings in 2007 and estimated total general service incandescent lamp sales at 72.3 million units a year. The reduced total cost over the design life is calculated by multiplying the estimated design life in years by the estimated annual reduction in electrical energy use due to the proposed standard (kWh/unit/yr) by current average electricity rate ($/kWh). Simple payback period is calculated in hours to match the design life; the design life of 1,000 hours equates to approximately one year of normal use. The average payback period for both Tier I and Tier II is estimated to be 625 hours. This equates to a payback period of approximately eight months based upon the design life of 1,000 hours.

Stakeholder Comments

On May 15, 2008, the Committee conducted a public workshop to obtain comments from interested parties regarding draft appliance efficiency regulations including lighting efficiency standards. The Energy Commission received comments from Osram Sylvania and the National Electrical Manufacturers Association (NEMA).

NEMA submitted comments on June 25, 2008,[7] including an alternate proposal stating that the EISA Tier II minimum efficacy standard of 45 lumens per watt is not a standard, per se, but is a backstop requirement in the event that standards are late or are deemed not to save sufficient energy. NEMA proposed that the Energy Commission replace the current proposed Tier II

[7] National Electrical Manufacturers Association, June 25, 2008.

language with the following language: "Effective January 1, 2018, the standards for federally regulated general service lamps shall be the same as those established by the Secretary of Energy in a rulemaking pursuant to 42 U.S.C sec 6295(i)(6)(A), as amended by section 321(a)(3)(v) of the Energy Independence and Security Act of 2007."

Federal appliance law, 42 USC section 6295 (i)(6)(A)(vi)(III) provides California with the authority to adopt the Tier II lighting standards without being preempted under 42 USC section 6297(b):

> "'(vi) STATE PREEMPTION.—Neither section 6297(b) nor any other provision of law shall preclude California or Nevada from adopting, effective beginning on or after January 1, 2018—
>
> ''(I) a final rule adopted by the Secretary in accordance with clauses (i) through (iv);
>
> ''(II) if a final rule described in subclause (I) has not been adopted, the backstop requirement under clause (v); or
>
> ''(III) in the case of California, if a final rule described in subclause (I) has not been adopted, any California regulations relating to these covered products adopted pursuant to State statute in effect as of the date of enactment of the Energy Independence and Security Act of 2007."
>
> "'(v) BACKSTOP REQUIREMENT.—If the Secretary fails to complete a rulemaking in accordance with clauses (i) through (iv) or if the final rule does not produce savings that are greater than or equal to the savings from a minimum efficacy standard of 45 lumens per watt, effective beginning January 1, 2020, the Secretary shall prohibit the sale of any general service lamp that does not meet a minimum efficacy standard of 45 lumens per watt."

The Energy Commission can adopt any lighting standard level meeting the provisions of Public Resources Code section 25402(c)(1) and EISA. The proposed standards are based on the analysis and recommendations made by PG&E and Ecos Consulting. The proposed standards are intended to help meet the AB 1109 2018 requirements. The standards that are proposed in no way conflict with federal section (vi)(II) or (vi)(III).

Proposed Regulations

This section summarizes the proposed changes to the Appliance Efficiency Regulations related to the strategy of adopting early effective dates of the federal standards in California and for consistency with federal law.

Section 1601 (k). Scope.

General service lamps have been added to the scope of regulated lamps.

Section 1602. Definitions.

Definitions for general purpose lighting have been added to 1602 (a) General and Section 1602 (k) General Service Lamps for consistency with EISA.

Section 1604 (k). Test Method for Specific Appliances.

References to test methods have been updated for consistency with federal laws.

Section 1605.3 (k). Lamps.

The following specifications have been added, consistent with the provisions of EISA.

Table K-8: Standards for State-Regulated General Services Incandescent Lamps — Tier I

Rated Lumens Range	Maximum rated Wattage	Minimum Rated Life Time	Proposed California Effective Date
1,490-2,600 Lumens	72 Watts	1,000 hours	Jan. 1, 2011
1,050-1,489 Lumens	53 Watts	1,000 hours	Jan. 1, 2012
750-1,049 Lumens	43 Watts	1,000 hours	Jan. 1, 2013
310-749 Lumens	29 Watts	1,000 hours	Jan. 1, 2013

Source: California Energy Commission, *2007 Appliance Efficiency Regulations*, August 2007

Table K-9: Standards for State-Regulated General Services Lamps — Tier II

Lumens Range	Maximum Lamp Efficacy	Minimum Rated Life Time	Proposed California Effective Date
All	45 lumens per watt	1,000 hours	Jan. 1, 2018

Source: California Energy Commission, *2007 Appliance Efficiency Regulations*, August 2007

Section 1606 - Filing by Manufacturers; Listing of Appliances in Database:

Table V, Data Submittal Requirements (Section K) has been revised to define required information for specific state-regulated lamps — medium screw-base general service incandescent lamps, medium screw-base general service compact fluorescent lamps (CFL), medium screw-base general service light-emitting diode (LED) lamps, and organic LED (OLED) lamps, consistent with federal law.

CHAPTER 3: Portable Luminaires

Background

Portable lighting fixtures, or *portable luminaires*, include plug-in table and floor fixtures. Portable lighting fixtures are not listed as "covered products" in federal law, with the exception of torchiere fixtures. Other than torchieres, no other portable lighting fixtures are covered by federal or California regulations. Most portable lighting fixtures are designed to accept lamps that are federally regulated. Currently, there are California and federal regulations for general service incandescent lamps and for general service lamps. Federally regulated general service lamps include CFL and LED lamps that are screw-based. The U. S. Environmental Protection Agency (EPA) developed and operates a voluntary ENERGY STAR® labeling specifications program for portable lighting fixtures.

The Committee received two initial proposals for portable luminaires, one from PG&E[8] and the other from the American Lighting Association[9] (ALA). After review of the initial proposals, comments, and discussion with PG&E and lighting industry representatives, the Energy Commission staff recommended alternative draft standards for consideration at the May 15, 2008, Committee workshop. This initial staff proposal included a limitation on maximum wattage per portable luminaire as included in the initial PG&E proposal, which the ALA argued was not technically feasible.

In its January 30, 2008, proposal, PG&E evaluated an option to require CFLs to be prepackaged for sale with all portable luminaires, but dismissed the idea as not providing persistent energy savings after the first CFL burnt out. The ALA asked the staff to reconsider this option. Staff did reconsider this option and determined that the initial CFL will last an average of eight years, at which time (2018) the proposed Tier II general service lamp minimum efficacy of 45 lumens per watt would be in effect. Therefore, persistent energy savings would be realized after the initial CFL burnt out because only high-efficacy replacement lamps are proposed to be available in 2018.

The staff worked with all of the stakeholders, taking elements from each of the proposals. The following five compliance options are proposed as regulations for meeting energy efficiency requirements for portable luminaires:

1. Be equipped with a dedicated fluorescent lamp socket; or
2. Be a LED luminaire, or a portable luminaire using LED lights including their power supply; or

[8] Pat Eilert, Gary Fernstrom and Ed Elliot, *Proposal Information Template for Portable Lighting Fixtures*, January 30, 2008.

[9] Clark Linstone and Terry McGowan, *Proposal Information Template for Portable Lighting Fixtures*, American Lighting Association, April 7, 2008.

3. Be equipped with GU-24 sockets that can support only high-efficiency lamps; or
4. Be prepackaged and sold with high-efficacy CFLs based on current Energy Star efficiency levels or with high-efficacy LED lamps; or
5. If equipped with single-ended, non-screw-based halogen lamp sockets (line or low voltage), include a dimmer control or high/low control and be rated for a maximum of 100 watts.

Additionally, the proposed regulations have the following requirements:

- Portable luminaires that have internal power supplies shall have zero standby power when the luminaire is turned off.
- Beginning January 1, 2013, portable luminaire manufacturers selling products in California shall report to the Energy Commission the annual unit sales of portable non-screw-based halogen luminaires sold in California.

Savings and Cost Analysis

PG&E with American Council for an Energy Efficient Economy (ACEEE) submitted a revised analysis[10] based on the above proposed regulations on July 30, 2008. PG&E's initial and revised analyses considered California stock, California annual sales, and initial costs for portable luminaires. Of the five compliance options listed above, parties agreed that compliance by prepackaging of high-efficacy CFLs (Option 4) will be the compliance path of choice. It would cost an additional $2.50 per socket to prepackage these CFLs, with a simple payback of 0.7 years.

The initial CFL will last an average of eight years, at which time it is expected that the proposed Tier II general service lamp minimum efficacy of 45 lumens per watt will be in effect. In Table 2, a 12-year life is used for portable luminaires, but the calculations are only based upon the first eight years for the initial CFL resulting from the proposed portable lamp standard.

Table 2 — Energy Savings and Reduced Costs for Portable Luminaires

Design Life (years)	Annual Unit Energy Savings (kWh)	Annual Unit Energy Cost Savings ($)	Annual Sales (units)	First-Year Statewide Energy Savings (kWh)	Incremental Cost of Improvement per Unit ($)	Reduced Total Cost Over the Design Life of the Appliance ($)	Simple Payback Period (years)
12	24.1	$3.37	5,662,757	136,472,443	$2.50	$26.99**	0.7

* Energy cost assumed to be $0.14 per kilowatt hour. Composite residential electricity prices used in residential demand forecast, Source: California energy demand 2008-2018.
**Reduced cost over the design life of the appliance is based only on the eight year design life of a CFL.

[10] Jennifer Amann, e-mail: Analysis for Portable Fixtures and Metal Halide Fixtures, July 30, 2008.

Annual unit energy cost savings are calculated by multiplying the average annual reduction in energy use per unit with energy price. The first-year statewide energy savings were calculated by multiplying the average annual unit energy savings by the total number of unit sales. The reduced total cost over the design life is calculated by multiplying the design life of a CFL by annual energy cost savings per unit, minus the incremental cost. Simple payback period is calculated by dividing estimated increase in price by annual energy cost savings.

The compliance Option 1 (equipped with a dedicated fluorescent lamp socket) and Option 2 (be an LED luminaire) for a portable luminaire are voluntary options intended to avoid impeding energy efficiency efforts that are already occurring in the market. Significant resources have been invested by EPA to promote Energy Star® portable luminaires, which can be used to comply with the proposed option 1 for a portable luminaire. There has recently been significant market activity in bringing high-efficiency LED lighting to consumers. Even though these two options may cost more than simply prepackaging CFLs with screw-based luminaires, the intent of these compliance options is to allow continued growth of alternative high-efficiency options in the market. These market trends are expected to be further amplified by the Tier I and Tier II standards.

Staff assumes Option 3 for a portable luminaire to be equipped with a GU-24 line-voltage socket to have zero costs because a socket will have to be purchased by manufacturers anyway. Therefore, the GU-24 socket will simply replace traditional screw-based line-voltage sockets. There is no information available that would indicate that a GU-24 socket will cost more than a traditional screw-based line-voltage socket. Chapter 4 discusses GU-24 sockets, luminaires, and adapters in more detail.

Option 4 was analyzed at the beginning of this section and is estimated to be the most likely to occur method of compliance with the proposed regulation.

Finally, staff assumes that Option 5 for portable luminaires to be equipped with single-ended, non-screw-based halogen lamp sockets, with a dimmer or high/low control and rated for a maximum of 100 watts has zero additional costs related to the proposed regulation because it allows products that are readily available in the market to comply with the regulations.

Stakeholder Discussion

At the Committee workshop on May 15, 2008, ALA suggested its support for an alternate compliance option that would require compact fluorescent lamps to be prepackaged and sold with every screw-based portable luminaire, as previously identified in PG&E's initial proposal. ALA recommended that the Energy Commission consider this compliance option.

There were a series of discussions between ALA and PG&E, Energy Solutions, ACEEE and staff following the May 15, 2008, workshop. To encourage further development of high-efficiency LED lamps, the Energy Commission staff added the option to prepackage either screw-based CFLs or use screw-based LED lamps in portable luminaires with screw-based sockets.

Proposed Regulations

The following is taken from the Express Terms, consistent with the specific format and table numbering conventions used in that document.

Section 1601. Scope.

Portable luminaires are specifically added to the scope of regulated appliances.

Section 1602. Definitions.

Section 1602 (n). Luminaires. New definitions are added to define the specific technologies, lamps, sockets, GU-24 and light output, power requirements and other attributes referred to in the energy efficiency compliance options specified in Section 1605.3 (n).

Section 1605.3 (n). Luminaires.

(4) Portable Luminaires.

A. Portable luminaires manufactured on or after January 1, 2010 shall meet one or more of the following requirements:

1. Be equipped with a dedicated fluorescent lamp socket connected to a high frequency electronic ballast contained within the portable luminaire with minimum system efficacy requirements in Table N-4;

Table N-4

Minimum System Efficiency Requirements for Pin-Based Fluorescent Lamps for Portable Luminaires

System Input Power Rating	Minimum System Efficacy
≤ 5 watts	30 lumens per watt
> 5 watts to ≤ 15 watts	40 lumens per watt
> 15 watts to ≤ 40 watts	50 lumens per watt
> 40 watts	60 lumens per watt

Source: California Energy Commission, *2007 Appliance Efficiency Regulations*, August 2007

2. Be equipped with a GU-24 line-voltage socket and not rated for use with incandescent lamps;

3. Be a light-emitting diode (LED) luminaire, or a portable luminaire with an LED light engine with integral heat sink, that complies with the minimum requirements in Table N-5;

Table N-5
Minimum Requirements for Portable LED Luminaires and Portable Luminaires with LED Light Engines with Integral Heat Sink

Minimum Light Output	200 lumens (initial).
Testing Requirements	Input wattage, luminous flux, and system efficacy shall be tested in accordance with California Joint Appendix JA8 – 2008, "Testing of Light Emitting Diode Light Sources," or in accordance with IES LM-79-08, "Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products."
Minimum Luminaire Efficacy	If testing an LED luminaire 29 lumens/W
Minimum Light Engine Efficacy	If testing an LED light engine with integral heat sink 40 lumens/W
Allowable Color Correlated Temperature (CCT)	2700 K through 5000 K
Minimum Color Rendering Index (CRI)	75
Power Factor	Residential ≥ 0.70
Electromagnetic and Radio Frequency Interference	•Power supplies designated by the manufacturer for residential applications shall meet FCC requirements for consumer use (FCC 47 CFR Part 15/18 Consumer Emission Limits). •Power supplies designated by the manufacturer for commercial applications shall meet FCC requirements for non-consumer use (FCC 47 CFR Part 15/18 Non-consumer Emission Limits).
Noise	Power supply shall have a Class A sound rating.
Transient Protection	Power supply shall comply with IEEE C.62.41-1991, Class A operation. The line transient shall consist of seven strikes of a 100 kHz ring wave, 2.5 kV level, for both common mode and differential mode.

Source: California Energy Commission, *2007 Appliance Efficiency Regulations*, August 2007

4. If equipped with an E12, E17, or E26 screw-based socket, the luminaire shall be prepackaged and sold together with one screw-based compact fluorescent lamp, or with one screw-based LED lamp for each screw-based socket on the portable luminaire. The compact fluorescent or LED lamps which are prepackaged with the portable luminaire shall be fully compatible with the luminaire controls, including portable luminaires having a dimmer control shall be prepackaged with dimmable compact fluorescent or LED lamps, and portable luminaires having 3-way controls shall be prepackaged with 3-way compact fluorescent or LED lamps. The compact fluorescent lamps required to be packaged with the luminaires shall meet the minimum energy efficiency levels established for 2008 by ENERGY STAR for compact fluorescent lamps. The LED lamps required to be packaged with the luminaire shall comply with the minimum requirements in Table N-5.

   Exceptions to Section 1605.3(n)4. The following portable luminaires are not required to be prepackaged and sold together with compact fluorescent or LED lamps:

   a. Portable Wall Mount Adjustable Luminaires that meet all of the following requirements: Designed only to be mounted on a wall, having no base which will allow the luminaire to stand on a horizontal surface, having an articulated arm, having a maximum overall length of 24 inches in any direction, fitted only with a single E-12, E-17 or E-26 lamp socket per luminaire, and controlled with an integral dimmer. Luminaires manufactured on or before December 31, 2011 shall have a maximum relamping rated wattage of 57 watts, and luminaires manufactured on or after January 1, 2012 shall have a maximum relamping rated wattage of 43 watts, as listed on a permanent pre-printed factory-installed label in accordance with Underwriters Laboratories (UL) 153.
   b. Art Work Luminaires that meet all of the following requirements: Designed only to be mounted directly to art work only for the purpose of illuminating that art work, fitted only with E-12 screw-base line-voltage sockets, having no more than three sockets per luminaire, and controlled with an integral high/low switch. Luminaires with a single socket shall have a maximum relamping rated wattage of 25 watts, and luminaires with two or three sockets shall have a maximum relamping rated wattage of 15 watts per socket, as listed on a permanent pre-printed factory-installed label in accordance with Underwriters Laboratories (UL) 153.

5. If equipped with single-ended, non-screw-based halogen lamp sockets (line or low voltage), shall include a dimmer control or high/low control and be rated for a maximum of 100W.

B. Portable luminaires that have internal power supplies shall have zero standby power when the luminaire is turned off.

C. Beginning January 1, 2013, portable luminaire manufacturers selling products in California shall submit to the Energy Commission annual unit sales of portable non-screw-based halogen luminaires sold in California, by major product class. Data for each calendar year shall be submitted no later than May 1 of the following year.

Section 1606. Filing by Manufacturers; Listing of Appliance in Database.

Table V, Data Submittal Requirements. Section N has been added to define required information for Portable Luminaires for the specific compliance method used, including type of portable luminaire, base type, GU-24 sockets and adaptors.

Apart from Table V, beginning January 1, 2013, portable luminaire manufacturers selling products in California shall submit to the Energy Commission annual unit sales of portable non-screw-based halogen luminaires sold in California, by major product class. Data for each calendar year shall be submitted no later than May 1 of the following year.

CHAPTER 4: GU-24 Sockets, Luminaires, and Adaptors

Background

The GU-24[11] is a 120-volt pin/twist socket recently developed by the lighting industry to be used only with high-efficacy light sources such as CFLs and LEDs. Some people in the lighting industry anticipate that the GU-24 may eventually replace the common Edison screw-base sockets for those types of light sources.

The GU-24 socket idea came out of a lighting industry "think tank" meeting held in 2003, which included participants from the ALA, NEMA, and the EPA Energy Star program. Energy Star subsequently held a design competition for manufacture of a prototype GU-24 socket to use the GU-24, and the EPA has been a strong supporter of the GU-24 socket development.

Because GU-24 sockets are relatively new in the market, there has been no significant demand for introducing incandescent or other low efficacy products that use GU-24 into the market. However, at least one manufacturer already has a GU-24 to screw-base adaptor which will allow incandescent lamps to be installed directly into luminaires that were designed for use with only compact fluorescent lamps. This circumvents the original intent to achieve a greater market penetration of CFLs and LEDs through the use of GU-24 sockets. There are no existing national or state regulations preventing manufacturers from introducing other low-efficacy GU-24 products into the market.

Savings and Cost Analysis

The proposed GU-24 regulations assure that the energy savings projected by the proposed regulations for general service incandescent lamps and for portable luminaires will be realized. To assure that GU-24 sockets do not accommodate incandescent lamps in the future, staff has added requirements that general service incandescent lamps shall not contain a GU-24 base, luminaires with GU-24 sockets shall not be rated for use with incandescent lamps, and no GU-24 to medium screw-base sockets shall be sold in California.

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[11] *G-24* is the designation of a lamp holder and socket configuration, based on a coding system of the International Energy Consortium where: "G" indicates the broad type of two or more projecting contacts, such as pins or posts; "U" distinguishes between lamp and holder designs of similar type but that are not interchangeable due to electrical or mechanical requirements; and "24" refers to the spacing of the electrical contact pins of 24 millimeters center to center.

There are zero costs associated with the GU-24 regulations because no low efficacy GU-24 products, other than one GU-24 to medium screw-base adaptor, exist in the market. The regulations do not require luminaire manufacturers to make modifications to existing GU-24 products. The proposed regulations simply prevent GU-24 products which enable incandescent use from being introduced into California.

Stakeholder Discussion

Discussions between NEMA, ACEEE, ALA, and PG&E have established broad support for the proposed regulations for high-efficacy GU-24 products. There have been no comments against any of the proposed GU-24 regulations.

Proposed Regulations

The following is taken from the Express Terms, consistent with the specific format and numbering conventions used in that document.

Section 1602. Definitions.

New definitions have been added to define GU-24 sockets adaptors.

Section 1605.3 (k). State Standards for Non-Federally-Regulated Appliances.

Incandescent lamps shall not contain a GU-24 base.

Section 1605.3 (n). Luminaires.

(5) GU-24 luminaires, sockets, and adaptors

A. Permanently installed and portable luminaires with GU-24 sockets manufactured on or after January 1, 2010 shall not be rated for use with incandescent lamps of any type, including line voltage or low voltage.

B. GU-24 adaptors manufactured on or after January 1, 2010 shall not adapt a GU-24 socket to any other line voltage socket.

Section 1606. Filing by Manufacturers; Listing of Appliance in Database.

Table V, Data Submittal Requirements. Section N has been added to define required information for GU-24 sockets and adaptors.