Measure BLD-1
Changes to Lighting Power Density Values Affected by Developments in Electronic Ballasts for Metal Halide Lighting

2008 California Building Energy Efficiency Standards

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CONTENTS

Overview

Complete the following table, providing a brief sentence or two for each category of information.

Description	Advances in electronic ballasts and metal halide lamps have been announced in 2005 that dramatically improve the energy efficiency of metal halide lamps over 150 watts. The key improvement is electronic ballasts that have both lower waste heat and produce superior lumen maintenance. A related development is the introduction of ceramic metal halide and pulse start quartz metal halide lamps matched to the ballasts. These technologies are very cost effective and can be used to reduce allowed lighting power in applicable facilities.
Type of Change	The Change affects certain lighting power density values in Tables 146-B, 146-C and 146-D, which are prescriptive lighting power allowances also used for baseline allowances in modeling. There is no other impact or change of scope. In addition, new corresponding lamp and ballast combinations should be added to the Non-residential ACM Manual Appendix NB.

Energy Benefits	The actual energy savings can be as high as 25% compared to current technology. However, some of the benefits were captured in the 2005 Standard when fluorescent high bay lighting was assumed to be an acceptable and cost effective replacement technology to standard metal halide equipment. Thus, this proposal is limited to about 10% for applicable space types.
Non-Energy Benefits	The electronic ballast may improve flicker and starting behavior. Use of ceramic lamps dramatically improves color and makes this technology broadly useful in high bay retail.
Environmental Impact	There are no known adverse impacts.
Technology Measures	The Measure requires the use of electronic ballasts for high wattage HID lamps. Ballasts are now being made by Advance Transformer, General Electric, Delta,and Holophane, with others pending. The supply is ample and the product is in broad use with leading high bay merchants including Best Buy. Ballast life is estimated at 50,000 hours and preliminary experience indicates high reliability.
Performance Verification	No field performance verification required.
Cost Effectiveness	The Measure is cost effective.
Analysis Tools	Standard analysis tools can be used to analyze this measure.
Relationship to Other Measures	Note that some of the applications of this measure were realized in the 2005 standard, so certain spaces, e.g. gyms, can not further benefit as the 2005 standard was based on high bay fluorescent where suitable. This measure is significantly related to PG&E's proposal with respect to retail lighting and must not be added to this or any other measure.

Methodology

This measure assumes that for high-bay spaces (generally over 20 feet above floor to lighting system) employing standard pulse start metal halide high bay lighting systems, a one-for-one replacement can be made employing an electronic ballast that, due to improved lumen maintenance, also permits the use of a lower lamp wattage. A life cycle cost calculation assuming equal maintained light levels was used. The result of the calculation demonstrates a lower life cycle cost for the new system regardless of how the TDV of the energy is weighted. A 15% HVAC impact is assumed. There was no attempt to review this for every Climate Zone.

Analysis and Results

The savings are extremely good. Each replaced luminaire saves about 112 watts when adjusted for equal light level. The simple payback period is less than 2 years. The life cycle cost difference significantly favors the new technology. The net power reduction is at least 25%.

- *Energy and Cost Savings* The new technology increases first costs $0.37 to 0.65 per square foot in a high bay retail setting and shows a net present value savings of $3.45 to $3.98 over 15 years of operation.
- *Cost-effectiveness.* The cost effectiveness test using the average TDV value (lowest adjustment factor) is a total cost effectiveness benefit of at least $5.62 per square foot over 15 years.

Recommendations

A reduction in allowed lighting power density according to the following tables is recommended. These reductions are based on the conservative estimate that at least 50% of the lighting systems in each suitable space type are subject to these improvements, so the proposed reduction in allowance is the closest increment of tens of a watt per square foot, rounded up.

Table 146-B

General commercial and industrial work buildings		
High bay	~~1.1~~	1.0
Retail and wholesale stores*	~~1.5~~	1.3

Table 146 –C

General commercial and industrial work		
High bay	~~1.1**~~	1.0**
Precision	~~1.3***~~	1.2**
Retail merchandise sales, wholesale showrooms	~~1.7~~	1.5

Material for Compliance Manuals

The manual should explain that for high bay spaces, the use of an electronic ballast is now strongly recommended, even with HID lamps in the 400 watt class.

Bibliography and Other Research

Technical data as follows:

Advance Transformer Dynavision Form. EH-5010-R02
Website data at www.delta-power-supply.com
Holophane HL-1996
GE NuVation Brochure OLP-2762

Benya Lighting Design Summary Letter to Best Buy, October 8, 2005 (private communication)

Appendices

None