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Witness: William P. Herdegen, III
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Sponsoring Party: KCP&L Greater Missouri Operations Company
Case No.: ER-2010-0356
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MISSOURI PUBLIC SERVICE COMMISSION

CASE NO.: ER-2010-0356

REBUTTAL TESTIMONY

OF

WILLIAM P. HERDEGEN, III

ON BEHALF OF

KCP&L GREATER MISSOURI OPERATIONS COMPANY

**Kansas City, Missouri
December 2010**

KCP&L Exhibit No. GMO-22
Date 2/4/11 Reporter LMB
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REBUTTAL TESTIMONY
OF
WILLIAM P. HERDEGEN, III
Case No. ER-2010-0356

1 **Q: Please state your name and business address.**

2 A: My name is William P. Herdegen, III. My business address is 1200 Main Street, Kansas
3 City, Missouri, 64105.

4 **Q: By whom and in what capacity are you employed?**

5 A: I am employed by Kansas City Power & Light Company ("KCP&L") as Vice President,
6 Transmission and Distribution Operations.

7 **Q: What are your responsibilities?**

8 A: My management responsibilities include the maintenance and operation of the
9 transmission and distribution ("T&D") systems of KCP&L and KCP&L Greater Missouri
10 Operations Company ("GMO"; Collectively, GMO and KCP&L, "Companies").

11 **Q: Please describe your education, experience and employment history.**

12 A: I graduated from the University of Illinois, Champaign-Urbana in 1976 with a Bachelor
13 of Science degree in Electrical Engineering, and in 1981, I received my M.B.A. from the
14 University of Chicago. I was first employed at KCP&L in 2001. I have over thirty-three
15 years of experience in the electric utility industry. Prior to joining KCP&L, I served as
16 chief operating officer for Laramore, Douglass and Popham, a consulting firm providing
17 engineering services to the electric utility industry. Additionally, I was vice president of
18 Utility Practice at System Development Integration, an IT consulting firm focused on
19 development and implementation of technology systems. I began my utility career at

1 Commonwealth Edison and over a course of more than twenty years, held various
2 positions, including field engineer, district manager, business unit supply manager,
3 operations manager and vice president - Engineering, Construction & Maintenance.

4 **Q: Have you previously testified in a proceeding at the Missouri Public Service**
5 **Commission (“Commission” or “MPSC”) or before any other utility regulatory**
6 **agency?**

7 A: Yes, I have previously testified before the MPSC and the Kansas Corporation
8 Commission.

9 **Q: What is the purpose of your Rebuttal Testimony?**

10 A: The purpose of my testimony is to address the Direct Testimony of Robert Wagner, who
11 filed testimony *pro se* and supports initiatives promoted by the International Dark Sky
12 Association (“IDA”), specifically, proposed changes to the Companies’ tariffs to include
13 a part-night rate and associated controller for turning outdoor lights like streetlights,
14 ornamental street lighting, and private unmetered protective lighting off from midnight to
15 6:00 a.m.

16 Also, Mr. Wagner asks the Companies to add the option of a 50-watt high
17 pressure sodium lamp (“50-HPS”) to their tariffs; convert tariff lamp listings from
18 wattage/lumens to “an illumination on the ground” or “illuminance based rates”.

19 Further, he seeks to prohibit the marketing of outdoor lights as safety, security or
20 crime prevention lights without a company guarantee to the effectiveness of such lighting
21 in addressing safety, security, or crime prevention protection.

22 **Q: Should the Commission and other parties to this case assume that if the Companies**
23 **have not rebutted an item that they agree with Mr. Wagner’s position on that item?**

1 A: No, such an assumption should not be made. The Companies reserve their rights to raise
2 additional defenses and offer rebuttal in the pending cases. Lack of rebuttal does not
3 indicate the Companies' acquiescence on an issue.

4 **Overall View of Mr. Wagner's Testimony**

5 Q: **What is your general view of Mr. Wagner's proposals?**

6 A: The mission of KCP&L and GMO, as leading and trusted energy partners in the
7 communities they serve, is to provide safe, reliable power and customer-focused energy
8 solutions, and to improve life in the communities they serve—always being
9 environmentally aware and responsible. Mr. Wagner's support of IDA's mission to
10 partner in the communities it serves and preserve and protect the nighttime environment
11 is consistent with the Companies' desire to be environmentally aware and responsible.
12 However, recognizing that responsibility, we must consider Mr. Wagner's propositions
13 within the framework of customer-focused energy solutions and, based on that analysis,
14 the Companies do not support his recommended changes to the Companies' tariffs.

15 **Prohibition of Marketing of Outdoor Lighting as**
16 **Preventing Safety, Security, or Crime**

17 Q: **Mr. Wagner is asking the Companies be prohibited from marketing outdoor**
18 **lighting as safety, security or crime prevention lighting without a guarantee to back**
19 **up the claim. (Wagner Direct, p. 10, ll. 5-6). What is your view of this request?**

20 A: For clarity, and certainly not to suggest Mr. Wagner seeks to purposely misrepresent
21 facts, he does not fully disclose the context in which the statement, "Turn Lights On,
22 Turn Crime Off," appears. The statement is found in KCP&L's area light brochure.
23 (Schedule RAW2010-25). It is a heading of a section that continues on to discuss how

1 security lighting is a component—not the exclusive remedy—for creating safe
2 environments, along with modern alarm and security systems. There is no affirmative
3 statement or even an inference that the protective area lights offered by the Company will
4 guarantee a customer’s safety, security or prevent crime.

5 If Mr. Wagner’s interpretation of the statement was accurate, he does not offer
6 authoritative evidence that suggests protective area lighting offered by the companies is
7 ineffective as a component, along with modern alarm and security systems, of creating a
8 secure and safe environment.

9 **Q: How do customers use protective area lighting?**

10 A: Let me highlight that the Companies provide a service; the decision of how and why
11 customers install protective area lighting is totally the customer’s. With that
12 understanding, and recognizing this as anecdotal, let me share some insight that will
13 hopefully provide an idea of how customers use protective area lighting.

14 Beyond the residential customer lighting the backyard, a barn, or lighting along a
15 driveway or property owners supplementing street lighting that may not be adequate
16 because of placement or vegetation—protective area lighting is used by business owners
17 and apartment owners and others that are simply trying to stem delinquent and
18 misdemeanor-type behavior. I am not speaking about Type-A Felonies but ‘nuisance
19 crime’ for lack of a better term.

20 **Q: Do you have examples of ‘nuisance crime’?**

21 We have a customer, a business owner, who installed protective area light to
22 discourage illegal activity in his dimly lit parking lot and alley. Also, we have a customer,

1 an apartment owner, frustrated by youthful delinquent behavior and inappropriate public
2 activities behind a set of unlit dumpsters, install protective area lighting.

3 I am not trying to be sensational—just trying to help paint a picture of how and
4 why some of our customers choose very bright protective area lighting. Do these
5 customers comprise the majority? Hopefully not. Were they successful at changing public
6 behavior? I don't know. What is important is what the customer thought the benefits were
7 of installing protective area lighting.

8 **Q: What is the Companies general experience regarding customers requesting lower-**
9 **watt lighting options?**

10 **A:** First, let me highlight that the Companies are not the exclusive source for outdoor
11 lighting. Customers may install their own light—and they do—that will better meet their
12 needs. Having said that, prior to installing an outdoor light, our field designers will
13 discuss with customers lighting options, potential issues of light trespass, and the
14 different wattages available. Based on our field designers' experience, few, if any,
15 customers ask for a dimmer light or ask to have a 70W light removed because it kept
16 them or their neighbors awake. Our designers indicate the majority of customers
17 requesting dusk-to-dawn service want the maximum amount of illumination that is
18 appropriate for their situation.

19 It is easy to simply say the Companies need to offer lower watt lamps, but it is
20 without context—how and why customers are choosing to install area lighting. However
21 it is characterized, the current protective lighting, dusk-to-dawn, area light offerings—70-
22 W, 150-W, and 400-W—meet the needs of the majority of customers.

1 **Q: Are there challenges and potentially unrecovered costs in offering a 50-HPS**
2 **protective area light option?**

3 A: Beyond the added complexity to operations, there is a question of whether a 50-HPS
4 option will provide sufficient lighting to the area being lit. In the case of a residential
5 installation, it is foreseeable a customer requests the 50-HPS option; we install it; and the
6 customer then not being satisfied with its illumination. So, after a month, the customer
7 requests the lamp be removed or a higher watt option be installed.

8 This scenario was not contemplated by the current rates which seek, over a period
9 of time, to capture the cost of the fixture, installation, and continuing maintenance and
10 off-peak electricity use. If the Commission orders a 50-HPS lamp option, the cost of
11 removing a lamp and installing a different lamp within a short time of installation should
12 be recovered by fee, or provided for in some other manner in the tariffs, so as not to cause
13 detriment to the ratepayers because a customer basically did not like the a lower watt, 50-
14 HPS lamp.

15 **Q: What distinction would you make between Mr. Wagner's suggestion the Companies**
16 **provide a guarantee of safety, security or crime prevention performance under its**
17 **protective area lighting programs that is similar to the guarantee offered under**
18 **their surge protection program? (Id. p. 11, ll. 12-14).**

19 A: The Company offers an exclusive, specific, remedy under its surge protection service.
20 The price of the surge protection includes the risk of nonperformance pursuant to the
21 terms and limitations of the program.

22 Unlike the surge protection service, it is not reasonable the Company offer a
23 guarantee regarding its protective area lights because the service is not the exclusive

1 remedy for providing security, safety, and crime protection—nor does the Company
2 make any representation that it is the exclusive remedy. The area lights are but one
3 component of establishing a safe environment. Even if the Company offered such a
4 guarantee, the price of the light would require capturing the cost of the nonperformance
5 risk of the other components of creating a safe environment such as personal
6 responsibility, alarm and security systems, deadbolts, and big dogs, among other things—
7 all representing elements outside the control of the Company.

8 Also, the surge protection service is a “below the line service” so revenue, cost,
9 and liability are not shared with ratepayers, while revenue and cost of the protective area
10 light are part of the cost of service and fully reflected in the Companies’ tariffs. Adding a
11 guarantee would require adding a risk premium cost for this service—an unnecessary
12 guarantee

13 **Q: What is your opinion of Mr. Wagner’s request that the Commission manage**
14 **outdoor lights (Id. p. 11, l. 18 - p. 12, l. 4) and also issue an order requiring all**
15 **utilities that offer outdoor lighting limit their marketing to the technical details of**
16 **the lights they provide such as: wattage; bulb lumens; ground luminance; glare,**
17 **backlight and uplight ratings in accordance with the Illumination Engineering**
18 **Society TM-15? (Id. p. 11, ll. 9-12).**

19 **A:** At first blink this may seem like a reasonable request but, as discussed later in greater
20 detail, I am concerned that Mr. Wagner’s suggestion circumvents the regular legislative,
21 rulemaking, and public hearing process and, in turn, silences potential stakeholders to the
22 issues regarding protective area lights. It is my understanding the Commission, by statute
23 and rule, is not able to create a statewide standard through a single rate case.

1 Also, establishing such a standard of providing only specifications ignores one of
2 the values of protective area lights; that area lights are a component to help establish a
3 safe environment. Offering that information to customers is not misleading and helps
4 customers understand potential benefits of area lighting as opposed to a sterile recitation
5 of technical information.

6 **Q: Do you find a disconnect between the suggestion to remove helpful information to**
7 **the consumer regarding one of the benefits of protective area lighting and Mr.**
8 **Wagner's own testimony?**

9 The suggestion to remove information regarding one of the benefits of protective
10 lighting sits in opposition to the introductory paragraphs to one of Mr. Wagner's
11 references—the Illumination Engineering Society TM-15 standard. The TM-15 standard
12 recognizes lighting contributes to safety, security, and improves highway driving
13 visibility. The introduction states:

14 Outdoor lighting serves a variety of purposes that include providing light
15 for nighttime visual activities, contributing to safety/security, and
16 enhancing the beauty of architecture...Outdoor lighting also serves to
17 improve driving visibility on roadways.” (IES TM-15, p. 1, Sec. 2.)

18 **Q: Are you aware of any other IES publication that ties lighting to security?**

19 Yes. The IES document, *Guideline on Security Lighting for People, Property, and*
20 *Public Spaces*, IES G-1-03, supports the view that outdoor lighting contributes to safety
21 and security. See Schedule WPH2010-1¹.

¹ Schedule WPH2010-1, http://www.techstreet.com/cgi-bin/pdf/preview/2350155/previews/IESNA_G-1-03_pre.pdf, accessed on November 23, 2010.

1 It states, referring to studies that examine the relationship between lighting and
2 crime:

3 The results of all these studies indicate that lighting has a place to play in
4 crime prevention... Lighting can affect crime by two indirect mechanisms.

5 The first is the obvious one of facilitating surveillance by the authorities
6 and the community after dark. If such increased surveillance is perceived
7 by criminals as increasing the effort and risk and decreasing the reward for
8 a criminal activity, then the level of crime is likely to be reduced. Where
9 increased surveillance is perceived by the criminally inclined not to
10 matter, then better lighting will not be effective. The second mechanism
11 by which an investment in better lighting might affect the level of crime is
12 by enhancing community confidence and hence increasing the degree of
13 informal social control.” (Schedule WPH2010-1, p. 2, Sec. 1.)

14 The G-1-03 guideline goes on to state security lighting is part of a well-
15 balanced security plan. (Id, p. 3, Sec. 2).

16 **Q: Do you agree with Mr. Wagner’s proposition that people assume brighter lights**
17 **improve visibility for a driver or pedestrian? (Wagner Direct, p. 10, l. 20 - p. 11, l.**
18 **4).**

19 **A:** I cannot agree or disagree. I am not aware of any studies or peer reviewed research, nor
20 does Mr. Wagner provide any, to support his concern about public safety and the effect of
21 bright lighting on nighttime roadway safety.

22 **Q: Doesn’t Mr. Wagner refer to an AMA policy regarding brighter lighting impacting**
23 **driver safety?**

1 A: Yes, he does reference the American Medical Association's ("AMA") policy statement,
2 H-135.937, *Advocating and Support for Light Pollution Control Efforts and Glare*
3 *Reduction for Both Public Safety and Energy Savings*. (Schedule RAW2010-26). This
4 policy statement, at best, is suggestive of Mr. Wagner's view and not authoritative or
5 intended for any other purpose than guidance on the distinctive initiatives of the AMA.
6 Here is an excerpt taken from the AMA's Webpage regarding the AMA's policy system.

7 Defining AMA Policy. Policy can be defined as statements that have the purpose
8 of guiding decision-making and actions. The AMA develops policy positions on
9 how the health care system should be organized and how it should function. When
10 people refer to 'AMA policy,' they are usually referring to the set of normative
11 statements the Association has developed on health care issues and the health care
12 system...

13 [Continuing,]

14 Categories of AMA Policy. AMA policy can be categorized in the following
15 manner. 1. Policies of the AMA House of Delegates. These statements are
16 established by the AMA House of Delegates. The House's policy statements on
17 health topics are one of the cornerstones of the AMA in the sense that they define
18 what the Association stands for as an organization. Schedule WPH2010-2², AMA
19 Webpage.

20 **Period of Nighttime Darkness: Double Cycling of Streetlights**

21 Q: What specifically is at cross-purposes between the changes proposed by Mr. Wagner
22 and the Companies' customers' interests?

² AMA Webpage, <http://www.ama-assn.org/ama/pub/about-ama/our-people/house-delegates/developing-ama-policies.shtml>, Accessed November 28, 2010.

1 A: Mr. Wagner's proposal seeks changes to the tariffs to create areas and periods of
2 darkness using technology that is programmable to turn streetlights off at a set time, such
3 as midnight. (Wagner Direct, p. 1, ll. 18-23.) The Company believes that customers—
4 whether residential, commercial, or municipalities—choose to illuminate areas and
5 streets at night for purposes of personal safety, to discourage criminal activity, improve
6 roadway safety, and offer a sense of security and peace of mind for themselves and
7 members of the community.

8 Even Mr. Wagner recognizes the impact lighting has on safety; his testimony
9 states:

10 "A programmable photocell includes a clock that allows the light to be
11 switched off at a designated time such as midnight and back on at a
12 selected time such as 6 am. The utility or customer may also choose a
13 similar time such as 11 pm until 5 am;" (Id. p. 1, ll. 20-23); and
14 "...lighting that still provides illumination during common busy times
15 such as morning and evening rush-hour..." (Id. p. 2, ll. 15-16).

16 I would note that Mr. Wagner assumes the utility determines when lights are
17 turned on and off. This is not true. The Companies provide a service based on the
18 preferences of the majority of customers.

19 Moreover, municipalities have a fundamental duty to provide for its citizens'
20 safety and based on the lighting options chosen by municipalities, lighting dark areas
21 during nighttime hour's looks to be foundational to the promotion of safety. This
22 fundamental duty of government to promote safety is captured in local ordinances, state
23 and federal regulations, and statutes.

1 **Q: Is it foreseeable there are issues of liability with regards to plunging areas into**
2 **darkness in the middle of the night?**

3 Yes. Although I am not a lawyer, I understand commercial, industrial customers,
4 as well as municipalities, have an interest in illuminating their facilities, parking lots,
5 streets, and roadways since leaving areas in darkness, as proposed by Mr. Wagner, may
6 create a civil liability if it is shown the customer's policy—for example, a municipality—
7 of turning lights off between midnight and 6 a.m. is negligent because it is foreseeable
8 that the municipality's imposed darkness ordinances contributed to potential injury of
9 persons and/or property.

10 Frankly, municipals and other customers have not indicated they want a six-hour
11 period of darkness.

12 Mr. Wagner's proposals, while well-intentioned, are not in the public's best
13 interest.

14 **Q: On its face, Mr. Wagner's request seems simple—adding technology to turn off**
15 **lights in the middle of the night and offering a lower lumen, lower wattage bulb.**
16 **What is your concern?**

17 **A:** I am concerned that potential stakeholders on the issue of street and area lighting are not
18 included in providing input regarding the issues Mr. Wagner raises and should be. The
19 stakeholders would likely include municipal customers; law enforcement; municipal
20 owners of streetlights—like the City of Kansas City; environmental groups; state and
21 local government agencies; municipal and cooperative electric utilities; other Missouri
22 investor owned utilities; insurance companies, and other interested customers—like Mr.
23 Wagner. The Company provides streetlight and protective area lights responsive to

1 customers' needs. Customers decide what lamp to use where and for what purpose. It is
2 likely other customer and stakeholders are interested in this subject and would welcome
3 the opportunity to offer input.

4 **Q: Do you have other concerns regarding Mr. Wagner's suggestions?**

5 Yes, my concerns align with what already is stated. The issues raised by Mr.
6 Wagner should have foundation in Missouri statewide public policy with clarity and
7 consistent application to all electric utilities and municipalities as opposed to being
8 compulsory upon a single company. I would highlight that Mr. Wagner's testimony
9 recognizes the need for a statewide standard:

10 The Public Service Commission should establish a state standard for the
11 minimum duration of the "off" period. [He] would recommend 6 hours per
12 night and leave it up to the utility to decide if this is from midnight to 6am,
13 11pm to 5am or other similar period. (Wagner Direct, p. 5, ll. 14-19).

14 **Q: Isn't your point—that streetlight and protective area lighting issues should be**
15 **rooted in a statewide public policy and Mr. Wagner's suggestion for a state**
16 **standard—to adopt a path similar to how New Hampshire responded to dark sky**
17 **issues?**

18 **A:** Yes. Let me say, without having an opinion as to whether the components of the New
19 Hampshire law are appropriate for Missouri, Mr. Wagner testifies, New Hampshire
20 signed into law statutes that adopt a New Hampshire dark sky policy (N.H. Rev. Stat. §9-
21 E. (2009)). (Wagner Direct, p. 2, ll. 8-11). The New Hampshire law sets-out a statewide
22 public policy by the legislative process.

1 I am supportive of dark sky issues to be sorted out in the legislative and
2 rulemaking process to allow stakeholders—like municipalities, environmental groups,
3 law enforcement, insurance companies, and other customers—to have a place at the dark
4 sky issues’ table. To impose dark sky initiatives on a utility in a ratemaking proceeding is
5 a bit like a tail wagging the dog—it seems a bit backwards.

6 Moreover, making wholesale changes to the Companies’ tariffs is premature with
7 active pilot projects by KCP&L, EPRI, and other utilities of promising new LED
8 technology.

9 In addition, if a majority of customers wanted to add technology to turn the lights
10 off during the early morning hours or a lower lumen, lower wattage fixture, the Company
11 would look to offering the options, but it is our experience there is no interest from
12 customers for such options. Mr. Wagner’s suggested tariff changes will add complexity
13 and cost to the streetlight and area light materials handling, operations, and maintenance.
14 The additional cost will need to be recovered from customers—a dark sky premium, so to
15 speak.

16 **Q: Have you calculated the additional cost of the “dark sky premium?”**

17 The cost is not calculable at this time without certainty as to what, if any
18 additional lamps, fixtures, and equipment are required under any ordered changes to the
19 tariffs. The Companies ask the Commission that, should such changes be ordered, time be
20 allowed to calculate and update streetlight and protective area light prices to align with
21 cost recovery of such ordered new lamps, fixtures, and equipment.

22 **Group Re-Lamping and Installation of Double-Cycling Controllers**

1 **Q: Mr. Wagner suggests replacing current streetlight controllers with programmable**
2 **photocells can easily be accomplished during regular group re-lamping**
3 **maintenance. Is his suggestion consistent with KCP&L's operations?**

4 **A:** No. KCP&L does not use group re-lamping of streetlight fixtures or area lighting
5 because it is inefficient and wastes perfectly good lamps. Replacement of photocells is
6 completed with replacement of a failed bulb. The Company's experience is a large
7 portion of the bulbs operate longer than their rated lamp life. This is consistent with
8 manufacturers' test criteria that report the average lamp life as the time period where half
9 the lamps fail. See G.E.'s technical sales manual, Schedule WPH2010-7, p. 2.

10 **Q: What do you mean, "...the average lamp life [is] the time period where half the**
11 **lamps fail?"**

12 **A:** Let me illustrate. To determine the average lamp life of a bulb, a manufacturer may line
13 up one hundred lamps, turning them on and off every ten hours—as indicated in Schedule
14 WPH2010-7, p. 2. The average lamp life is determined when the fiftieth lamp fails, but
15 fifty of the lamps continue to illuminate.

16 **Q: Based on your illustration, group re-lamping would remove working lamps. Is that**
17 **correct?**

18 **A:** Yes. Group re-lamping on a fixed time schedule causes replacement of perfectly
19 serviceable bulbs, increasing the cost of operations. Since the rated lamp life represents a
20 statistical median, fifty-percent of the bulbs would already have failed, leaving customers
21 in darkness for a period, and fifty-percent of the lamps would last beyond the rated lamp
22 life—forcing a replacement of functioning lamps.

1 **Q: This sounds like another “dark sky premium” cost. Do you know what additional**
2 **costs because of group re-lamping would need to be recovered under the tariffs?**

3 A: We informally consulted with our lighting contractor who confirms that group re-lamping
4 would result in increased costs. The actual cost is difficult to determine since group re-
5 lamping would be voluntary and each municipal and commercial customers’ lamp
6 inventory is unique, having different types of lamps allocated differently between
7 suburban and rural locations. The Companies ask the Commission that, should such
8 changes be ordered, time be allowed to calculate and update streetlight and protective
9 area light prices and/or other tariffed prices to align with cost recovery of such ordered
10 group re-lamping.

11 **Q: What does your experience with regards to customers whose streetlight or**
12 **protective area lamp has failed?**

13 A: Customers want lamps replaced when they fail as opposed to keeping an area in darkness
14 for a long period of time until, as Mr. Wagner proposes, a re-lamping event is scheduled.
15 In other words, returning to the example of the lamp life testing—if your lamp is the first
16 to fail in your group, you would wait as the next forty-nine lamps fail before your lamp
17 was replaced. In addition, there are other reasons that may shorten the life of a lamp and
18 cause it to fail—like weather, vandalism, traffic accidents, and so forth. KCP&L’s
19 service standard is to replace failed bulbs within 48 hours of the reported failure.

20 **Q: How reliable is a lamp’s rated useful life in context of Mr. Wagner’s testimony**
21 **stating a part-night use extends the useful life of a lamp?**

22 A: Not very reliable at all. Mr. Wagner’s declaration that part-night use extends the useful
23 life of a lamp is not accurate. Bulb life tests by bulb manufacturers are based on ten hour

1 run time cycles, meaning that the bulb is only started every ten hours. It is generally
2 accepted by bulb manufacturers that the greatest determinant to lamp life is the number
3 on/off cycles the lamp experiences. (Schedule WPH2010-7, p. 2). Therefore, cycling
4 bulbs on and off more frequently than a ten hour interval will materially reduce the
5 lamp's life and increase the replacement frequency and costs. (Id.)

6 In part-night use, the lamps would turn on at dusk, then off at midnight, then on at
7 6 A.M. then off at dawn, effectively shortening the life of the lamp at a rate greater than a
8 single ten hour on/off cycle per day as represented in manufacturers' technical
9 documentation.

10 **Q: Do you anticipate additional costs to exchange photocells in streetlights and area**
11 **lighting systems?**

12 A: Yes. In the event the Companies would be ordered to undertake an exchange of
13 photocells in streetlights and area lighting systems, the effort would likely require an
14 additional, separate program—increasing operational costs that would need to be borne
15 by the customer. The Companies ask the Commission that, should such changes be
16 required, time be allowed to calculate and update lease prices and/or other tariffed prices
17 to align with cost recovery of such ordered exchange of photocells.

18 **Q: Mr. Wagner states that he does not see why the Company could not purchase**
19 **photocells for \$12.73—the same price as Connecticut Light and Power—and offer a**
20 **similar rate. (Wagner Direct p. 5, ll. 9-13). Is that a reasonable assumption?**

21 A: No, it is not reasonable that the cost of a photocell for an out-of-state power company
22 with a unique rate design and cost of service model determined under Connecticut laws
23 and rules is representative of the photocell cost to a Missouri public utility. Moreover, the

1 witness, in an effort to support his proposition, points to a September 1, 2010, compliance
2 letter to the Connecticut Department of Public Utility Control from Northeast Utilities
3 System on behalf of Connecticut Light and Power Company. (Schedule RAW2010-9).
4 The letter states, "Prior to the installation [of the photocell], the customer will pay \$12.73
5 for the cost of the new photocell, which reflects the difference between the cost of an
6 existing dawn to dusk photocell and the programmable photocell." (Id., Emphasis added).

7 Mr. Wagner's testimony lists the total cost of the photocell as \$12.73, which is
8 not accurate. The cited cost in the compliance letter is *in addition* to the cost of the
9 photocell that is replaced. The cost to install the programmable photocell, inclusive of the
10 dusk-to-dawn photocell and a \$12.73 dark sky premium cost, so to speak, would need to
11 be recovered from customers. Assuming the Companies' additional cost for a
12 programmable photocell was \$12.73, the dark sky premium multiplied by the
13 approximate 43,000 streetlights in the KCP&L-MO and GMO service territories would
14 increase the photocell costs by over \$547,000, exclusive of labor.

15 **Q: Mr. Wagner states there are benefits to group re-lamping by citing EPA**
16 **Publication, EPA 430-B-95-009, Lighting Maintenance, (1995), (RAW 2010-7). Does**
17 **the EPA Publication support the proposition—there are benefits to group re-**
18 **lamping?**

19 No. The cited EPA document (RAW 2010-7) is dated 1995 and far-a-field of street
20 lighting. Specifically, RAW 2010-7 relates to industrial and commercial applications of
21 largely florescent-type lamps. The document is absent information or data that suggests
22 its contents can be equally applied to roadway and area lighting applications and High
23 Pressure Sodium ("HPS") lamps and fixtures.

1 light tariffs and then turnaround and offer a preferred LED technology—increasing cost
2 by another dark sky premium.

3 **Q: How do the offered examples support the Company’s view it is not preempting the**
4 **use of lower lumen, more energy efficient fixtures?**

5 A: They illustrate that when lower lumen and wattages are available, customers continue to
6 select the higher level lumen and wattages. Also, municipal customers are interested in
7 new technology and the Company is supporting a pilot of the new technology.

8 **Q: Mr. Wagner suggests that a part-night rate option is beneficial to individuals and**
9 **communities seeking a reduction in stray light. (Wagner Direct. p. 4, ll. 13-19).**
10 **What are your thoughts on his suggestion?**

11 A: Obviously, individuals and communities that are interested in dark sky initiatives would
12 consider part-night options a benefit. Mr. Wagner goes on to support his proposition by
13 pointing to the City of Kansas City (“KCMO”) adopting an outdoor lighting ordinance to
14 reduce light trespass. However, a close reading of KCMO’s outdoor lighting ordinance
15 exempts outdoor lights on lots occupied by residential buildings containing fewer than 4-
16 dwelling units, effectively exempting most residential properties. (KCMO Ordinance 88-
17 430-03-B, 2010, Schedule WPH2010-4). Also exempted is the city’s street lighting
18 system, provided that streetlights comply with the fixture and shielding standards of 88-
19 430-05 wherever practical. (Id., 88-430-03-E). The term “wherever practical” is not
20 defined by the ordinance so this lack of clarity allows for a great deal of flexibility in the
21 ordinance’s interpretation, and the ordinance is silent regarding the wattage and lumens
22 of streetlights.

1 **Q: Mr. Wagner, a KCMO resident, points to KCMO's light trespass ordinance and a**
2 **KCMO Councilman as supportive of dark sky initiatives. Are these relevant to the**
3 **proposed dark sky initiatives?**

4 A: No. The Companies do not lease streetlights to KCMO so any revision to the Companies'
5 streetlight tariffs would not have any impact on streetlight options in KCMO or impose
6 any requirement on the city. Also, there is a question whether KCMO's ordinance places
7 an actionable requirement on the city to address issues with their own streetlights.

8 **Q: Recognizing KCMO owns their streetlights and would not be impacted by the leased**
9 **municipal street light portions of the Companies' tariffs, are you aware of KCMO's**
10 **general view with regards to their street lighting program?**

11 A: Granted, I am not in a position to speak authoritatively as to KCMO's general principles
12 with regards to its street lighting program. However, KCMO's Website notes that voters
13 approved General Obligation Bonds "...to upgrade and expand the street light system to
14 raise the level of illumination on streets and sidewalks and to enhance personal safety and
15 security." The Website goes on to state, "Since 1997, new development and other capital
16 projects also added lights resulting in 81,000 units in service as of December 2002."
17 (Schedule WPH2010-5³). These statements suggest that KCMO believes that the
18 illumination of streets and sidewalks enhance personal safety and security.

19 **Q: Please elaborate on instances where Mr. Wagner draws conclusions based on**
20 **incomplete facts or makes flawed assumptions?**

21 A: Mr. Wagner's direct testimony states, "KCP&L used to offer 4000 lumen and lower
22 lights in its Schedule 73 filed with the State Corporation Commission of Kansas."

³ <http://www.kcmo.org/CKCMO/Depts/PublicWorks/StreetLightProgram/index.htm>, Accessed November 19, 2010).

1 (Wagner Direct, p. 6, ll. 18-20.) The Company does not make any representation that
2 4,000 lumen lamps are adequate for street lighting purposes. The Company offers the
3 majority of its customers' options consistent with their needs. Mr. Wagner cites to a
4 fixture that is an obsolete incandescent fixture that has not been offered since 1972. The
5 few instances the fixtures remain are at the request of municipalities and are generally for
6 ornamental fixtures and designed for use on specific streetscape applications.

7 His testimony further states he is aware of at least sixteen utilities in nine different
8 states that offer 50-watt or lower HPS lamps. (Id., p. 6, l. 22 - p. 7, l. 16). Mr. Wagner
9 makes a sweeping assumption that because one utility offers a particular fixture that all
10 utilities should offer the same fixture. Furthermore, his examples do not fully indicate the
11 number of customers that use the lower wattage option or part-night tariff.

12 In August 2010, the Company informally contacted the manager of the streetlight
13 outdoor lighting program at one of the largest utilities on the list, Southern California
14 Edison ("SCE"), which provides power to nearly 13 million people in over 400 cities and
15 communities in a territory covering 50,000 square miles, (Southern California Edison,
16 Form 10-K, March 2010, p. 5. Schedule WPH2010-6). He indicated only one customer
17 utilizes the part-night rate and approximately five-percent of its outdoor lights are 50-
18 HPS light fixtures—the same percentage of 70-W Sodium Vapor lamps already available
19 in the GMO-MPS service territory.

20 **Q: What additional conclusions drawn by Mr. Wagner's testimony are based on**
21 **incomplete information?**

22 **A:** Mr. Wagner seeks adding a 50 and 70 watt HPS streetlight option to KCP&L and GMO's
23 tariffs, respectively. The Companies agree that lower watt HPS lamps are generally more

1 energy efficient than incandescent or mercury vapor lamps of like lumens. It is for that
2 reason the Companies no longer offer mercury vapor private unmetered protective lights
3 and municipal street lighting as of May 1986 (KCP&L Tariff Sheets 33, 35-35B) and
4 April 1992 (KCP&L Tariff Sheet 36A). Also, mercury vapor lighting is no longer
5 available in the GMO-L&P service territory (GMO Tariff Sheets 42, 43, 49) and is no
6 longer available in the GMO-MPS service territory as of November 2007 (GMO Tariff
7 Sheets 88, 91). KCP&L and GMO received approval from the Commission to end the
8 availability of mercury vapor lamps. The changes reflected in their tariffs, at that time,
9 addressed shifting customer preferences by offering the same lumens at lower wattage or
10 greater lumens at a similar wattage of the replacement lamp.

11 Considering historical customer behavior, offering lower watt lamps—50 and 70
12 watt HPS—is not likely to convert a majority of customers to the lower watt option over
13 the current higher watt, higher lumen options.

14 **Convert Outdoor Lighting Tariffs from Lumens and Wattages and**
15 **Convert to Lighting Color and Illumination Attributes**

16 **Q: Mr. Wagner asks the Companies consider the impact of color in offered lighting**
17 **options and that the Companies' tariffs convert outdoor lighting rates from listing**
18 **lumens and wattages to listing expected illumination on the ground. Do you see any**
19 **challenges regarding such changes?**

20 **A:** Yes. His testimony suggests an advantage of using the monochromatic light of low
21 pressure sodium lamps over other lighting options. The Company, responsive to
22 municipal customers' preferences, does not offer low pressure sodium fixtures.

1 Also, the use of illumination on the ground data is problematic since the spectrum
2 of variables that affect the calculation of an illumination data point are not easily captured
3 in the generalities of the Companies' tariffs. For example, the reflected illumination from
4 the ground will differ from the same lamp with the same shield at the same height
5 depending on the groundcover, whether it is concrete, asphalt, grass, earth, rocks, etc.
6 This calculation is best left to the customer's designers and engineers who are most
7 knowledgeable as to the intended use and desired placement of the light.

8 The Companies provide lighting services and the customer determines which
9 lamp will best meet their design requirements based on the intended use of the light.

10 Additionally, the Companies' newly installed fixtures are the high cutoff type,
11 which has the best light control available in an HPS fixture and offers cutoff fixtures for
12 roadway lighting as standard units.

13 **50-HPS Will Not Lower Street Lighting Prices**

14 **Q: Mr. Wagner states 50-HPS lamps will lower municipal street lighting costs and, in**
15 **turn, reduce tarified prices. Do you agree with that analysis?**

16 **A:** No. Although higher watt and lumen lights generally cost more than lower watt options,
17 experience tells us that customers are first interested in the brightness of the lamp as it
18 relates to the customer's design requirements and use. The rate of energy used is
19 secondary to customer decision-making in streetlight and area light applications. The
20 Companies do not expect by offering 50-HPS units that they will replace higher lumen
21 and watt lamps considering the low acceptance of the 70W Sodium Vapor lamps ("70-
22 SV"), which make up around five-percent of GMO-MPS' streetlights, while 150-watt and
23 greater sodium vapor and mercury vapor lamps comprise over seventy-percent of the

1 streetlight inventory. In addition, the amount of energy used is a small component of the
2 tariffed cost of the lamp.

3 **Q: So if it is not the amount of kWh used, what are the major components of the**
4 **tariffed cost of street and area lights?**

5 A: The cost of the light fixture, installation, and maintenance expense comprise the majority
6 of the cost of street and area lights. This is not only true for the Companies, but within the
7 utility business. A clear example of this is reflected in Mr. Wagner's Schedule
8 RAW2010-4, the NHPUC's rates for "Midnight Service", a part-night rate, and standard
9 dusk-to-dawn service rate for the same lamp. The rates are the same even though the part-
10 night rate uses less kWh per light. So the expectation that a lower watt lamp and/or a
11 part-night rate will lower costs to municipalities and customers is not realistic.

12 **Q: Would you expect using 50-HPS streetlights would increase, decrease, or have no**
13 **effect on the number of streetlights required to illuminate a given street?**

14 A: Most likely, the number of lower watt/lumen streetlights required to illuminate a given
15 street or location would be greater than using lamps with higher wattages and lumens. It
16 is foreseeable that 50-HPS lamps would not meet the design needs demanded by
17 municipalities. Depending on the light level requirements of a municipality, use of 50-
18 HPS fixtures would likely result in installation of additional fixtures to achieve the
19 desired illumination levels—thereby netting an increase in the number of lights and the
20 cost to customers.

21 **Q: Do you wish to address Mr. Wagner's comments regarding CO2 reduction?**

22 A: Yes. In support of his recommended streetlight tariff changes, Mr. Wagner offers that the
23 lower wattage lamp will use less energy and, in turn, reduce CO2 emissions. (Wagner

1 Direct, p. 7, ll. 2-3). While the Companies do not agree with Mr. Wagner regarding the
2 specific changes he has requested KCP&L and GMO make to their streetlight tariffs, the
3 Companies are interested in increasing the efficiency of the streetlights in their service
4 territory. As noted previously in my testimony, KCP&L is working with its municipal
5 customers to test more efficient street lighting options such as LED bulbs which may
6 provide even greater efficiency than the options proposed by Mr. Wagner.

7 **Q: Does that conclude your testimony?**

8 **A:** Yes, it does.
9

Three areas of housing were selected; one was the experimental area where the lighting was improved; one was designated the adjacent area; the third was the control area, which served as the baseline against which any changes in crime could be monitored. The lighting in the adjacent and control areas remained unchanged. One aspect of the study was to see if improved lighting in one area might lead to similar benefits of crime reduction in the adjacent area. There was a marked reduction in the prevalence of crimes such as theft and vandalism, vehicle crime, and personal crime in the experimental area after relighting. There was no significant change in the adjacent or control areas. A similar study in the town of Dudley, England, showed that the level of delinquency decreased more in the relighted area than in the control area.

The results of all these studies indicate that lighting has a place to play in crime prevention. A list of sources for further reading may be found in **Annex A**. While there are no guarantees that improved lighting will cause a decrease in crime, there are circumstances in which lighting can be an effective crime countermeasure, either alone or in combination with other measures.

Lighting can affect crime by two indirect mechanisms. The first is the obvious one of facilitating surveillance by the authorities and the community after dark. If such increased surveillance is perceived by criminals as increasing the effort and risk and decreasing the reward for a criminal activity, then the level of crime is likely to be reduced. Where increased surveillance is perceived by the criminally inclined not to matter, then better lighting will not be effective. The second mechanism by which an investment in better lighting might affect the level of crime is by enhancing community confidence and hence increasing the degree of informal social control. This mechanism can be effective both day and night but is subject to many influences other than lighting.

2.0 SCOPE AND PURPOSE

The primary purpose of this publication is to establish guidelines for the design and implementation of security lighting.* It addresses security illumination but does not give advice on construction practices. The objective is to provide guidance for designing security lighting systems for new facilities and for evaluating existing facilities and systems. This publication is intended for

* Note the distinction made in this document between security lighting and lighting for safety. Security lighting is intended to protect people and property from criminal activities. Lighting for safety is intended to provide safe working conditions, safe passage and identification of hazards or obstructions.

the use of property owners and managers, crime prevention specialists, law enforcement and security professionals, risk managers, lighting specifiers, contractors, the legal profession, and homeowners who are concerned about security and the prevention of crime. Crime, its prevention, and the application of lighting to help minimize criminal activity, are considered in a less technical and user-friendly manner for the benefit of property owners, but illuminating engineers, architects and other professionals should find the concepts useful to review with their clients.

The primary measurement references throughout this document are metric, with the English equivalent in parenthesis. For example, 1.5 meters will be displayed as 1.5 m (5 ft), and 100 lux will be displayed as 100 lux (10 fc). These conversions are approximate, but considered sufficiently accurate in this context.

In this publication will be found a discussion of basic security principles, illuminance requirements for various types of properties, a protocol for evaluating current lighting levels for different security applications, and security survey and crime search methodology. The guidelines are based on consensus among members of the IESNA Security Lighting committee and other security experts.

Suggestions are given for exterior and interior security lighting practices for the *reasonable protection of persons and property*. This document also promotes a concept of *best practice*, which takes into account the following lighting design issues:

- Economics (including cost, maintenance and operational costs)
- Environmental issues (including light pollution, light trespass and the adverse effects of light on animals and plants)
- Municipal lighting ordinances, by-laws or codes
- Energy conservation, and maintenance requirements

Minimum guidelines for the safe movement of persons and equipment and for performing specific tasks can be found in other IESNA publications. This document is intended to provide specific guidelines where it has been determined that *security is an issue*, and where security is an important determining factor in the design or retrofit of a given property.

Note that throughout this guideline the phrase when *security is an issue* is used to differentiate the lighting design suggestions presented herein from those contained in other IESNA publications. While these other publications may make reference to security, in G-1 it is the only issue. Note too that when *security is an issue*, not only lighting,

but all measures and system components are increased and/or strengthened; for example, personnel, surveillance, gates, locks, and fences.

Security lighting, as part of a well-balanced security plan, should have the following objectives:

1. Provide a clear view of an area from a distance and enable anyone moving in or immediately around it to be easily seen
2. Deny potential hiding spaces adjacent to frequently traveled foot routes
3. Permit facial identification at distance of at least 9 m (30 ft), and create the perception of being identifiable
4. Facilitate the proper use of other security devices available on the property
5. Deter crime against persons or property
6. Enhance the public's feeling of comfort in accessing spaces and increase night-time pedestrian traffic

3.0 BASIC PRINCIPLES OF SECURITY AND SECURITY LIGHTING

3.1 Principles

Security lighting is installed to help protect people and property from criminal activities, and to create a perception of security. To better understand the principles of security lighting, it is first appropriate to look at several key security tenets.

Responsibility - In North America, the burden of security and safety is generally placed on the individuals who have primary control over a given property. With the rights of control comes the responsibility of control. For example, a property owner can enforce rules of trespass, install security systems, restrict access, and make other decisions that may have far reaching consequences for those who access the property. To a lesser degree, a tenant of the property may share in this control and responsibility for the sublet space. Owners and operators have or should have, a superior knowledge of the site's history, including crime. Casual visitors, invitees, or customers generally have no responsibility for security at a given site since they are not able to exercise reasonable control over the events at the location, or influence the environment. It is generally the responsibility of a resident, business operator, or property owner to provide for the safety and protection of human life and the property.

Anticipating the threat - A helpful approach in determining the security needs of a property or operation is to study the *opportunity, means, and motivation* of

potential perpetrators. Security works to deny *opportunity*, and increase the level of *means* or resources necessary for the criminal to successfully attack the target, and escape. When opportunity is limited, and a large amount of time and resources are required to successfully complete a criminal act and escape, criminal *motivation* declines.

Time - Time is the criminal's enemy. The longer a criminal act takes in *planning, execution, and escape*, the more likely the crime will be deterred. Most common criminals will choose a property that requires the least amount of stealth, equipment, and planning.

Target hardening - A target is harder to attack when coordinated security elements are provided. In the process of target hardening, deterrent objectives are set, options reviewed, and steps taken to improve security. The *target* is the people or property to be protected, and the various security features are the *hardening elements*. Each separate security element adds to the others, making the target harder to attack. Security elements available to the professional will vary by situation, but often include management controls, perimeter protection, a means of surveillance, response capabilities, and security lighting. A good security plan will contain layers of security features, and will not rely on one single security feature for success.

Fight or flight - The basic decision made by persons when threatened is fight or flight. In other words...*is defense or evasion the appropriate measure?* Sometimes, the act of fleeing danger is simply not an option due to circumstances. *Fight* may be the physical act of defense or a call for help. For police or security officers, it usually means some form of physical defense for serious threats. *Flight*, on the other hand, may mean moving to a safe place, or getting out of the way of a presumed threat. Lighting, if properly installed and maintained, can play an important role in helping people make this basic decision.

Security elements - Security elements can be *active* or *passive* deterrents. Active elements have the capacity to interact with persons or generate a response to a criminal's actions. Passive elements include those security features and applications that are static in nature and do not interact with a would-be intruder or criminal.

Passive elements for a home or business may include deterrent features such as perimeter fencing or walls, open or barrier landscaping, exterior and interior illumination systems, safes, open areas, and warning signs.

The most active deterrent is a patrol officer. The effectiveness and response of uniformed individuals making patrol rounds is often hard to predict, causing a



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Developing AMA Policies

The AMA Policy System

The American Medical Association (AMA) has a formalized policy system. The key dimensions of the AMA's policy system are:

1. The processes through which AMA policy positions are established;
2. The processes used to record and disseminate AMA policy; and
3. The activities through which the AMA promotes and advocates its policy positions.

Defining AMA Policy

Policy can be defined as statements that have the purpose of guiding decision-making and actions. The AMA develops policy positions on how the health care system should be organized and how it should function. When people refer to "AMA policy," they are usually referring to the set of normative statements the Association has developed on health care issues and the health care system. They may also be referring to the set of statements the AMA has developed about its internal organizational structure and decision-making process (governance system) as well as medical science and technology.

Purpose of AMA Policy

The Core Purpose of the AMA is, "To promote the science and art of medicine and the betterment of public health." AMA policy provides the conceptual foundation and organizational framework for the activities that the Association undertakes to achieve its Core Purpose.

Categories of AMA Policy

AMA policy can be categorized in the following manner.

1. Policies of the AMA House of Delegates.
These statements are established by the AMA House of Delegates. The House's policy statements on health topics are one of the cornerstones of the AMA in the sense that they define what the Association stands for as an organization. They provide the information and guidance that physicians and others seek from the AMA about health care issues. The House's policies are based on professional principles, scientific standards, and the experience of practicing physicians.

The House also establishes policies on the governance of the Association and policies that direct the Board to take specific actions.

2. Code of Medical Ethics.

This category includes the two components of the AMA's Code of Medical Ethics: the AMA Principles of Medical Ethics, which establish the core ethical principles of the medical profession, and current Opinions of the Council on Ethical and Judicial Affairs (CEJA). The Opinions represent CEJA's application of the Principles of Medical Ethics to more than 200 specific medical ethical issues in medicine. For reference, each Opinion is followed by one or more Roman numerals that identify the Principle(s) from which the opinion is derived. Most Opinions are based on background reports, providing a detailed analysis of the salient ethical considerations, as well as the rationale behind the Council's recommendations. These reports are referenced at the end of Opinions as appropriate and made available

Related Links

[AMA Code of Medical Ethics](#)

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separately here.

3. AMA's Constitution and Bylaws.

The Constitution establishes the basic principles of the AMA and the Bylaws provide the framework for the governance and administration of the Association. The AMA House establishes the content of the AMA Constitution and Bylaws.

Coding of AMA Policy

Every AMA policy is assigned a letter prefix and a number. The letter prefixes indicate the source and nature of the policy. The combination of a letter prefix and number provides a unique identifier for each AMA policy.

- Policies with the prefix H are contained in the Policies of the AMA House of Delegates and relate to the House's positions on health issues;
- Policies with the prefix E are contained in the Code of Medical Ethics.
- Policies with the prefix C are contained in the Constitution section of the AMA Constitution and Bylaws;
- Policies with the prefix B are contained in the Bylaw section of the AMA Constitution and Bylaws; and
- Policies with the prefix G are contained in the Governance Policies of HOD and relate to the governance of the Association.
- Policies with the prefix D are also contained in the Policies of the AMA House of Delegates; these policies relate to directives that the House has given to the Board (HOD directives tell the Board to take specific actions such as develop model legislation on a topic or undertake a study of an issue);

The Process of Creating AMA Policy

Reports and resolutions are submitted for consideration at each meeting of the AMA House. The reports and resolutions are generated by AMA delegates/delegations, the AMA Board of Trustees, AMA Councils, and AMA Sections. The actions that the House takes on the reports and resolutions establish AMA policy. The actions of the House can (1) establish AMA policy on health care issues; (2) modify the AMA Bylaws; (3) modify the AMA Constitution; and/or (4) direct the AMA Board to take specific actions.

The Council on Ethical and Judicial Affairs plays a special role in the development of AMA policy. Although CEJA routinely gathers input from the AMA House before issuing new Opinions, CEJA has the independent authority to establish AMA policy on ethical issues through the issuance of its Current Opinions.

The AMA Board of Trustees also plays a special role in the development of AMA policy. Between meetings of the House of Delegates, the Board has the authority to create AMA policy on an issue if no applicable policy exists. In urgent situations, the Board has the authority to take those policy actions that it deems best represent the interests of patients, physicians, and the AMA. Any such actions by the Board must be placed before the House of Delegates.

Recording and Distributing AMA Policy

After each House meeting, the speakers of the AMA House oversee the process of updating the AMA policy database to reflect the actions taken by the House and any modifications that CEJA has made in its Current Opinions.

Once the AMA policy database has been updated, the speakers oversee the process of updating the Association's PolicyFinder programs. PolicyFinder is available as a Web-based application and as a stand-alone version that can be installed on a PC.

PolicyFinder is the principal mechanism through which the AMA distributes information on its policy positions.

Promoting and Advocating AMA Policy Positions

The AMA works to promote and implement its policies in a number of ways, including the following:

- Communications;

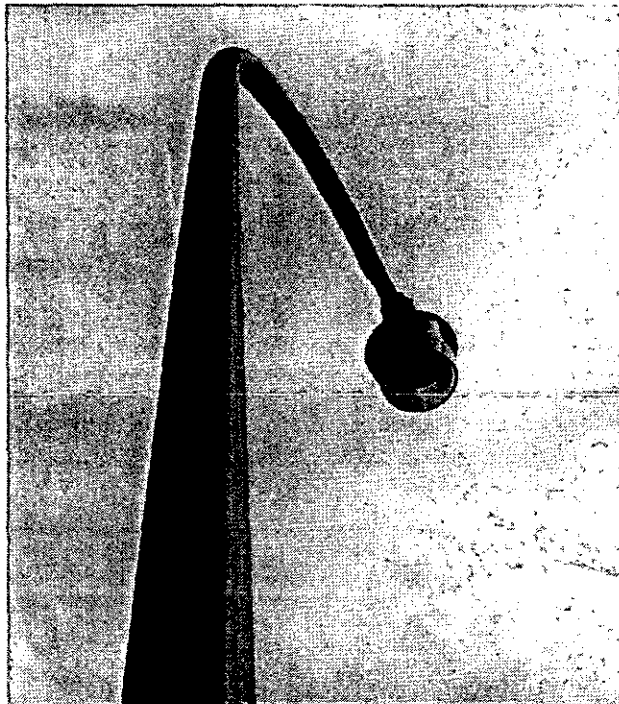
- AMA representation on standard-setting and accreditation bodies;
- The legislative process at the national and state levels;
- Litigation;
- Advocacy campaigns at the national and state levels and advocacy in the private sector; and
- Advocacy to regulatory bodies.

Additional Information

[Detailed description of the AMA policy system](#)

[AMA PolicyFinder](#)

LED Technology in Street and Area Lighting



New models of LED outdoor lighting are hitting the market as utilities search for alternatives to conventional street and area lighting. To achieve comparable light output, LED fixtures house clusters of individual LEDs driven by power electronic circuits.

Today, high-intensity discharge (HID) lighting, such as high-pressure sodium and metal-halide lamps, prevails when it comes to illuminating streets, parking lots, and walkways. But high-power light-emitting diodes (LEDs) promise a brighter future in outdoor illumination. Their capacity to send a more pleasing light in one direction makes them an ideal candidate to replace conventional outdoor lighting.

In 2009, EPRI launched the LED Energy Efficiency Demonstration. The goal of the project is to discover a better light bulb, one that not only meets the outdoor lighting requirements of consumers but also uses less electricity in doing so.

Potential for Energy Efficiency

The efficiency of converting electricity into light is called *efficacy*—the ratio of light output (measured in lumens by a light meter) to power consumption (usually measured in watts by a power meter).

Comparing LED lighting to traditional lighting in the laboratory quickly reveals that the HID lighting is in fact more energy-efficient. A traditional HID lamp without its fixture has an overall efficacy between 78 and 94%, whereas the efficacy of a fixture-less LED lamp ranges from 40 to 85%. But when installed in the real world—with their specifically designed fixtures—LED lighting has numerous advantages.

Conventional lamps for street and area lighting radiate light in nearly all directions. Large reflectors above the lamps harvest and redirect some of the wasted light, but even so, 30% of the light is emitted as light pollution that travels skyward or trespasses into unintended places. LED lamps, on the other hand, emit light in a single direction. That is why LED lamps emit very little light pollution, greatly increasing their overall efficiency and improving uniformity of coverage.

Potential for Energy Efficiency

The objective of the LED Energy Efficiency Demonstration is to assess LED lighting technologies by measuring their real-world performance. Participating utilities and municipalities have identified sites for the demonstrations. Demonstrations begin by

gathering pre-installation electricity measurements and light data that corresponds to the sensitivity of human eyes. In this way, the power consumption, light output, and light quality of existing HID lighting can be determined before the new LED fixtures are retrofitted.

Barriers

Barriers to the Demonstration. For the Demonstration, engineers determined that measurements should be made near the ground where light is incident upon walking and driving surfaces. Moreover, the measurements should be made on an exact grid. These two requirements—the height of the measurement and its grid location—posed a difficulty for engineers.

Accurate, timely, and repeatable measurements of LED light levels are possible using the computer-controlled Mobile Light Measurement System, or Rover, a four-wheel, technology-laden, remotely controlled robot similar in appearance to the U.S. Mars Exploration Rover. Using a global positioning system, the Rover aims its precision light meters skyward, recording photometric data onto its onboard computer at up to five times per second as an operator maneuvers the Rover throughout a high-resolution grid.

Barriers to Consumer Adoption. Disadvantages of LED lighting include the high cost of initial installation, non-standardized interfacing of LED light bars, lower immunity to electrical disturbances, and a lower efficacy than traditional HID lamps.

Although the cost of installing LED lighting is greater than the installation cost for conventional lighting (up to 10 times higher in some cases), the budgeted cost for the maintenance of conventional lighting exceeds the initial cost of their installation. LEDs also last longer than HID lighting—a lifespan as long as 100,000 hours according to some manufacturers—which also reduces the maintenance costs.

Although the efficacy of LED lamps is unimpressive in the laboratory, the installation of LED lamps in the real world does result in energy savings. Because more of its light strikes intended surfaces than traditional HID lighting, and because the emitted light is a bluish-white light that is more pleasing than light from high-pressure sodium lamps, the LED lamp can operate at a reduced light output and still achieve superior results.

Applications and Results

Although the LED Energy Efficiency Demonstration is less than two-years-old, it has already garnered promising results. In Ballwin, Missouri, for example, Ameren is hosting an LED lighting demonstration on a public street illuminated by high-pressure sodium (HPS) lamps. The LED retrofit has resulted in an energy savings of 41%.

Southern Company is testing new LED installations in a parking lot illuminated by metal-halide lamps. The energy savings of the LED fixtures compared to the metal-halide fixtures is greater than 50%.

In Chattanooga, Tennessee, TVA is hosting an LED lighting demonstration on a public street illuminated by HPS lamps. The LED retrofit has resulted in an energy savings of 16%, as well as better distribution of light on the ground, less light pollution, and a lower ratio of bright to dark areas.

For More Information

For more information, contact the EPRI Customer Assistance Center at 800.313.3774 (askepri@epri.com).

Contact

Tom Geist, Project Manager, Power Delivery and Utilization
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6. roof-top gardens;
7. perimeter plantings on roof-tops, decks or balconies;
8. pedestrian lighting;
9. flag or banner poles;
10. benches and seating areas;
11. vine-covered fences, walls or trellises;
12. brick walls;
13. public art installations; and
14. additional landscaping and tree planting elsewhere on the site that will be visible from public right-of-way.

88-430 OUTDOOR LIGHTING

88-430-01 PURPOSE

The outdoor lighting standards of this article are intended to protect the public health and general welfare by controlling the adverse impacts of glare and light trespass associated with poorly shielded or inappropriately directed lighting fixtures.

88-430-02 APPLICABILITY

Unless otherwise expressly exempted, the regulations of this article apply to all uses.

88-430-03 EXEMPTIONS

The following are expressly exempt from the outdoor lighting regulations of this article:

- 88-430-03-A.** airport runway and aviation safety lights required by the FAA (e.g., warning lights on radio, communication and navigation towers);
- 88-430-03-B.** outdoor lights on lots occupied by residential buildings containing fewer than 4 dwelling units;
- 88-430-03-C.** temporary holiday light displays;
- 88-430-03-D.** outdoor light fixtures producing light directly by the combustion of fossil fuels, such as, kerosene lanterns or gas lamps;
- 88-430-03-E.** city street lighting system, provided that city street lights should comply with the fixture and shielding standards of 88-430-05 wherever practical;
- 88-430-03-F.** luminous tube lighting;
- 88-430-03-G.** lighting of official government flags;
- 88-430-03-H.** lights associated with outdoor recreation uses, which are subject only to the standards of 88-430-07; and
- 88-430-03-I.** construction and emergency lighting used by construction workers or police, firefighting, or medical personnel, provided the lighting is temporary and is discontinued immediately upon completion of the construction work or abatement of the emergency requiring the lighting.

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88-430-04 GENERAL REGULATIONS AND STANDARDS

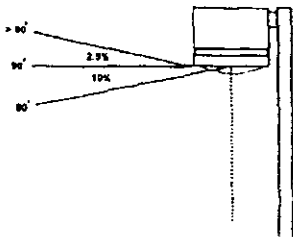
88-430-04-A. Flashing, revolving, or intermittent exterior lighting visible from any property line or street is prohibited.

88-430-04-B. High-intensity light beams, such as outdoor searchlights and lasers, are prohibited unless expressly approved for temporary use in accordance with the special use procedures of 88-525.

88-430-05 FIXTURES AND SHIELDING

88-430-05-A. All outdoor light sources that produce more than 4,050 lumens must be at least partially shielded. For the purposes of this provision, "partially-shielded" or "semi-cutoff" means an outdoor light fixture shielded so that no more than 2.5% of the light emitted directly from the lamp or indirectly from the fixture is projected at angles above a horizontal plane extending from the bottom of the fixture.

Partially Shielded, Semi-Cutoff Fixture



88-430-05-B. Light fixtures mounted under gas station canopies must be completely recessed into the canopy with flat lenses that are translucent and completely flush with the bottom surface (ceiling) of the canopy.

88-430-05-C. SPILLOVER LIGHT

Spillover light onto R-zoned property or public rights-of-way may not exceed 2 lux, measured at grade along the property line.

88-430-05-D. GLARE

All outdoor lighting must be reflected away from residences and streets.

88-430-06 EXTERIOR LIGHTING PLAN

88-430-06-A. WHEN REQUIRED

An outdoor lighting plan must be submitted as part of any special use, development plan, or site plan application. The lighting plan must be reviewed to determine whether the proposed outdoor lighting complies with the standards of this article.

88-430-06-B. INFORMATION REQUIRED

Outdoor lighting plans must include a photometric study and data on the types of lighting fixtures to be used. The photometric plan must include all of the following unless the city planning and development director determines that a thorough review and determination is possible without such information:

COMMITTEE SUBSTITUTE FOR ORDINANCE NO. 100394

1. scale drawing of the site with all outdoor lighting fixture locations identified;
2. fixture specifications indicating the type of fixture, height, shielding, luminaire type and wattage;
3. lamp type and size;
4. a point-by-point illumination array for off-street parking areas and other vehicular use areas and along the property lines. The point-by-point array must indicate site illumination at (minimum) 10-foot intervals along the property line and at 20-foot intervals on the interior of the site.

88-430-07 ALTERNATIVE COMPLIANCE AND SPECIAL STANDARDS FOR OUTDOOR RECREATION USES

Because of their unique requirements for nighttime visibility and their limited hours of operation, the city planning and development director is authorized to permit alternative means of compliance for outdoor recreation uses. In approving an alternative compliance lighting plan, the city planning and development director is authorized to impose reasonable conditions to help mitigate potential adverse impacts. Such conditions include limiting pole/fixture heights; limiting hours of operation; requiring special setbacks, landscaping, screening, or cutoff fixtures; and other techniques.

88-435 OUTDOOR DISPLAY, STORAGE, AND WORK AREAS

88-435-01 APPLICABILITY

The standards of this article do not apply to the sales of food, flowers, newspapers, periodicals and similar materials that are not left outdoors overnight. Additionally, these standards do not apply to approved temporary uses.

88-435-02 OUTDOOR DISPLAY

88-435-02-A. CLASS A OUTDOOR DISPLAY

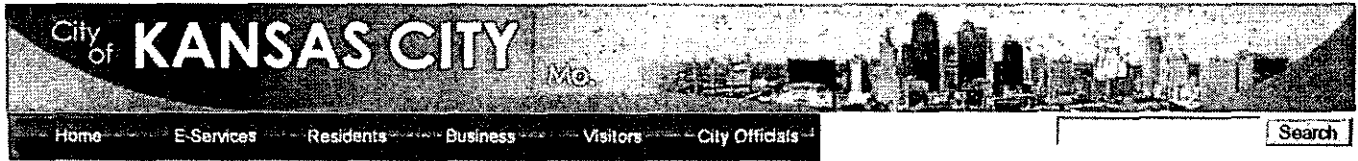
1. DEFINED

Class A outdoor displays are areas outside of a completely enclosed building or structure used to display goods for sale to the general public as part of and subordinate to retail sales or similar business establishment. This includes but is not limited to garden supplies, building supplies and plant materials.

2. REGULATED

Class A outdoor display areas may be allowed in association with any retail or similar business establishment, provided they comply with the following standards:

- (a) Outdoor display areas must be located outside of drive aisles, fire lanes and parking spaces;
- (b) Outdoor display areas are prohibited in any required setback or within the first 50% of the yard area as measured between the right-of-way and the building line;



Home > Departments > Public Works > Street Light Program

Business

E-Services

Residents

Business

Visitors

City Officials

Departments

Aviation Department

City Auditor's Office

City Clerk's Office

City Manager's Office

City Planning and Development

Finance

Fire

General Services

Health

Housing

Human Relations

Human Resources

Information Technology

Law

Municipal Court

Neighborhood and Community Services

Parks and Recreation

Public Works

Water Services

Street Light Program

In 1997, voters approved General Obligation Bonds to upgrade and expand the street light system to raise the level of illumination on streets and sidewalks and to enhance personal safety and security. At the time, there were 48,000 street lights in service. Phase I of the lighting system improvements, financed by the bonds, in the portions of the City served by Kansas City Power and Light Company is complete. Phase I upgraded 40,000 existing lights and added 29,500 new lights to the system representing a \$88.5 million investment in basic infrastructure that serves about 85 percent of the city. Since 1997, new development and other capital projects also added lights resulting in 81,000 units in service as of December 2002.

In September of 2002, the survey and design process for upgrading the remaining lights in suburban portions of the City began. These areas are currently served by Aquila (formerly Missouri Public Service Co). To meet recommended illumination criteria for this area, 3,000 new units may need to be installed, and 3,000 existing units may require retrofitting.

As of May 2006, 209 lights were designed and constructed in the eastern section of City limits through Capital Improvement funds. Phase II work is being coordinated through the Capital Improvement Management Office and is being financed with the annual Capital Improvement allocations from the G.O. bonds.



Design features

The modernization program relocates lights to produce uniform spacing and eliminate dark spots. In typical residential streets, lights are spaced at approximately 160 foot intervals. Old mercury vapor fixtures and lamps are replaced with energy efficient high pressure sodium fixtures and lamps. Where necessary, to raise lighting levels to that recommended by the Illuminating Engineering Society of North America, additional poles and lights are installed. New or in-fill lighting added will match the style of lights currently in the adjacent area.

Tree trimming

Concurrent with street light upgrades, trees on the public right-of-way are trimmed by City employees or through a contract administered by the Parks and Recreation Department's city forester. For information on tree trimming related to the street lights or other issues related to street trees, call the city forester at 816-513-9550.

[Street Light Program - Glossary](#)

[Street Light Program - Tips](#)

[Street Light Program - Problems](#)

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ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

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**UNITED STATES
SECURITIES AND EXCHANGE COMMISSION**
Washington, D.C. 20549

FORM 10-K

(Mark One)

ANNUAL REPORT PURSUANT TO SECTION 13 OR 15 (d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the fiscal year ended December 31, 2009

TRANSITION REPORT PURSUANT TO SECTION 13 OR 15 (d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the transition period from _____ to _____

Commission File Number 1-2313

SOUTHERN CALIFORNIA EDISON COMPANY
(Exact name of registrant as specified in its charter)

California
(State or other jurisdiction of
incorporation or organization)

95-1240335
(I.R.S. Employer
Identification No.)

2244 Walnut Grove Avenue
(P.O. Box 800)
Rosemead, California
(Address of principal executive
offices)

91770
(Zip Code)

(626) 302-1212
(Registrant's telephone number, including area code)

Securities registered pursuant to Section 12(b) of the Act:

<u>Title of each class</u>	<u>Name of each exchange on which registered</u>
Capital Stock	American
Cumulative Preferred	
4.08%Series	4.32%Series
4.24%Series	4.78%Series

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PART I

ITEM I. BUSINESS

SCE is an investor-owned public utility primarily engaged in the business of supplying electricity to a 50,000-square-mile area of central, coastal and southern California, excluding the City of Los Angeles and certain other cities. This SCE service territory includes over 400 cities and communities with a collective population of more than 13 million people. In 2009, SCE's total operating revenue was derived as follows: 42% commercial customers, 39% residential customers, 6% industrial customers, 2% resale sales, 6% public authorities, and 5% agricultural and other customers. SCE had 17,348 full-time employees at December 31, 2009.

SCE makes available, free of charge on www.edisoninvestor.com, its Annual Report on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K, Proxy Statement and amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Exchange Act, as soon as reasonably practicable after SCE electronically files such material with, or furnishes it to, the SEC. Such reports are also available on the SEC's internet website, www.sec.gov. The information contained on, or connected to, the Edison investor website is not incorporated by reference into this report.

Financial Information About Geographic Areas

All of SCE's revenue for the last three fiscal years is attributed to SCE's country of domicile, the United States. All of SCE's assets are located in the United States.

Regulation

CPUC

SCE's retail operations are subject to regulation by the California Public Utilities Commission ("CPUC"). The CPUC has the authority to regulate, among other things, retail rates, energy purchases on behalf of retail customers, rate of return, rates of depreciation, issuance of securities, disposition of utility assets and facilities, oversight of nuclear decommissioning, and aspects of the construction, planning and project site identification of the electricity transmission system.

Resource Adequacy Requirements

The CPUC has established resource adequacy requirements, which require SCE to procure adequate electricity to meet its expected customer needs on both a system-wide and a local basis. SCE would be subject to penalties if it failed to meet the requirements. SCE complied with the resource adequacy requirements in 2009 and expects to comply in 2010.

Procurement of Renewable Resources

California law requires SCE to increase its procurement of energy from renewable resources by at least 1% of its annual retail electricity sales per year so that 20% of its annual electricity sales are procured from renewable resources by no later than December 31, 2010. Under the

High Intensity Discharge Lamps

Section Updated 04 / 2010

Lamps

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Incandescent

Halogen

High Intensity
Discharge

Fluorescent

Compact
Fluorescent

LED Lamps
and Systems

Specialty
Lamps

Structural
Lamps

Projection

High Intensity Discharge Lamps

General Information

Fixture Requirements - Lamp Enclosure type

HID lamps have fixture requirements that must be followed. The following three codes identify the appropriate fixture for a particular lamp. Lamps having an "O" code can be operated in an "Open or Enclosed" fixture. Lamps with a "S" code can be used in open fixtures only if operated in a vertical $\pm 15^\circ$ burn position. Lamps in all other burn positions must be suitably enclosed.

O = Open or Enclosed Fixtures

E = Enclosed Fixtures Only

S = Lamps operated in a vertical position (Base Up or Down), $\pm 15^\circ$, can be used in an open fixture. Lamps burned in any other orientation must be used in "enclosed fixtures only."

Use in Enclosed Fixtures. "Enclosed" fixture means a fixture suitably enclosed and designed to contain fragments of hot quartz or glass (up to 1100°C) per UL Standard #1598 (if in doubt, contact your fixture manufacturer).

Use In Open Fixtures. For lamps operated in the vertical position $\pm 15^\circ$ that are not designated "Enclosed Fixtures Only," lamp may be used in an open or enclosed lighting fixture depending upon the application and operating environment. For example, if the lamp is located near combustible material or in an area which is unoccupied for extended periods, an enclosed fixture which can contain fragments of hot quartz or glass is recommended. For more information, contact your fixture manufacturer.

Protection of Bulbs from Moisture

Outer bulbs of HID lamps are made of heat-resistant glass, designed to have strength and thermal-shock-resistant characteristics suitable for normal applications in typical luminaires. However, shielding of lamps must be provided to avoid bulb breakage that could result from direct contact with liquids (such as water) during operation.

Rated Life

Values are based on laboratory tests of a large number of representative lamps under controlled conditions, including operation at 10 hours per start on ballasts having specified electrical characteristics. Individual lamps or groups of lamps may, of course, vary from the Rated Life shown. Lamp operating conditions can also affect life. Where Rated Life is less than 24,000 hours, it is a MEDIAN value of life expectancy; that is, the total operating time at which, under normal operating conditions, 50% of any large group of initially installed lamps is expected to be still burning. Where Rated Life is 24,000+ hours, 67% of lamps are expected to be still burning at 24,000 hours. For cost-of-light calculations involving these lamps, if an estimated operating time is required at which 50% of the lamps will still be burning, a value of 28,500 hours is suggested. At burning cycles shorter than 10 hours per start, the median life will be shortened approximately as follows:

5 hrs/start: approx. life 75% of rating

2-1/2 hrs/start: approx. life 56% of rating

1-1/4 hrs/start: approx. life 42% of rating

Lumens - Lumens listed are reference lumens

Rated average lamp lumens are obtained under controlled laboratory conditions in a prescribed burning position. **Initial Reference Lumens** refer to the lamp lumen output after 100-hours burning. **Mean Reference Lumens** refer to the lamp lumen output at the mean lumen point during lamp life. The mean lumen point occurs at 50% rated life for HPS and mercury lamps, and at 40% rated life for metal halide lamps. Lamp performance on typical systems under typical service conditions will vary from the reference lumen ratings.

High Intensity Discharge lighting systems are subject to a wide range of variations which may affect final lighting levels. As a result, lamp performance on actual systems may vary due to lamp orientation, ambient temperatures, ballast variations, line voltage and other

reasons. Care must be taken when choosing a system to consider how these changes can affect your light levels both initially and at the mean lumen point.

Ballasts

HID lamps (except E-Z-Merc[®]) require auxiliary ballast equipment designed to produce proper electrical values. Actual lamp watts may vary depending on ballast characteristics. For total system watts, add nominal ballast watts.

All Lucalox[®], Mercury, and Metal Halide lamps (except I-Line) will start at ambient temperatures of -22°F (-30°C). I-Line Multi-Vapor[®] will start at ambient temperatures of 5°F (-15°C) when used on approved mercury ballasts.

Start Characteristics

Full light output does not occur immediately when power is applied. Instead, there is a time delay for the lamp to reach 90% total light output. The starting delay for High Pressure Sodium is 3-4 minutes, for Metal Halide 2-5 minutes, and for Mercury 5-7 minutes.

Restart Characteristics

With a power interruption of a half cycle or more, the arc will extinguish. When power is immediately reapplied, full light output does not occur immediately. For HPS lamps there is a delay of 1 minute to reach 90% total light output; however, Lucalox[®] LU1000 requires 2 minutes and E-Z Lux[®] lamps require 3 minutes to reach 90% total light output. For most Metal Halide lamps, including CMH[®], when the power is immediately reapplied, there will be a delay of 10 to 17 minutes before the lamps reach the 90% light output level. PulseArc[®] lamps restrike in <4 minutes. The restart delay for mercury lamps is 3 to 6 minutes to reach 90% total light output.

Operating Positions and Codes

Mercury and High Pressure Sodium lamps may be operated in any burn position and will still maintain their rated performance specifications. Metal Halide and Low Pressure Sodium lamps, however, are optimized for performance in specific burn positions, or may be restricted to certain burn positions for safety reasons.

U = Universal burning position

HBU = Horizontal -15° to Base Up

HBD = Horizontal $+15^\circ$ to Base Down

HOR = Horizontal $\pm 15^\circ$

HOR PA = $\pm 75^\circ$

HOR $\pm 60^\circ$ = applies to MVR 1650

H45 = Horizontal to $\pm 45^\circ$ only

VBU = Vertical Base Up $\pm 15^\circ$

VBD = Vertical Base Down $\pm 15^\circ$

If no special burn position is noted, the burn position is universal.

HID Color

The color temperature and CRI listed in the tabular data are for reference purposes only. All high intensity discharge lamps exhibit some degree of lamp-to-lamp color variation and shift over life. These characteristics can be increased based on choice of fixture, ballast, burning position, and ambient conditions. Color variation can be greater than normal during the initial 100 hours of burning. Where color consistency is important, consider using ConstantColor[®] CMH[®] for better performance. Contact your local GE Lighting representative for more information.

Export Base Lamps (/27 and /40)

Export only lamps have a non-domestic (non-U.S.) base and are not intended for use in the United States due to potential shock hazard. The lamps are identified by "/27" or "/40" at the end of the lamp description and comply with electrical characteristics defined by IEC standards.

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Operating Notes

CMH® Chromafit™ Metal Halide Lamps

Use in enclosed luminaire with front cover made of glass, capable of containing the fragments of a lamp should it shatter, to avoid risk of fire. Do not use with Polymeric Lens.

E-Z Lux® Lamps

These high pressure sodium lamps should be operated only on certain mercury ballasts, as indicated below.

LUH215/EZ: use only with the following types of H37 250-watt mercury ballasts: high reactance lag-type autotransformers or 240-volt and 277-volt reactors. Do not use with CW (lead-type) or CWA ballasts.

MXR32 Metal Halide Lamp and Electronic Ballast

MXR32 lamps must be operated on GE's special, high-power-factor electronic ballast, HAL32/120. Outside dimensions for the ballast are 9-1/4" long, 3-1/8" wide and 1-3/4" high.

Saf-T-Gard® Multi-Vapor® and Saf-T-Gard® Mercury Lamps

Caution: If the outer glass envelope of a Saf-T-Gard® lamp is broken, the arc tube will self-extinguish, but the supporting structure will still be electrically connected. Be sure power is off and the lamp has cooled before removing the lamp to avoid possible electrical shock from contact with the arc tube support and to avoid risk of burn from the hot arc tube.

Arcstream® Metal Halide Lamps

Arcstream® tubular-shaped lamps must be used in suitably enclosed fixtures with UV-absorbing cover glass. Enclosed fixtures must be capable of containing fragments of hot quartz or glass (up to 1100°C) in the unusual event of the outer bulb shattering. Also see complete Warning and Caution Notices on metal halide lamps.

Dimming

High Wattage CMH® lamps may be dimmed to 50% of full rated wattage. With dimming, the color shifts to a cooler (higher Kelvin) temperature and CRI decreases. The dimming of 20-150W CMH® lamps is not normally recommended. Large power reductions significantly alter the thermal characteristics of the lamp resulting in color shift. Quartz metal halide and mercury vapor lamps may be dimmed to 50% of full rated wattage. High pressure sodium lamps

may be dimmed to 35%. For all dimming, the lamp must be started in full-power mode and must be operated in that mode for a minimum of fifteen minutes prior to reduced-power operation. Minimum open circuit voltage must meet ANSI requirements at full-power, during power transition, and in the reduced-power mode to prevent premature cycling (see appropriate ANSI lamp documents for specific minimum OCV requirements). Other application guidelines may apply.

Footnotes

- 9 Do not use this lamp in fixtures designed for less than rated lamp wattage.
- 14 Life shown is for vertical +15° operation.
- 16 Approximate lumen ratings at 45° burning position: Initial - 145,000. Mean - 124,000.
- 17 Rated life based on 5 or more burning hours per start.
- 28 Use only 1000-watt H12 or H34-type ballasts. Do not use on 1000-watt H36-type ballasts.
- 32 Lamp will run at 400-watts when used on a linear reactor ballast.
- 33 Rated life based on 11 hours per start.
- 38 Requires a non-ANSI designated ballast with a special, add-on metal halide ignitor. Contact your local GE representative for a list of approved ballasts and ignitors.
- 39 UV Control is a quartz material that effectively cuts UVB and UVC radiation.
- 42 Approximate lumen ratings at 45° burning position: Initial - 153,000. Mean - 139,000.
- 43 When operated on a 120 hrs. cycle (minimum), lamp life rating may be extended by up to 50% based on engineering estimates.
- 44 Rated life based on 7 hours per start.
- 45 Use electronic ballast, peak lead ballast, or system which can shut itself off if ballast overheating occurs.
- 46 Use only with the following types of H39 175-watt mercury ballasts: high-reactance lag-type autotransformers or 240-volt and 277-volt reactors. Do not use with CW (lead-type) or CWA ballasts.
- 47 Use only with the following types of H37 250-watt mercury ballasts: high-reactance lag-type autotransformers or 240-volt and 277-volt reactors. Do not use with CW (lead-type) or CWA ballasts.
- 48 Use only with the following types of H33 400-watt mercury ballasts: high-reactance lag-type autotransformers, reactors, CWA auto regulators or CW regulators.
- 49 Not for use with lampholders that have stainless steel center contacts to avoid lamp or lampholder damage due to arcing.
- 50 Not for use on Magnetic-Regulator or Electronic-Regulator ballast systems to avoid ballast overheating.
- 51 Use only with electronic ballast.
- 52 Use only with approved ballast.