



## Lighting Design Lab



### The Impact of New Legislation on Lighting

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## Today

### Lighting Design Lab

K&L

### Why Lighting Legislation?

### Energy Codes & Standards

90.1

189.1

IECC

### Energy Legislation

EPACT

CBTD

EISA and GSL

DOE GSFL and DOE IRL Lamp Rule Making

EISA and Metal Halide Fixtures

### What's Next

ACESA

HR2454

DOE Labeling

FTC Labeling

### Resources

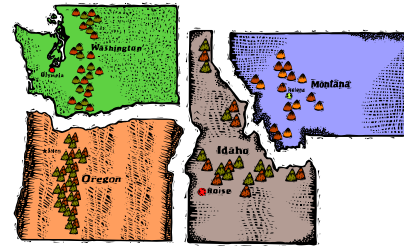
Questions



## Our Sponsors



## Our Region



Project or Specifier must be in our region



## Our Goal

To Promote Energy Efficiency and Quality Design Thru:

1. Education
2. Consultations
3. Industry Alliances



## Education

### 4 Classes Annually

2 spring, 2 fall on a variety topics held throughout the Pacific Northwest (WA, OR, ID, MT)

Additional classes as requested

### Lighting Lab Tours

Color Boxes

Lamp Technologies

Lighting Vignettes: displays in a real world environment



### Demonstrations

Full Scale Mock-up Facility





## Education

### Website and Newsletter

- Commercial Lighting Guides
- Downloads of previous lighting presentations
- Links to allied sites
- Lighting articles
- Codes and Standards downloads



### Library

- Manufacturers catalogs
- Full IES library
- Text and reference materials



## Consultations

### In-House and On-site Consultations



Project OR Specifier must be in the region



## Industry Alliances



ASHRAE: American Society of Heating, Refrigerating and Air Conditioning Engineers



IES: Illuminating Engineering Society



NCQLP: National Council on Qualifications for the Lighting Professions



USGBC/LEED: U.S. Green Building Council/ Leadership in Energy and Environmental Design



## To know and love

\*



## Why?

### Improve Lighting

Safety, productivity, aesthetics, fairly easy



### Save Money

Energy costs, maintenance costs, payback under 3 years

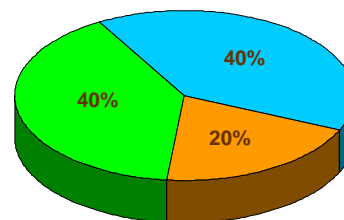


### Save Energy

Pollution, Public Relations, LEED



## Why?



Average Commercial Building's Electric Usage

According to US DOE



## Energy Codes

### ANSI/ASHRAE/IES 90.1 Standard



American National Standards Institute  
 American Society of Heating, Refrigerating and  
 Air Conditioning Engineers  
 Illuminating Engineering Society



## Energy Codes

### ANSI/ASHRAE/USGBC/IES 189.1 Green Building Standard



American National Standards Institute  
 American Society of Heating, Refrigerating and  
 Air Conditioning Engineers  
 U.S. Green Building Council  
 Illuminating Engineering Society



## Energy Codes

### IECC: International Energy Conservation Code



International Code Council



## ANSI Standards

### ANSI: American National Standards Institute

Founded in 1918

Based in Washington, D.C.

Mission: To enhance both the global competitiveness of U.S. business and the U.S. quality of life by promoting and facilitating voluntary consensus standards and conformity assessment systems, and safeguarding their integrity.

ANSI is a national *voluntary consensus* standard developed under the auspices of ASHRAE. ANSI does not develop American National Standards (ANSs); it provides all interested U.S. parties with a *neutral* venue to come together and work towards common agreements. ***Consensus is defined by the American National Standards Institute (ANSI), of which ASHRAE is a member and which has approved this standard as an ANS, as "substantial agreement reached by directly and materially affected interest categories. This signifies the concurrence of more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that an effort be made toward their resolution."***

Compliance with this standard is *voluntary* until and unless a legal jurisdiction makes compliance mandatory through legislation.



## ASHRAE

### ASHRAE: American Society of Heating, Refrigerating and Air Conditioning Engineers

Founded in 1894

Based in Atlanta, GA

Mission: To advance the arts and sciences of heating, ventilating, air conditioning and refrigerating to serve humanity and promote a sustainable world.

An international organization of 51,000 persons. ASHRAE fulfills its mission through research, standards writing, publishing and continuing education.



## IES

### IES: Illuminating Engineering Society

Founded in 1906

Based in New York, NY

Mission: To advance the arts and sciences of heating, ventilating, air conditioning and refrigerating to serve humanity and promote a sustainable world.

Recognized technical authority on illumination. Its objective has been to communicate information on all aspects of good lighting practice to its members, to the lighting community, and to consumers, through a variety of programs, publications, and services.





USGBC

## USGBC: U.S. Green Building Council

Founded in 1998

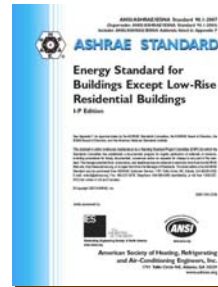
Based in Washington, D.C.

Mission: To transform the way buildings and communities are designed, built and operated, enabling an environmentally and socially responsible, healthy, and prosperous environment that improves the quality of life.

Developed the Leadership in Energy and Environmental Design (LEED) Green Building Rating System which provides a suite of standards for the environmentally sustainable design, construction and operation of buildings and neighborhoods.



## 90.1 Standard



Current Version: 2007  
Next Update: 2010

1975 – Original Standard published.

1980, 1989, and 1999 - Revisions published using the ANSI and ASHRAE *periodic* maintenance procedures.

Based upon these procedures, the *ENTIRE* standard was publicly reviewed and published in its entirety *each* time (approx every 10 years)

2001 - Standard moved to **continuous maintenance**, permitting the standard to be updated several times each year through the publication of approved addenda to the standard. (full publications now every 3 years instead of 10)



## 90.1 Standard

### Requirements of 90.1

#### Controls:

- Occupancy
- Daylighting

#### Limits on Lighting Power

- Interior
- Exterior

In developing the lighting power densities for the 2010 Standard, the efficacies of T8 (800 Series) combined with energy saving electronic ballast, and the efficacies of incandescent lamps circa 2012 were used.

So the new LPDs coming out of 90.1 and IECC are keeping pace with the legislation we will be talking about today!



## 189.1 Standard



January 2010 - Published by ASHRAE in conjunction with the USGBC and the Illuminating Engineering Society.

Provides a criteria by which a building can be judged as "green," written in model code language that jurisdictions can use to develop a green building construction code for a "total building sustainability package".

Standard is intended to *complement* green building rating programs not compete.



## 189.1 Standard

### Highlights of 189.1

Based on Section 9 (Lighting) of ASHRAE 90.1

Interior LPD (Lighting Power Densities) are capped at 90% of 90.1-2007

Exterior lighting 4-lighting zones (L1/L2/L3/L4)

Additional control requirements



## 189.1 Standard

### Some Control Requirements of 189.1

**Manual-ON or bilevel automatic-ON occupancy sensors** are required in <250 sq.ft. offices, all classrooms and other spaces (otherwise, all occupancy sensors must be manual-ON)

**Occupancy Sensors to switch or dim to at least 50% of power\*** in Hallways of hotels, motels, dorms, multifamily buildings, and industrial/commercial storage stacks as well as library stack areas.

**Emergency lighting** capped at 0.1W/sq.ft. but additional allowed if controlled by automatic shutoff device.

**Daylight zones >250 sq.ft.** must be automatically controlled by daylight sensing coupled with continuous dimming or stepped switching.\*\*

**Outdoor lighting** must comply with Section 9 of 90.1 except building facades, parking lots, garages, canopies (sales and non-sales) and outdoor sales areas require automatic controls to *reduce lighting power by at least 50% one hour after normal business closing* and within 30 minutes after sunrise.\*\*\*

\*With an exception for low-LPD HID \*\*several exceptions \*\*\*with some exceptions



## IECC Code



ICC (International Code Council) publishes IECC model energy code.

Encourages energy conservation through efficiency in envelope design, mechanical systems, lighting systems and the use of new materials and techniques.

Lighting requirements very similar to 90.1

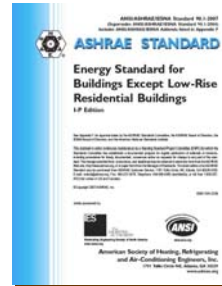
Developing it's own "green standard" called International Green Construction Code (IGCC). "Cooperating Sponsors": AIA and ASTM International.

IGCC competes with 189.1

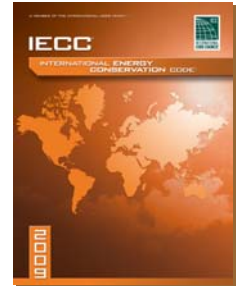


## IECC Code

### Lighting Sections are Substantially Equal



2007 Version



2009 Version

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## IECC Code

### Other International Codes



IBC: International Building Code



IFC: International Fire Code



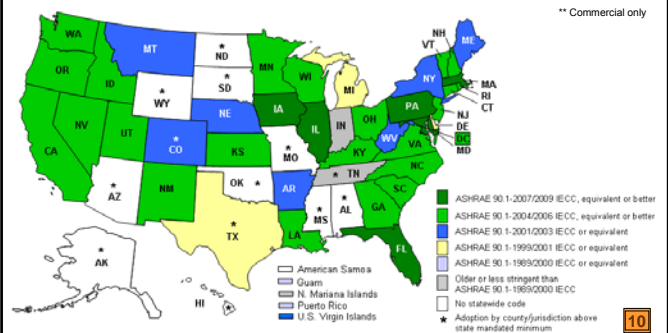
IRC: International Residential Code



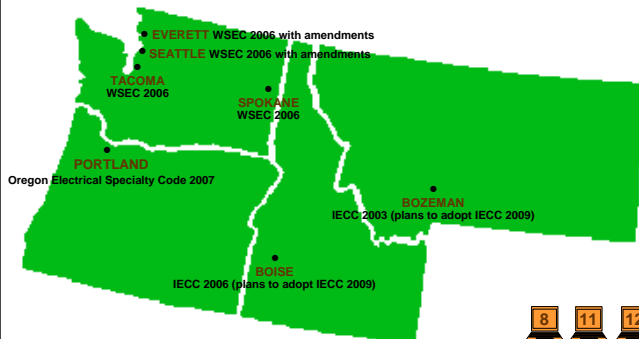
IRC: International Mechanical Code



## Which State Follows Which Code? \*\*



## ...but what about me?



## Energy Legislation

EPACT: Energy Policy Act of 2005 (signed into law August 2005)

EISA: Energy Independence and Security Act of 2007 (HR 2454) (signed into law December 2007)

DOE IRL: US Department of Energy standard for Incandescent Reflector Lamps

DOE GSFL: US Department of Energy standard for General Service Fluorescent Lamps

ACESA: American Clean Energy and Security Act of 2009



## EPACT History

### Energy Policy Act 1992

#### Lighting Element:

Labeling incandescent A-line and screw-based CFLs with energy cost info (buy lumens not watts)



#### Intent:

Encourage use of more energy-efficient screw-based lamps

Minimum efficacies for incandescent R30 & R40, plus incandescent PAR lamps, effective 10/31/95



Encourage use of more energy efficient halogen reflector lamps

Minimum efficacies and color rendering standards (CRI) for straight and U-bend fluorescent, effective for 4-ft and 8-ft lamps



Eliminate availability of full wattage T12 "halo" fluorescent lamps and encourage use of reduced wattage ES types or use of more efficient rare earth types, like T8s



## EPACT 2005

### EPACT: Energy Policy Act of 2005

signed into law August 8, 2007



*"To ensure jobs for our future with secure, affordable, and reliable energy."*



## EPACT 2005



## EPACT 2005

### First Lighting Products to be Affected



Max 190W



Must meet Energy Star 2.0 (ES label NOT required)



Must meet Energy Star 2.0 (ES label NOT required)

Became Effective January 1, 2006



## EPACT 2005

### Mercury Vapor Lamp Ballasts

Mercury Vapor Lamp Ballasts OR Luminaires Containing such Ballasts for *general illumination*\* applications may not be manufactured, marketed, sold or imported into the United States.

Intended replacement: MH (Metal Halide)

\*2007 EISA legislation provides for continued use in specialty applications provided the ballast is marked "Not for general illumination" and identifies the specialty application.

Became Effective January 1, 2008



## EPACT 2005

### Ballasts Operating Energy Saver T12 Fluorescent Lamps

Federal Ballast Rule in 2000 aimed at replacing the standard T12 MAGNETIC ballasts and lamps, set minimum BEFs (ballast efficiency factors) that only electronic ballasts could meet. Only included full wattage lamps were covered.

Now, new efficiency standards for ballasts operating ES lamps go into effect.

By 2010, ballast manufacturers cannot manufacture replacement ballasts that do not pass the new Ballast Efficacy Factors (BEF) requirements.\*

\*Exceptions  
Dimming ballasts that dim to 50% or less  
T12-HO ballasts capable of starting down to -20° F  
Low power factor ballasts (<90) labeled for use in residential applications only

Became Effective July 1, 2009



## EPACT 2005

### Ballast Regulations added to 2000 Federal Ballast Rule

Action	Per 2000 Ballast Rule: BEF Standards for operation of full-wattage T12 Lamps	Per 2005 EPAct: BEF Standards for operation of energy-saving T12 Lamps
Ballast manufacturers can no longer make ballasts that do not pass the new requirements for use in new fixtures.	April 1, 2005	July 1, 2009
Ballast manufacturers cannot sell ballasts that do not pass the new requirements to U.S. fixture manufacturers.	July 1, 2005	October 1, 2009
Fixture manufacturers cannot sell fixtures that include ballasts that do not pass the new requirements.	April 1, 2006	July 1, 2010
Ballast manufacturers cannot manufacture replacement ballasts that do not pass the new requirements.	July 1, 2010	July 1, 2010



## EPACT 2005

### How It May Impact You

Replace the magnetic ballasts with higher-efficiency ballasts as they fail



and as a building owner there's federal help...



## CBTD

### The Energy Efficient Commercial Buildings Tax Deduction

New Construction or Renovation  
AND  
Building Owners or Tenants are eligible



Lighting



HVAC



Building Envelope



## CBTD



Reduces the initial cost of investing in energy-efficient lighting and other building systems.

Tax incentives up to \$1.80 per square foot!\*\*

Bill introduced recently to increase the allowance to  
**\$3.00 per square foot!!!**

Allows a larger portion of the capital investment to be depreciated in the first year.

Can be claimed in a single tax year instead of amortized over a period of years.

AND...

\* building must be completed by December 31, 2007

\*\* for all three systems, otherwise cap is .60 per square foot



## CBTD

### Just SOME of the fine print

**All Systems:** project must be "certified" to reduce total annual energy and power costs to at least **50% less** than a Reference Building satisfying the requirements of ASHRAE/IESNA 90.1-2001 solely through changes to the building's lighting, HVAC/hot water and building envelope.

Indoor lighting systems 16-2/3%	HVAC/hot water systems 16-2/3%	Building envelope features 16-2/3%
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**Partial Systems:** project must be "certified" to reduce total annual energy and power costs to at least **10-20% less** than a Reference Building satisfying the requirements of ASHRAE/IESNA 90.1-2001. These savings must be achieved solely through changes to **one** of the three qualifying building systems or features.

Indoor lighting systems 20%	HVAC/hot water systems 20%	Building envelope features 10%
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**'Interim Lighting Rule':** The total amount that can be deducted is capped at between \$0.30 and \$0.60/sq.ft on the below sliding scale based on a 25-40% reduction below the maximum allowable lighting power density (W/sq.ft.) in ASHRAE/IESNA 90.1-2001\*

\* unless space is a warehouse, then indoor lighting must achieve 50% reduction in LPD to achieve .60/sq. ft.



## EISA

### EISA: Energy Independence and Security Act of 2007

signed into law December 19, 2007



*"To create clean energy jobs, achieve energy independence, reduce global warming pollution and transition to a clean energy economy."*





## EISA

### Lighting Sections



Section 321: Energy Efficiency Standards for General Service Incandescent lamps



Section 322: Incandescent Reflector Lamp Efficiency Standard



Section 322: Standards for Fluorescent Lamps



Section 324: Metal Halide lamp FIXTURES



## Is the Incandescent being banned?

**The Boston Globe**  
AP Associated Press  
Bill would ban incandescent bulbs

**U.S. News** & WORLD REPORT  
FAQ: The End of the Light Bulb as We Know It  
By MARGANNE LAVELLE

## The New York Times

### Kissing Edison's Light Bulb Goodbye

By JAMES KANTER

**WorldNetDaily**  
YOUR GOVERNMENT AT WORK

Congress bans incandescent bulbs  
Massive energy bill phases out Edison's invention by 2014

**The Seattle Times**

Incandescent lights out?  
Hoarder buys 3,000 bulbs



## Is the Incandescent being banned?

...not *EXACTLY*

EISA 2007 is NOT 'banning' the incandescent lamp but has established '*efficiency standards*' for all light bulbs sold in or imported into the United States.



EISA 2007 will require that manufacturers improve the performance of the following lamps over a TWO YEAR phase in period, STARTING JANUARY 1, 2012.



## What is considered an INCANDESCENT

According to EISA: Section 321

A standard incandescent or halogen type lamp that:

- Is intended for general service applications,
  - Has a medium screw bases,
  - Has a lumen range of 310-2600 (40 - 100W in today's wattages), and
  - Is capable of operating at least partially in the range of 110-130 volts.
- either a standard or "modified spectrum" lamp (technically defined by the law).

\* (i) is not a colored incandescent lamp; and

(ii) when operated at the rated voltage and wattage of the incandescent lamp:

(I) has a color point with (x,y) chromaticity coordinates on the Commission Internationale de l'Eclairage (C.I.E.) 1931 chromaticity diagram that lies below the black-body locus;

and

(II) has a color point with (x,y) chromaticity coordinates on the C.I.E. 1931 chromaticity diagram that lies at least 4 MacAdam steps (as referenced in IESNA LM16) distant from the color point of a clear lamp with the same filament and bulb shape, operated at the same rated voltage and wattage."



## EISA Schedule for General Service Incandescent

**Beginning on Jan. 1, 2012:** ALL general service lamps, CFL, LED, incandescent OR halogen light source AND lamps "used to satisfy lighting applications traditionally served by general service incandescent lamps" ... must have a minimum color rendering index (CRI) rating of:

- 80 if not a "modified spectrum" lamp; or
- 75 if a "modified spectrum" lamp

**Beginning on Jan. 1, 2012:** bulbs with a rated lighting output of 1,490 to 2,600 lumens (current 100-watt bulbs) may consume a maximum of 72 watts

**Beginning on Jan. 1, 2013:** bulbs with a rated lighting output of 1,050 to 1,489 lumens (current 75-watt bulbs) may consume a maximum of 53 watts

**Beginning on Jan. 1, 2014:** bulbs with a rated lighting output of 750 to 1,049 lumens (current 60-watt bulbs) may consume a maximum of 43 watts, and bulbs with a rated lighting output of 310 to 749 lumens (current 40-watt bulbs) may consume a maximum of 29 watts

NOTE: The lumen ranges for *modified spectrum* lamps lumen ranges are 25% lower but with the same maximum wattages.

By 2020 all bulbs will have to be at least **70% more** efficient than today's incandescent bulbs.



## EISA Schedule for General Service Incandescent

Current Wattage	Rated Lumen Ranges	Maximum Rated Wattage	Minimum Rated Lifetime	Effective Date (Manufactured on or after)
100	1490-2600	72	1,000 hours	1/1/2012
75	1050-1489	53	1,000 hours	1/1/2013
60	750-1049	43	1,000 hours	1/1/2014
40	310-749	29	1,000 hours	1/1/2014

21-36  
l/w

20-28  
l/w

17-24  
l/w

11-26  
l/w



## An option...



Replace with CFL or /LED retrofit that produces a minimum 1490 lumens or incandescent lamps that meet criteria



## The GSIL exemptions...

Appliance lamp  
black light  
bug  
colored  
Infrared  
left-hand thread  
marine  
marine signal  
mine service  
plant light  
reflector  
rough service  
shatter-resistant  
sign service  
silver bowl  
showcase  
3-way  
traffic signal  
vibration service  
G shape with  $\geq 5$ -inch diameter  
T shape of  $\leq 40W$  and  $> 10$ -inch length  
B, BA, CA, F, G16-1/2, G25, G30, S and M14 lamps of  $\leq 40W$   
Candelabra incandescent and other lights not having a medium Edison screw base



## The exemptions' exemptions...

### Exemption Reversal Condition

The Act includes a provision whereby sales of certain exempted lamps will be monitored by the US DOE between 2010 and 2025:

**rough service  
vibration service  
2601-3300 lumen general service (150W)  
3-way and  
shatter-resistant lamps**

For each of these lamp types, if sales *double* above the increase modeled for a given year—signaling that consumers are shifting from standard incandescent to these incandescents and thereby not saving energy—the lamp type will lose its exemption.



## DOE GSFL & DOE IRL Lamp Rule Making

### GSFL: General Service Florescent Lamp IRL: Incandescent Reflector Lamp

The Energy Policy and Conservation Act...that any new or amended energy conservation standard that the DOE prescribes for covered consumer and/or commercial products, including general service fluorescent lamps (GSFL) and incandescent reflector lamps (IRL), must be designed to "achieve the maximum improvement in energy efficiency . . . which the Secretary determines is technologically feasible and economically justified." Furthermore, the new or amended standard must "result in significant conservation of energy."



## GSFL & DOE IRL Lamp Rule Making

### Highlights

Covers the same lamp families covered by EPCA 1992:

Incandescent (& Halogen) Reflector Lamps (IRL)  
General Service Fluorescent Lamps (GSFL)

Declared that the R20, BR30, ER30, BR40 and ER40 lamps exempted by EISA 2007 continue to be exempt

Adds 4-ft. T5 standard and HO fluorescent lamps with miniature bi-pin bases

Becomes Effective July 14, 2012



## What is considered a FLUORESCENT

### According to EPCA

General Service Fluorescent Lamps are:

Fluorescent lamps which can be used to satisfy the majority of fluorescent applications \*

\* See "The GSFL exemptions" slide



## Current DOE GSFL standards

### FLUORESCENT LAMPS

Lamp Type	Nominal Lamp Wattage	Minimum CRI	Minimum Average Lamp Efficiency (LPW)	Effective Date (Period of Months)
4-foot medium bi-pin	>35 W	69	75.0	36
	≤35 W	45	75.0	36
2-foot U-shaped	>35 W	69	68.0	36
	≤35 W	45	64.0	36
8-foot slimline	65 W	69	80.0	18
	≤65 W	45	80.0	18
8-foot high output	>100 W	69	80.0	18
	≤100 W	45	80.0	18

These CRI minimum ratings have not changed



## Future DOE GSFL standards

Lamp Type	Correlated Color Temperature	Energy Conservation Standard lm/W
4-Foot (T8-T12) Medium Bi-pin ≥25W	≤ 4,500K	89
	> 4,500K and ≤ 7,000K	88
2-Foot (T8-T12) U-Shaped ≥25W	≤ 4,500K	84
	> 4,500K and ≤ 7,000K	81
8-Foot (T8-T12) Slimline ≥52W	≤ 4,500K	97
	> 4,500K and ≤ 7,000K	93
8-Foot (T8-T12) High Output	≤ 4,500K	92
	> 4,500K and ≤ 7,000K	88
4-Foot (T5) Miniature Bi-pin Standard Output ≥26W	≤ 4,500K	86
	> 4,500K and ≤ 7,000K	81
4-Foot (T5) Miniature Bi-pin High Output ≥49W	≤ 4,500K	76
	> 4,500K and ≤ 7,000K	72

Becomes Effective July 14, 2012



## The GSFL exemptions...

- Fluorescent lamps designed to promote plant growth
- Fluorescent lamps specifically designed for cold temperature installations
- Colored fluorescent lamps
- Impact-resistant fluorescent lamps
- Reflectorized or aperture lamps
- Fluorescent lamps designed for use in reprographic equipment
- Lamps primarily designed to produce radiation in the ultra-violet region of the spectrum
- Lamps with a CRI (color rendering index) of 87 or greater



## Which GSFLs will go away?

**T12 4-ft. & 2-ft U-lamps with Medium Bi-pin Bases**  
 All 4-ft. T8 basic 700 Series lamps at 2800 lumens fail  
 Some 700 Series 2 ft. U-lamps pass; all 2-ft. 800 Series U-lamps pass

**T12 8-ft. Slimline with Single Pin Bases**  
 All 75W F96T12 lamps fail  
 Most 60W F96T12/ES fail

**T12 8-ft. 800mA HO with RDC Bases**  
 All 110W F96T12 HO lamps fail  
 All 95W F96T12/ES/HO fail

\* very few very high lumen rare earth phosphor lamps will pass



## Which GSFLs will go away?

**T8 4-ft. & 2-ft. U-lamps with Medium Bi-Pin Bases**  
 All 4-ft. T8 basic 700 Series lamps at 2800 lumens fail  
 Some 700 Series 2 ft. U-lamps pass; all 2-ft. 800 Series U-lamps pass

**T8 8-ft. Slimline with Single Pin Bases**  
 All pass except some 700/SP Series

**T8 8-ft. HO with RDC Bases**  
 All pass except some 700/SP Series  
 All 95W F96T12/ES/HO fail

**T5 4-ft. with Miniature Bi-Pin Bases**  
 All pass



## Current DOE IRL standards

### Incandescent Reflector Lamps

Wattage Range	Minimum LPW
40-50W	10.5
51-66W	11.0
67-85W	12.5
86-115W	14.0
116-155W	14.5
156-205W	15.0

Effective 1992 (R and PAR)

Effective June 1, 2008 (BR and ER)



## Future DOE IRL standards

### Incandescent Reflector Lamps

Lamp watts	Lamp type	Diameter	Volts	Minimum efficacy (lumens/W), expressed as range for 40-205W *
40-205	Standard spectrum	>2.5 in. (PAR30, PAR38, BR30, ER30, BR40, R40)	>125 (130V)	18.4-31.9
			<125 (120V)	16.0-27.6
		<2.5 in. (R20, PAR20)	>125 (130V)	15.4-26.7
			<125 (120V)	13.5-23.4
40-205	Modified spectrum	Standards approximately 17% less stringent as standard spectrum lamps.		

\* BR30, BR40 & ER40 lamps rated at 65W  
ER30, BR30, BR40 & ER40 lamps rated at ≤ 50W  
R20 lamps rated at ≤ 45W

Effective July 14, 2012



## The IRL exemptions...

R, PAR, ER, BR, PBR or similar shape

with wattages less than 40 watts

with diameters less than or equal to 2.25 inches

with voltages less than 115 V or greater than 130 V

that are colored lamps

that are rough or vibration service lamps



## How the IRL standards might impact YOU

All of today's *current* standard PAR halogen lamps will be eliminated\* and likely that all 130V PAR halogen lamps will be eliminated

### THE BAD

Need a substitute  
Substitutes cost more  
Change is difficult

### THE GOOD

Manufacturers fighting to be leader  
Forces better technology  
Saves energy  
Saves money in long run  
Better technology gets cheaper over time

\* few of today's halogen reflector lamp (PAR20, PAR30 and PAR38) can meet the standards.



## Likely IRL replacements

Advanced incandescent with special coatings including halogen bulbs  
ie: Infrared-coated halogen reflector lamps: IRC (Philips), IR (Sylvania) or HIR (GE)

Compact Fluorescent Lamps (CFLs)

Light-Emitting Diodes (LEDs)

### A FEW OPTIONS

Been using a 50W R20 lamp?  
Use 45W R20 or any halogen PAR20

Been using a BR40 lamps > 65W and < 205W lamps?  
Use 65W BR40 or halogen PAR38



## DOE estimated savings

30 Year period (2012-2042)



2 to 1.1 gigawatts



1.8 to 6.2 gigawatts

gigawatt = 1 billion watts



## EISA Section 324

### Metal Halide Ballasts Defined by EISA

#### PROBE-START METAL HALIDE BALLAST

A ballast that:

(A) starts a probe-start metal halide lamp that contains a third starting electrode (probe) in the arc tube

AND

(B) does not generally contain an igniter but instead starts lamps with high ballast open circuit voltage. Lamps shall be started by first providing a high voltage pulse for ionization of the gas to produce a glow discharge.

#### PULSE-START METAL HALIDE BALLAST

An electronic or electromagnetic ballast that starts a pulse-start metal halide lamp with high voltage pulses.



## EISA Section 324

### Metal Halide Fixtures

Prohibits the sale of a metal halide fixture ranging from 150W – 500w unless the ballast in the fixture is greater than 88% efficient

Ballast Type	Wattage	Ballast Efficiency *
Magnetic Probe Start	150W – 500W	94%
Pulse Start	150W – 500W	88%
Non Pulse Start Electronic	150W – 250W	90%
Non Pulse Start Electronic	251W – 500W	92%

Applies to FIXTURES manufactured on or after January 1, 2009  
(additional reviews in 2012 to be effective 2015 and another review in 2015 to be effective 2022)



## The MH Fixture Exemptions...

Fixtures with regulated lag ballasts

Fixtures with electronic ballasts to operate at 480V

Fixtures that meet all the following criteria:

Are only rated for 150W lamps

and

Are rated for use in wet locations

and

Contain a ballast that is rated to operate at ambient air temperatures above 50°C



## How EISA Affects MH Fixtures

Virtually eliminates the manufacturing of current 150W – 500W probe-start MH magnetic ballasted fixtures

Only impacts the sale of metal halide fixtures in the U.S. and U.S. territories

Sale of metal halide fixtures for markets outside of the United States does not need to comply

\* Does not affect replacement ballasts



## Benefits of Pulse-Start MH

- more energy efficient
- up to 16% improvement in lumen maintenance
- up to 50% greater system efficacy (l/w)
- up to 50% longer lamp life
- better CRI (85+)
- quicker start from cold (2 mins) / quicker re-strike time (4 mins)



## Metal Halide Fixture Labeling

All metal halide ballasts AND the metal halide fixture cartons

**MUST**

include a circle "E" label as prescribed by the Federal Trade Commission \*  
(required by EISA 2007)



\* The encircled capital letter "E" on metal halide ballasts must appear conspicuously, in color-contrasting ink (i.e., in a color that contrasts with the background on which the encircled capital letter "E" is placed) on the surface that is normally labeled. It may be printed on the label that normally appears on the metal halide ballast, printed on a separate label, or stamped indelibly on the surface of the metal halide ballast.  
(SIMILAR LANGUAGE FOR PACKAGING, PRINTED MATERIAL AND ADVERTISING)



## What's Next

DOE will initiate TWO rulemakings to consider whether lamp standards should be made more stringent

**January 1, 2014:** (when the last efficiency standards go into effect) DOE must initiate a process to determine if any exempted lamp types should stop being exempted.

**January 1, 2020: MINIMUM 45 lumens per watt (l/w) BY 2020!** If rulemaking cannot produce savings greater than or equal to 45 lumens/watt then the Secretary shall prohibit the sale of ANY "general service lamp" (incandescent, compact fluorescent, light emitting diode) and **"any other lamps the Secretary determines are used to satisfy lighting applications traditionally served by general service incandescent lamps" that does not meet a minimum efficacy standard of 45 lumens per watt (Referred to as "backstop requirement" which is an outright ban on certain general service lamps (last resort).**



## LED Integral Lamp Specs\*



AND



Manufacturer must sign up to be an Energy Star partner.

Manufacturers must participate in DOE's Quality Advocates program and use the Lighting Facts label that is part of that program.

Lamp must be at least as energy efficient as comparable CFLs, with light output, color, and distribution equivalent to that of incandescent or halogen bulbs.



Manufacturer required to test 10 samples for at least 6,000 hours continuously, with an LM-79 test performed at the outset and end, to determine the lumen maintenance.

Different criteria are given depending on whether then lamp is omni-directional, decorative or directional.

A warranty must be provided for lamps covering material repair or replacement for a min of 3 years (DOP).

\* Energy Star criteria for LED lamps applies only to "integral" LED lamps i.e. lamps that are intended as replacements for conventional light bulbs.

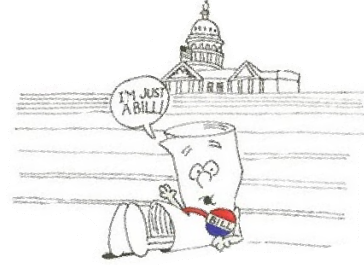
Updated March 22, 2010.....Effective August 31, 2010



## But wait...there's MORE!

### ACESA 2009

American Clean Energy and Security Act of 2009



## ACESA 2009

*"To create clean energy jobs, achieve energy independence, reduce global warming pollution and transition to a clean energy economy."*

Section 161: Technical corrections to EISA 2007

Section 162: Technical corrections to EPACT 2005

Section 201: greater efficiency in building codes

Section 211: lighting efficiency standards

exemptions to current EISA standards are slated to expire in July 2013, per ACESA 2009 pending energy legislation



## Even More Legislation to Come?

### U.S. House Bill HR2454 (Waxman-Markey Climate Bill)

Proposed:

**Pole Mounted Outdoor Lighting Standards**  
Minimum task l/w (lumen per watts) requirements based upon BUG ratings

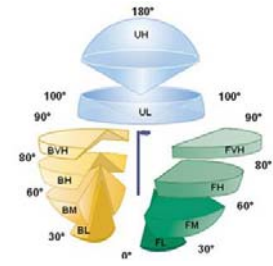
BackLight  
Uplight  
Glare

**Mercury Lamps**

considering the end of mercury lamps for general lighting applications by 2016

**IRLs**

review of current exemptions



## DOE labeling for SSL\*

### Light Output/Lumens

Measures light output. The higher the number, the more light is emitted.  
Reported as "Total Integrated Flux (Lumens)" on LM-79 test report.

### Watts

Measures energy required to light the product. The lower the wattage, the less energy used.  
Reported as "Input Power (Watts)" on LM-79 test report.

### Lumens per Watt/Efficacy

Measures efficiency. The higher the number, the more efficient the product.  
Reported as "Efficacy" on LM-79 test report.

### IESNA LM-79-2008

Industry standardized test procedure that measures performance qualities of LED luminaires and integral lamps. It allows for a true comparison of luminaires regardless of the light source.

### Registration Number

Model Number  
Type

Brand X

**lighting facts**<sup>CM</sup>  
A Requirement of the U.S. DOE

Light Output (Lumens) 840

Watts 9.9

Lumens per Watt (Efficacy) 83

Color Accuracy (Color Rendering Index, CRI) 87

Light Color (Correlated Color Temperature, CCT) 2900 (Warm White)

Warm White 3000K Bright White 4000K Daylight 6500K

All results are according to IESNA LM 79-2008. Approval Method for the Electrical and Photometric Testing of Solid State Lighting. The U.S. Department of Energy (DOE) verifies product test data and results.

Visit [www.lightingfacts.com](http://www.lightingfacts.com) for the Label Reference Guide.

Registration Number: 4821031701003  
Model Number: 14756074526294947123456  
Type: 14756074526294947123456

**Color Rendering Index (CRI)**  
Measures color accuracy. Color rendition is the effect of the lamp's light spectrum on the color appearance of objects.

**Correlated Color Temperature (CCT)**  
Measures light color. \*Cool colors have higher Kelvin temperatures (5000-6500 K); \*warm colors have lower color temperatures (2700-3000 K). Color temperatures higher than 6000 are outside of the defined region for white light, but may be appropriate for outdoor applications.

\*voluntary



## FTC labeling for all lamps\*

Brightness  
820 lumens

Estimated Energy Cost  
\$7.49 per year

Front

**Lighting Facts**  
Per Bulb

Brightness 820 lumens

Estimated Yearly Energy Cost \$7.49  
Based on 3 hrs/day and 11.4 ¢/kWh.  
Your cost will depend on your rates and use.

Life in Years 1.4 yrs  
Based on 3 hrs/day

Color Appearance  
Warm Cool  
2700 K

Energy Used 60 watts

Back

\*mandatory?  
FINAL DECISION: JUNE 2010





## FTC labeling for lamps with Hg\*

Lighting Facts	
Per Bulb	
Brightness	870 lumens
Estimated Yearly Energy Cost	\$1.62
Based on 3 hrs/day and 11.4 kWh Your cost will depend on your rates and use.	
Life in Years	5.5 yrs
Based on 3 hrs/day.	
Color Appearance	
Warm	Cool
2700 K	
Energy Used	13 watts
Contains Mercury	
Manage according to local, state, and federal disposal laws. For information: <a href="http://epa.gov/bulbrecycling">epa.gov/bulbrecycling</a> or 1-800-XXXX-XXXX.	

\*mandatory? Proposed Back Label for Bulbs Containing Mercury

FINAL DECISION: JUNE 2010



## Web Resources

- (1) Lighting Design Lab: [www.lightingdesignlab.com](http://www.lightingdesignlab.com)
- (2) ANSI: [www.ansi.org](http://www.ansi.org)
- (3) ASHRAE: [www.ashrae.org](http://www.ashrae.org)
- (4) IES: [www.ies.org](http://www.ies.org)
- (5) USGBC: [www.usgbc.org](http://www.usgbc.org)
- (6) Standard 90.1: [www.ashrae.org/technology/page/548](http://www.ashrae.org/technology/page/548)
- (7) Standard 189.1: [www.ashrae.org/greenstandard](http://www.ashrae.org/greenstandard)
- (8) IECC: [www.internationalcodes.net](http://www.internationalcodes.net)



## Web Resources

- (9) ICC: [www.iccsafe.org](http://www.iccsafe.org)
- (10) Energy Codes by State: [www.energycodes.gov](http://www.energycodes.gov)
- (11) WA State Energy Code (WSEC):  
<http://sbcc.wa.gov/Page.aspx?nid=14>
- (12) OR State Energy Code:  
[http://www2.iccsafe.org/states/oregon/07\\_Structural/Building07\\_Frameset.htm](http://www2.iccsafe.org/states/oregon/07_Structural/Building07_Frameset.htm)
- (13) US Department of Energy: [www.energy.gov](http://www.energy.gov)



## Web Resources

- (14) Energy Policy Act of 2005:  
[www.epa.gov/oust/fedlaws/publ\\_109-058.pdf](http://www.epa.gov/oust/fedlaws/publ_109-058.pdf)
- (15) Commercial Lighting Tax deduction:  
[www.lightingtaxdeduction.org](http://www.lightingtaxdeduction.org)
- (16) EISA 2007 Legislation:  
[http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=110\\_cong\\_bills&docid=f:h6enr.txt.pdf](http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=110_cong_bills&docid=f:h6enr.txt.pdf)
- (17) ACESA 2009 (only a bill):  
[http://frwebgate.access.gpo.gov/cgi-in/getdoc.cgi?dbname=111\\_cong\\_bills&docid=f:h2454ih.txt.pdf](http://frwebgate.access.gpo.gov/cgi-in/getdoc.cgi?dbname=111_cong_bills&docid=f:h2454ih.txt.pdf)



## Web Resources

- (18) Lighting Facts Label: [www.lightingfacts.com](http://www.lightingfacts.com)
- (19) Federal Trade Commission: [www.ftc.gov](http://www.ftc.gov)
- (20) Energy Star (LED integral lamp standards):  
[http://www.energystar.gov/ia/partners/manuf\\_res/downloads/IntegralLampsFINAL.pdf](http://www.energystar.gov/ia/partners/manuf_res/downloads/IntegralLampsFINAL.pdf)



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