



• **We're baaack!**

After several months of exile due to structural repairs to our building, the LDL is back downstairs. We have expanded our teaching resources, and we welcome everyone to tour our new space and use our services to solve your lighting problems.

• The Lighting Design Lab has long worked to present efficient lighting as part of an integrated design approach. Our remodel aimed to model a

high performance workplace utilizing the latest theories of worker productivity and application of sustainable design and materials.

The remodel addresses our need for a larger teaching space; puts people into the daylighted spaces; and moves the teaching displays into the non-daylighted areas. Views are provided in each workspace. Sustainable carpeting, marmoleum™ floors, and low VOC paints were used. The new kitchen and restroom have water conserving fixtures. Higher, open ceilings and fewer walls create a whole new open look and feel for the LDL.

• **Sustainability Lectures at the LDL**

As part of the sustainability initiative, we present a new series of talks on 'green' issues. The series kicks off in September with a workshop on "Air Quality: Bringing Biodiesel to the Job Site". See the calendar of events inside for more sustainability events.

• **Collaborating with the Puget Sound Section of the Illuminating Engineering Society of North America**

Puget Sound lighting professionals have a chance to engage one of the leading lights in the industry — David DiLaura — in an evening of provocative talk, ideas and discourse. Join with the new editor of the Journal of the IESNA in reviewing both the history and future of lighting as we know it. Registration details on page 5.

• **New applications classes for Fall**

Having completed our biannual fundamentals series of classes, we begin our more advanced class series. This fall we begin by looking at two popular topics — lighting big spaces and outdoor lighting. These two new classes address areas that generate lots of questions from around the region.

• **LEED™ Lighting Credits, Gymnasiums, and the Advanced Energy Guide**

This issue of the newsletter brings articles from all 3 of our lighting specialists. Eric Strandberg LC takes a look at using fluorescent lighting in gymnasiums. Shaun Darragh LC reviews the credits available for lighting in the LEED™ program. Michael Lane LC presents exciting news of a hands-on guide to designing small office buildings to be 30% more efficient than mandated by energy codes.



LDL returns.

Above: The Lighting Design Lab celebrates the return to normalcy at the "Reopen House". From left: Shaun Darragh LC, Eric Strandberg LC, Elizabeth Ellisor, Nacho Bravo, Michael Lane LC, Diana Grant, Adam Griffen, Randy Smith

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News

# leed™ lighting credits.

by Shaun Darragh LC



## Pierce County, Washington Environmental Services Building

Located in Tacoma, this project was chosen as an AIA Top Ten Green Project for 2004. Designed by Miller|Hull Partnership, Seattle, Washington. This project received extensive daylight modeling services by the BetterBricks Daylighting Lab in Seattle, Washington.

## LEED™ Resources

Leadership in Energy & Environmental Design (LEED™) is a program of the United States Green Building Council (USGBC). The council is the nation's foremost collection of leaders from across the building industry working to promote buildings that are environmentally responsible, profitable and healthy places to live and work.

USGBC Home Page  
[www.usgbc.org](http://www.usgbc.org)

Cascadia Chapter Home Page  
(Pacific Northwest Region)  
[www.usgbc.org/Chapters/cascadia](http://www.usgbc.org/Chapters/cascadia)

This coming November 10 - 12, 2004, the USGBC annual conference, GreenBuild comes to the Northwest. The Portland, Oregon Convention Center hosts the international conference and expo.

For details visit  
[www.greenbuildexpo.org](http://www.greenbuildexpo.org)

Case Studies of LEED™ Buildings in the Cascadia Region  
[www.usgbc.org/chapters/cascadia/resources.asp](http://www.usgbc.org/chapters/cascadia/resources.asp)

In recent years, the US Green Building Council has established the LEED™ (Leadership in Energy & Environmental Design) program as a primary driving force behind the Green Building Movement. Lighting can be instrumental in achieving at least 8 and as many as 22 points within the framework of the system. The system is broken down into several sections. Let's take a look at the lighting component of LEED on a section by section basis.

### Section SS: Sustainable Sites

- Credit 8: Light Pollution Reduction; 1 Point  
The intent is to minimize stray light from leaving the property.

### Section EA: Energy & Atmosphere

- Prerequisite 1: Fundamental Building Systems Commissioning; Required  
Prerequisite 2: Minimum Energy Performance; Required  
All buildings being submitted for LEED™ certification must meet either local energy code requirements or the provisions of ASHRAE/IESNA 90.1-1999, whichever is more stringent.

- Credit 1: Optimize Energy Performance; 1-10 points

Surpassing the energy requirements of ASHRAE/IESNA 90.1-1999 by 15%-60% will result in the granting of 1-10 additional points. Remember that this energy credit is based on the whole building energy use, not just the lighting. That said, reductions in lighting energy can have profound impacts on building energy usage and may result in associated HVAC load reductions. Note that meeting the Seattle Energy Code should automatically result in 1 point for this credit.

- Credit 3: Additional Commissioning; 1 Pt  
Verify and ensure that fundamental building elements are designed, installed, and calibrated to operate as intended.

- Credit 5: Measurement & Verification; 1 Pt  
Provide for the ongoing accountability and optimization of building energy and water consumption performance over time.

### Section MR: Materials & Resources

- Credit 5.1: Regional Materials: 20% Manufactured Regionally; 1 Point  
Lighting has a minor role in this credit, but may prove helpful in some circumstances. Specify equipment that is manufactured within a 500 mile radius from the job site.

### Section EQ: Indoor Environmental Quality

- Credit 6.1: Controllability of Systems: Perimeter Spaces; 1 Point

- Credit 6.2: Controllability of Systems: Non-Perimeter Spaces; 1 Point  
Both 6.1 and 6.2 require providing a high level of control to individual building occupants.

- Credit 8.1: Daylight and Views; Views for 90% of Spaces; 1 Point

Provide for the building occupants a connection between indoor spaces and the outdoors through the introduction of daylight and views into the regularly occupied areas of the building.

Research shows us that people are happier, healthier, and more productive when they have good access to natural daylight and view corridors. For this credit, 75% of all critical visual task occupied space must achieve a Daylight Factor of 2%.

- Credit 8.2: Daylight and Views; Daylight 75% of Spaces; 1 Point

Provide for the building occupants a connection between indoor spaces and the outdoors through the introduction of daylight and views into the regularly occupied areas of the building.

For this credit, occupants in 90% of all regularly occupied spaces must have a direct line of sight to vision glazing.

### Section ID: Innovation & Design Process

- Credit 1: Innovation in Design; 1-4 Points  
Develop some interesting new design approach that advances the state of the art and this credit may be yours.

An expanded version of this article is available in the articles section of the on-line newsletter in printer-friendly Adobe Acrobat PDF format. The expanded article has more information about each LEED™ sections and credits, including additional resources.

## errata

**Refining the Window; LDL NEWS, Spring Summer 2004.** A statement made about the "Daylight Window" versus the "View Window," the Solar Heat Gain Coefficient for the daylight window should have read: "not greater than 38%" rather than 25%. We regret the error. Thanks to Bill Coady at TRACO Architectural Systems for the clarification.

# gymnasium lighting.

by Eric Strandberg L C



Left: The gymnasiums at the new University of Montana Rec Center integrate daylight and fluorescent lighting into an efficient and visually effective space.

With all the new school construction going on in the region, the Lab has been asked to comment frequently on lighting for gymnasiums. Good lighting for gymnasiums would seem to be a simple task but as we try to design systems that are energy efficient, versatile, and provide high quality light, it can become complicated. Additionally, with the new light sources and fixture types, the old tools and rules of thumb become less viable.

The first type of lighting that should be considered for every new project is daylight. Gymnasiums generally are large volume, high ceiling, and single story, making them excellent candidates for skylights. Additionally, their hours of operation coincide nicely with availability of daylight. However, there will be times when electric lighting will be needed to either supplement low levels of daylight or for night time activities. This article will address those concerns.

For the past few decades the standard practice has been to use Metal Halide "High Bay" type fixtures. When this kind of lighting first became available it was a marked, if idiosyncratic, improvement to the old generation of fluorescent, incandescent, and mercury vapor lights that were used until then. On the positive side, standard Metal Halide (MH) has a number of good properties. It has high lumens per watt, (efficacy), and fairly long life, both of which are of importance to building operators. Also, because gymnasiums are tall spaces, a degree of optical control is desired to distribute the light properly. Because Metal Halide is a point source it is well suited for this task and can lead to lighting layouts that use fewer fixtures than with older technologies. However, standard MH does have some properties that are less than favorable, and I will list them below, (the new Ceramic Metal Halide CMH lamps solve some of these problems).

## Metal Halide Issues:

- **Strike time**
- **Restrike**
- **Color shift**
- **Lamp lumen depreciation**
- **Poor color rendering**
- **Harsh shadows**

The advantages of fluorescent systems are many and can be categorized as follows:

- **High lumens per watt (in the 90 range)**
- **Excellent lumen maintenance**
- **Excellent Color Rendering**
- **Instant strike and no "restrike".**
- **Softer shadows**

Given these properties, why is MH still the standard practice light source used in athletic facilities today? I think it is a lack of awareness of the new fluorescent products available and the benefits of using them. This article is an effort to demonstrate the differences and advantages of fluorescent lighting in these applications. I will model a typical gymnasium space with a variety of lighting strategies and compare the results.

In the following example, I have used a typical lighting layout for a 75' X 100' single court gym area w/ a fixture height of 26'. The reflectances are 70% for the ceiling, 60% for the walls, and 30% for the floor. Not only will we look at power consumption and light level but also uniformity, expressed as Max to Min ratio. Uniformity describes how evenly the space is lit and for this type of space having evenly distributed light is important not only for the field of play but for the surrounding visual field.

Fixture types used in this example:

A. (Baseline) 15 standard 400W metal halide high-bay w/ glass reflector

B. 63 -2 lamp 32W T8, 4' industrial w/ specular reflector and 10% uplight (3 rows)

C. 15-4 lamp 54W T5HO 2'x 4' high-bay w/ specular reflector

E. 14-8 lamp 40W Biax Wrap style w/ Prismatic lens

While no one system is perfect, I think it is clear from these examples that the fluorescent systems have lower power, good uniformity while maintaining more than adequate light levels. The extended version of this article on our website has additional examples for comparison.



A. Metal Halide (400W)



B. Fluorescent T-8 (32W)



C. Fluorescent T-5HO (54W)



E. Fluorescent Biax (40W)

Fixture Type	Average	Maximum	Max/Min	W/Ft <sup>2</sup>
(A) 400watt MH X 15	28.8	37.9	4.2	.9
(B) 32watt 2 lamp T8 X 63	28.5	40.5	4.2	.5
(C) 54watt 4 lamp T5 X 15	28.5	35.8	3.1	.5
(D) 42watt 8 lamp CFL X 15	27.1	34.2	3.0	.6
(E) 40watt 8 lamp Biax X 14	27.7	38.9	4.5	.6
(F) 32watt 6 lamp T8 X 15	25.0	33.6	4.2	.5

# fall 2004 events.

Registration on Page 6

## did you know?

Members of professional design organizations (AIA, NCQLP/LC, ALA, BOC, and others) may be able to receive continuing education credits for attending events offered by the LDL.

To self-certify your credits (sometimes called learning units) make sure you keep the Certificate of Completion that we distribute at each event.

Learning unit credits are almost always issued at a rate equal to the contact hours. So a 3 hour class would be worth 3 credits.

For information about how your organization works with continuing education credits visit their website at:

### AIA

[aia.org](http://aia.org)

### ALA

[americanlightingassoc.com](http://americanlightingassoc.com)

### ASID

[asid.org](http://asid.org)

### BOC

[nec.net/boc.htm](http://nec.net/boc.htm)

### BOMA

[boma.org](http://boma.org)

### IFMA

[ifma.org](http://ifma.org)

### IIDA

[iida.com](http://iida.com)

### NCQLP

[ncqlp.org](http://ncqlp.org)



BETTERBRICKS

All Registration **must be in advance**. All fees must be **paid in advance**. No registrations or fees will be accepted at the door. On-line registration is available at <http://www.lightingdesignlab.com/classes>

## 1 • Lighting for Big Spaces: Industrial/Warehouse/Retail/Recreational. \$30

Eugene:	Tuesday, Sept 14	• 2:30pm - 5:00pm
Portland:	Wednesday, Sept 15	• 2:30pm - 5:00pm
Billings:	Monday, Sept 20	• 1:00pm - 3:30pm
Boise:	Wednesday, Sept 22	• 2:30pm - 5:00pm
Missoula:	Thursday, Sept 23	• 1:00pm - 3:30pm
Seattle:	Wednesday, Sept 29	• 2:30pm - 5:00pm
Spokane:	Thursday, Oct 28	• 2:30pm - 5:00pm

In recent years the trend in lighting large, high ceiling spaces has shown a marked trend away from HID high-bay style lighting in favor of a variety of fluorescent strategies. This class will address current options for lighting various types of large spaces including Industrial Facilities, Big Box Retail, and Recreation Spaces like gymnasias. We will examine the pros and cons of a variety of lighting and controls strategies focusing on maximizing visual comfort and performance while minimizing energy use and cost.  
(2.5 CEU contact hours)



## 2 • Effective Outdoor Lighting. \$30

Boise:	Wednesday, Oct 20	• 2:30pm - 5:00pm
Seattle:	Wednesday, Oct 27	• 2:30pm - 5:00pm
Eugene:	Monday, Nov 8	• 2:30pm - 5:00pm
Portland:	Tuesday, Nov 9	• 2:30pm - 5:00pm
Billings:	Monday, Nov 15	• 1:00pm - 3:30pm
Missoula:	Thursday, Nov 18	• 1:00pm - 3:30pm
Spokane:	Thursday, Dec 2	• 2:30pm - 5:00pm

Exterior lighting not only provides for safety and security of persons and property, quality exterior lighting also creates a dynamic nighttime environment while minimizing both light trespass and light pollution. What does it take to light parking, walkways, entrances, canopies, outdoor sales & facades aesthetically and functionally? What can you do to minimize light pollution and light trespass to be a good neighbor? How does LEED™ Site Credit 8 address exterior lighting? Can you do all this and meet the 2004 ASHRAE/IESNA 90.1 Standards new exterior lighting section? This class will provide you with an understanding of issues and concepts for quality exterior lighting.  
(2.5 CEU contact hours)



## • project design reviews. no cost.

The lighting specialist is available to provide schematic design review of proposed lighting strategies on your commercial and industrial lighting projects. Please contact the specialist for your territory to directly set up an appointment in your office.

= basic    = intermediate    = expert

### 3, 4 & 5 • Sustainability Lectures. no charge.

As part of a promoting a more integrated design approach, the LDL will be hosting a series of on sustainable design.

3. Seattle: Wednesday, Sept 22 • 8:00am - 11:30am  
Air Quality: Bringing Biodiesel to the Job Site Workshop

An interactive workshop for developers, architects and contractors on incorporating biodiesel into the construction industry. The workshop will provide education on the benefits and use of biodiesel, present success stories from contractors and fleets who are using biodiesel, and from developers who have incorporated biodiesel into the bid process, and provide a nuts and bolts discussion of where to get biodiesel and job site logistics.



4. Seattle: Tuesday, Oct 12 • 10:30am - 11:30am  
Tony Gale, former City of Seattle Architect  
Renewables 2005 in Seattle

A major sea change is underway on our planet. Never before had a civilization as much technical knowledge so rapidly. As we begin to understand the implications and requirements of this "new age", we must seek enduring solutions that are technically and socially balanced. Moving beyond short-lived architectural styles and engineering bravado is simply good business.

5. Seattle: Monday, October 25 • 8:00am - 4:00pm  
Building Design for Disassembly Workshop

### • An Evening with David DiLaura. Puget Sound IESNA Section Meeting. \$40 IESNA Members / \$45 Non-Members

Seattle: Thursday, Sept 16 • 5:45pm - 9:00pm  
Please RSVP via e-mail to Andrew Pultorak of Seattle Lighting at [andrew@seattlelighting.com](mailto:andrew@seattlelighting.com)

The Puget Sound Section of the Illuminating Engineering Society is pleased to present an evening of enlightenment with one of the foremost lighting educators in the United States. David DiLaura is a professor in the College of Civil, Environmental and Architectural Engineering at the University of Colorado in Boulder. His list of accomplishments in the engineering sciences is extensive. His wit, humor and deep insights into the world of lighting will fascinate you. His dynamic way of presenting a topic awakens and incites the listener into wanting to learn more. David's presentations at LightFair are always a packed house event and space is limited so make sure you register early for this event. This will be an evening event at the beautiful World Trade Center with appetizers, a cash bar, a beautiful view and time to relax/network with fellow members of the design and construction industry before David's presentation.



### 6 • Architecture in the Best Light: an integrated approach to using daylight and electric light in the built environment. no charge.

Seattle: Wednesday, October 13 • 12:00pm - 1:00pm

In recent years we have seen a long overdue renaissance in the use of daylight as a primary light source in architecture. While this is a step in the right direction, introducing high quality daylight into the built environment is only half of the equation. In order to most effectively light our built environment, we need to fully integrate electric lighting systems with daylight design. This requires very deliberate design intent and meticulous control choices. This class will offer current design strategies intended to insure that your architectural conception will be seen in the best light possible.

(1 CEU contact hours per session)



### 7 • LDL Open House. no charge.

Seattle: Wednesday, December 8 • 9:00am - 3:00pm

Join us in our yearly celebration of lighting in our region. We kick off the day with our New Products Trade Show at 10AM, where the best new lighting products are on display, and local manufacturer representatives will answer all of your questions. Our keynote speaker (to be announced) will talk from 11 - Noon. The buffet lunch from 12 - 1 will give you a chance to catch up with old friends and discuss the stimulating topic addressed by the keynote speaker, and revisit the trade show. Our What's New in Lighting seminar will be held from 1 - 2. The trade show ends at 3.



### Idl class locations:

Billings:	Prudential Floberg Realtors 1550 Poly Drive Billings MT	Missoula:	Univ. of Montana Continuing Education Todd Building Room 203 Missoula MT	Seattle:	Lighting Design Lab 400 E Pine St Suite 100 Seattle WA
Boise:	Idaho Power 1221 W Idaho St Boise ID	Portland:	Univ. of Oregon Portland Center Portland Room #102 722 SW 2nd Ave Portland, OR	Spokane:	WSU Spokane Phase I Classroom Bldg 668 N Riverpoint Blvd Spokane WA
Eugene:	EWEB Community Room 500 E 4th Ave Eugene OR				

# registration form.

Fall 2004 Classes

**PAYMENT POLICY: Fees Must Be Paid In Advance before attending class.** Purchase Orders, checks, and credit cards are accepted. Complete and fax this form to 206-329-9532. Class fees are waived for university students and employees of sponsoring electric Utilities. **No Payment or Registration Will Be Accepted At The Door.**

**Secure On-line registration is available at <http://www.lightingdesignlab.com/classes>**

registration fee paid by. (circle one)

credit card • enclosed check • purchase order • Utility employee fee waiver • university student fee waiver

## registration information.

Name • \_\_\_\_\_

Company • \_\_\_\_\_

Profession • \_\_\_\_\_

I Pay My Electric Bill To • \_\_\_\_\_

## billing information. (must be complete to process card transactions)

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City, State, Zip • \_\_\_\_\_

**Credit Card Number (VISA & MasterCard ONLY)** • Please include your CVV Code - last 3 digits of the number on the back of your card near your signature

Expiration Date • \_\_\_\_\_

please check the circles of the class(es) and event(s) you wish to attend (on-line registration available).  
event locations on page 5.

### 1 • High-Bay Fluorescent. \$30

- Eugene: Tues 9/14 • 2:30pm - 5:00pm
- Portland: Wed 9/15 • 2:30pm - 5:00pm
- Billings: Mon 9/20 • 1:00pm - 3:30pm
- Missoula: Thurs 9/23 • 1:00pm - 3:30pm
- Boise: Wed 9/22 • 2:30pm - 5:00pm
- Seattle: Wed 9/29 • 2:30pm - 5:00pm
- Spokane: Thurs 10/28 • 2:30pm - 5:00pm

### 2 • Effective Outdoor Lighting. \$30

- Boise: Wed 10/20 • 2:30pm - 5:00pm
- Seattle: Wed 10/27 • 2:30pm - 5:00pm
- Eugene: Mon 11/8 • 2:30pm - 5:00pm
- Portland: Tues 11/9 • 2:30pm - 5:00pm
- Billings: Mon 11/15 • 1:00pm - 3:30pm
- Missoula: Thurs 11/18 • 1:00pm - 3:30pm
- Spokane: Thurs 12/2 • 2:30pm - 5:00pm

### 3, 4 & 5 • Sustainability Talks. no charge.

- 3) Bringing Biodiesel to the Job Site  
 Seattle (3): Tues 9/22 • 7:30am - 11:30am
- 4) Renewables 2005 in Seattle  
 Seattle (4): Tues 10/12 • 10:30am - 11:30am
- 5) Building for Disassembly Workshop  
 Seattle (5): Mon 10/25 • 8:00am - 4:00pm

### 6 • Architecture in the Best Light. no charge.

- Seattle: Wed 10/13 • 12:00am - 1:00pm

### 7 • LDL Open House. no charge.

- Seattle: Wed 12/8 • 9:00am - 3:00pm

You can register instantly and securely on-line. Payment is accepted by credit card, check and purchase order.  
[www.lightingdesignlab.com/classes](http://www.lightingdesignlab.com/classes)

# advanced energy design guide.

by Michael Lane L C

A joint committee of the AIA / IESNA / ASHRAE / US DOE / New Buildings Institute has produced a user-friendly guide to high-efficiency design of small office buildings (<20,000 ft<sup>2</sup>). The *Advanced Energy Design Guide for Small Offices* demonstrates how to design new office buildings that are at least 30% more efficient than allowed by ASHRAE Standard 90.1-1999. This type of building is one of the most commonly found structures in the country, and was therefore targeted for this first design guide.

Published by ASHRAE and the American Institute of Architects, the AEDG provides a hands-on manual for increasing the efficiency of each segment of a building's energy use. The areas addressed include: building envelope; interior lighting (and daylighting); HVAC equipment and systems; service water heating; exterior façade and parking lot lighting; and plug loads.

The main goals for producing the AEDG were clarity, concise, clear and simple use of language. Care was taken to keep it from being filled with detailed technical jargon. The AEDG covers: setting energy goals and strategies for your climate zone; "how-to's" for implementation; and quality assurance practices. The lighting and daylighting section provides details on both electric lighting technology and details on vertical windows and skylights.

The AEDG provides conceptual assistance to understand where the greatest savings potential lies for your type of building in your climate zone. The guide helps identify what member of the design team would be responsible for the design improvements. The AEDG also helps designate where in the design process each efficiency improvement would best take place.

The Advanced Energy Design Guide for Small Offices is intended to be a concise — around 50 pages — cookbook for creating recipes for more energy efficient and comfortable buildings. While not intended to replace or supersede other programs, such as LEED™, it can play a role in lowering the energy consumption by those programs. In areas of the country that still have Utility incentives for energy efficiency, a 30% reduction below ASHRAE 90.1 would be an excellent way to approach qualifying a new building.

Information on ordering copies of the new guide is not yet available at press time. Check back on our home page for links and details when they become available.

*(Editor's note: Michael Lane, LDL's senior lighting specialist, is on the ASHRAE 90.1 lighting subcommittee and served on the AEDG group to develop the lighting section of the new guide.)*

## enhanced vision T12—T8.

by Diana Grant

I would like to make the case that improving the lighting in our work environments is like getting new eyeglasses.

A recent document identifies tremendous potential for improving the quality of lighting throughout the Northwest. The report is the ASSESSMENT OF THE COMMERCIAL BUILDING STOCK IN THE PACIFIC NORTHWEST (March 2004, Kema-Xenergy) funded by the Northwest Energy Efficiency Alliance (our sponsors). They surveyed different commercial building types, such as groceries, hospitals, schools and offices. Remarkably, they found that a third (31%) of these buildings are still using T12 lamps and magnetic ballasts.

How would it look to have a grey-green or grey-yellow filter over your glasses? That is what happens to color perception with the old T12 lamps. They also flicker and buzz because of the magnetic ballast fre-

quency. Some people are sensitive to this flicker and can get headaches and eye fatigue when working under these lights.

How much would you pay for less eye fatigue, fewer headaches and enhanced color vision—does \$20.00 seem like a deal? The typical cost for changing 2-T12 lamps with magnetic ballast to 2-T8 lamps and electronic ballast is about \$20 for materials.

The T8 lighting system produces better color rendering and no flicker because it operates at a much higher speed using electronics. This results in fewer headaches and eye fatigue and no buzz.

This simple strategy produces the same amount of light as T12's but uses 30% less energy. For over a decade, many regional utilities have paid customers a portion of the cost to install T8 lamps with electronic ballasts. The utilities get the energy savings and the customers get lower operating costs and

improved lighting quality for the employees and customers.

Check out your lighting and call your local utility to see if they have a retrofit program that will pay you to go to T8 lamps with electronic ballasts. Even if they don't, for working environments where we are dealing with people (skin tones) or retail sales of products where color vision is important, \$20 per fixture is a small price to pay for the benefits received. Hopefully, by the next Regional Conservation Assessment report, the percentage of T12 lamps in our region will be zero.

The Lighting Design Lab website has links to many regional utilities for program information. Also, Please, recycle your old lamps! Our website also has resources to do that, too.



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BetterBricks is a nonprofit initiative of the Northwest Energy Efficiency Alliance. Our free service connects commercial building professionals with the information, tools, training and consultation needed to design and construct high performance buildings. To learn more about our services, call 1.888.216.5357 or visit our website at BetterBricks.com.

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