



Throughout our region, electric utilities and businesses are worried about the supply and price of energy. Sometimes it seems like quality solutions are hard to come by. Untrue! The Lighting Design Lab and our sponsors have been demonstrating quality energy saving solutions for lighting and daylighting for a dozen years. We

responding to  
the energy crisis  
— without panic.



Northwest Industries Retrofit.  
Daylighting & Electric Light •  
*photography, Barbara Erwine*

This glass manufacturer added skylights and switched to metal halide lamps for a dramatic improvement in visual clarity and productivity.

frequently provide solutions that save over 25% of the lighting energy in existing businesses. How?

• **Get the right light**

Check your spaces to see how much light you have and how many lamps are in your luminaires. Older light fixtures using 4 bulbs may not be providing more light than a modern 2 or 3 lamp system. Look at how much daylight is coming through your windows — some daylight offices may need only a task light. Delamping or relamping may be the first step to getting the right light. See the article on page 2 for assistance on delamping.

• **Don't use it when you don't need it**

The most efficient light is the one that is off when it is not needed. Automated lighting controls help ease the hassle of shedding load in your building — often more than 15% savings through occupancy and daylight controls. Some occupancy controls also sense daylight. See the article on page 3 for details of the effect of switching on lamp life.

• **Make daylight your partner**

Daylight — the diffuse light of the sky, not direct sunlight — is a powerful ally in the battle for energy savings. It is delivered free to your doorstep, it makes workers and students more productive, and helps retailers improve sales. Today's design techniques and controls can help you tame the sun and make it your energy ally.

None of this is news. Over the past decade, the LDL has highlighted businesses like Northwest Industries and the Northwest Federal Credit Union. These companies combined daylight and electric lighting to make their buildings more efficient *and* more productive.

We have completely revamped our class series, with a new, comprehensive curriculum and reference textbook. The new series is based on the 2001 Revision of the *Advanced Lighting Guidelines*. See the article about our new curriculum on page 7. Details of our exciting new fall class series is inside this newsletter, as well as always being online at [www.lightingdesignlab.com](http://www.lightingdesignlab.com).

News

in this issue.

- 1 ... Lighting Retrofits
- 2 ... Delamping Properly
- 3 ... Turning off Lights
- 4 & 5... Events
- 6 ... Registration
- 7 ... New LDL curriculum
- 8 ... Contact List

## delamping properly.

by Michael Lane L C



### new retrofits.

Lighting manufacturers are responding to the energy crisis on the West Coast with new lamps and ballasts for greater energy savings. Here are a couple of new systems.

#### GE Lighting

T8 Watt-Miser Ultra — a 30W T8 lamp with full light output and 80+CRI

#### Osram / Sylvania

“Extreme Lighting System” — a 2-lamp 49W lamp/ballast system producing ‘normal’ light output, and a 30,000 hour lamp life rating

In these days of energy capacity shortage on the West Coast, many businesses are looking for ways to quickly and inexpensively shed electric load. One of the most popular solutions is to take out some of the existing fluorescent light bulbs (properly called lamps). This technique is called “delamping”. Delamping of fluorescent luminaires is a possible energy saving solution. There are **2 main questions** to ask before delamping any fluorescent luminaire.

#### • What will happen to my light level and will this new light level be adequate for the task?

The simple answer is that the IESNA (Illuminating Engineering Society of North America) has developed recommended light levels for most lighting tasks. If the delamping does not reduce the light level below these recommended light levels then it is a good idea to delamp.

If the delamping does reduce the light level below recommended levels then productive and worker safety can be compromised. As a rule of thumb for office and schools: Do not delamp the luminaire if in doing so will reduce the number of lamps to fewer than two 4-foot lamps for every 64 square feet.

The following is a rough guide and actual light levels will vary depending on reflectance values, partition heights and locations, age of lamps.

If upon examination there are 3-lamps lighting 64 square feet then one lamp could be removed without reducing light levels below IESNA recommendations.

If upon examination there are 4-lamps lighting 64 square feet then two lamps could be removed without reducing light levels below IESNA recommendations. Remember, this is a rule of thumb and field conditions (reflectance, room size, dirt) need to be considered.

#### • Does it make a difference what kind of ballast I have now?

There are series and parallel wired ballasts. Most magnetic ballasts are series wired. It is about 50/50, series to parallel when using electronic ballasts.

With series wired ballasts, when one lamp is removed from the ballast the other lamp will not light properly and will fail if left running. The non-removed lamp will probably not light or will flicker or produce very little light. So, in a series wired ballast we need to remove all of the lamps from the ballast. The ballast will continue to use energy, 3 to 6 watts for magnetic and 0 to 10 watts for electronic. I have heard conflicting reports on delamping series wired electronic ballasts, that this may cause the ballast to fail if left for a prolonged period. I therefore recommend that the power to the ballast be terminated. Magnetic ballasts are very bullet proof and will not fail if left energized, however they will still use some energy.

Parallel wired ballasts can be delamped without too many problems and are often rated by the manufacturer to run one less lamp than the label rating (be sure to check with the manufacturer if the ballast is rated to run fewer lamps than the label states). If you check the ballast list (on our website) you will notice some 2-lamp ballasts running 1-lamp, 3-lamp ballasts running 2-lamps, and 4-lamp ballasts running 3-lamps, that are rated by the manufacturer to operate properly delamped.

# Switching for Savings!

## controlling light.

by R a n d a l S m i t h



Above: The Ergolight from Ledalite fully integrates switching, dimming, and daylight integration in a single luminaire. Photo courtesy Ledalite.

### Should I Turn Off Fluorescent Lighting When Leaving A Room?

**Short Answer:** Turn them off if you will be gone for more than about 15-20 minutes (for details keep reading). There are a few misconceptions about fluorescent lighting that keep too many people from turning lights off to save energy. Like many of our myths about energy, there is a small amount of truth in the beliefs.

**Misconception #1:** It takes more energy to start a fluorescent that it does to run it, so leave the lights on all the time to save money on your electric bill.

**Reality:** When you turn on a fluorescent light bulb (correctly called a "lamp"), there is a very brief jump in current when the ballast charges the cathodes and causes the lamp to start. This inrush of current can be many times greater than the normal operating current of the lamp. However, the spike of current draw normally lasts no longer than 1/10th of a second, and draws the equivalent of about 5 seconds of normal operation. So, if you turn your fluorescent lamp off and on more frequently than every 5 seconds, you *will* use more power

than normal. So, normal switching of fluorescent lamps has very, very, very little effect on a power bill.

**Misconception #2:** Turning fluorescent lamps off and on wears them out right away.

**Reality:** Electric lights have a published rating for expected life. The rating is in the thousands of hours for fluorescents. Fluorescent lights have a life rating based on how many hours they are left on every time they are turned on. This is usually referred to as "burn time", and for fluorescent lights the burn time is three hours. Every time a fluorescent light is turned on, a tiny amount of the coating on the electrodes is burned off. Eventually, enough coating is burned off, and the lamp fails to start. Most full-size fluorescent lamps are rated to last 20,000 hours when left on for 3 hours every time they are turned on. This means that the lamp has roughly 6,667 starts available to use up. ( $20,000/3 = 6,667$ )

**Longer burns extend lamp life.** If you "burn" your fluorescent lamps shorter than 3 hours per start, you use up your potential starts faster. If you "burn" them longer than 3 hours per start, you use up your starts more slowly. However, you are paying energy costs for the operating time of the lamps, and the most efficient lamp is the one that is not on when it is not needed.

**But longer burns use more en-**

**ergy.** Operating a light when it is not needed is simply spending money for no purpose. Today's rapidly rising electric rates mandate that every building becomes leaner with energy use to control costs.

### Find the trade off point.

There is a point where the amount of money you save from turning off the light exceeds the cost of reducing lamp life by more frequent starts. If you use the formula in **Table 1** at \$0.05 KWh, you come up with a time of about 15 to 20 minutes for that point. As energy rates go higher, that time becomes shorter. If you pay less than a nickel per kilowatt hour, your turning-off point would be longer.

### Ballast types are important.

The kind of ballast you use may make a difference if you turn your fluorescent lights off frequently. There are three different kinds of electronic ballasts: instant start; rapid start; and programmed start. Which one you use can influence your choice of how frequently to switch off your fluorescent lights.

(See article page 7 about ballast types.)

**Table 1: The "Official Formula" to calculate how often to switch lamps off and on**  
From "Economics of Switching Fluorescent Lamps" IEEE Transactions on Industry Applications Vol 24, No 3, May/June 1988

Actual Lamp Life =  
Rated Lamp Life x f(u) where, f(u) =  
 $1.71 (1 - \exp[-(u/3.89)^{0.505}])$  u =  
burning cycle, hours of operation per start

## 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 2 hour class would be worth 2 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)



# fall 2001 events.

Registration Form  
on Page 6

**All Registration MUST BE IN ADVANCE. All fees MUST BE PAID IN ADVANCE. No registrations or fees will be accepted at the door. Also, please read article on page 7 about our new lighting curriculum.**

## 1 • lighting & human performance. by Joel Loveland



Spokane: monday 9/17 • 4:00pm - 6:00pm • \$20  
Bozeman: tuesday 9/18 • 4:00pm - 6:00pm • \$20  
Portland: tuesday 9/25 • 4:00pm - 6:00pm • \$20  
Eugene: wednesday 9/26 • 4:00pm - 6:00pm • \$20  
Boise: wednesday 10/3 • 4:00pm - 6:00pm • \$20  
Seattle: tuesday 10/9 • 4:00pm - 6:00pm • \$20

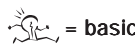
This first installment of our curriculum examines what light does to us — how we see, experience our environment, and use light energy for health. The class covers how our brain uses color and contrast to interpret the world around us. Night vision will be addressed, and how low-light seeing differs from daytime seeing. Nonvisual effects of light are addressed, from Vitamin D production to circadian rhythms. There will be an extensive review of historic and recent research into the effect of lighting on learning, productivity and even retail sales. Current research into the impact of daylight on human behavior will be covered. Students will leave with an understanding of how radiant energy is important to the intellectual, emotional, physical, and aesthetic functioning of the human animal.

## 2 • energy impacts & policies. by Michael Lane

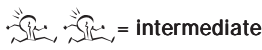


Spokane: wednesday 10/10 • 4:00pm - 6:00pm • \$20  
Bozeman: thursday 10/11 • 4:00pm - 6:00pm • \$20  
Portland: tuesday 10/16 • 4:00pm - 6:00pm • \$20  
Eugene: wednesday 10/17 • 4:00pm - 6:00pm • \$20  
Boise: wednesday 10/24 • 4:00pm - 6:00pm • \$20  
Seattle: tuesday 10/30 • 4:00pm - 6:00pm • \$20

Energy is the lifeblood of our environment, and this class examines how the energy used by lighting determines the success or failure of our buildings. The class will explore how lighting influences operating costs, worker comfort and performance, and the business bottom line. Using energy impacts the environment through power generation, waste disposal, and visual pollution. Energy can dictate the very design of a building through energy and building codes, construction methods, and design practices. Students will leave with an understanding of the role of lighting energy in various building types, how lighting impacts the environment, and impacts of codes and standards on the design and operation of buildings.



= basic



= intermediate



= expert

### 3 • lighting design considerations. by Eric Strandberg



Spokane: tuesday 10/30 • 4:00pm - 6:00pm • \$20  
Bozeman: thursday 11/1 • 4:00pm - 6:00pm • \$20  
Portland: tuesday 11/6 • 4:00pm - 6:00pm • \$20  
Eugene: wednesday 11/7 • 4:00pm - 6:00pm • \$20  
Boise: wednesday 11/14 • 4:00pm - 6:00pm • \$20  
Seattle: tuesday 11/20 • 4:00pm - 6:00pm • \$20

Effective lighting design is half technical expertise and the remainder is the art of the aesthetic. This class covers the process of determining the appropriate illumination levels and color qualities for the visual task that is being performed. Lighting quality is examined for the factors of light distribution, workplace considerations, and the importance of lighting for people. Finally, the class considers the tools used for lighting analysis, daylighting design tools, and the methodology used for economic analysis of lighting systems. The student will leave with an understanding of the process for determining target light levels for an activity, the methods used to select the highest quality type of lighting for an application, and ways to evaluate the performance and economics of a lighting design.

### 4 • 12th annual open house.



Seattle: wednesday 12/5 • 10:00am - 2:00pm • No charge

Come join us in celebrating an even dozen years of success in the Pacific Northwest. This year we kick off the day with our keynote speaker — Carol Jones, LC from the Light Right Consortium. Our ever-popular trade show features the best in new lighting products, and the local manufacturer's representatives will answer all of your questions. Eric Strandberg presents a seminar on "What's New in Lighting" to round out the day. Keep an eye on your mailbox for our postcard announcement with all the final details!

### 5 • daylighting design for schools. by Joel Loveland



Seattle: begins 9/24 — ends 12/7 • 11:00am - 1:00pm • \$50

UW class but open to LDL students. A 20 session seminar on the role of daylighting in the design of schools and the enlightenment of children. Meeting from 11 AM - 1 PM on Mondays and Fridays, Mondays will be hands-on experimentation with daylighting design, Fridays will entail generalized field investigations and discussions of concepts of light and daylight, and their role in school design. (40 hrs / \$50)

### 6 • resources for sustainable design. by Karen Geissinger

sponsored by the Business and Industry Resource Venture, Seattle Chamber of Commerce



Seattle: thursday 10/11 • 4:30pm - 6:00pm • No charge

An exciting presentation on Sustainable Design and Construction. Design and construction professionals will learn about sustainable building, including the costs and benefits of building green, how to green your firm, an overview of green building rating systems, and the local and national legal and market forces encouraging green building. Students will leave with an understanding of the process of making a project more sustainable, and the resources available in the Puget Sound area for making sustainability happen.

#### • regional class locations.

Spokane: Avista Auditorium, 1411 E Mission, Spokane, WA

Bozeman: Montana Power Division Office, Bull Room, 121 E Griffin Drive, Bozeman, MT

Portland: PGE National Earth Advantage Center, Auditorium, 16280 SW Upper Boones Ferry Rd, Portland, OR

Eugene: EWEB Training Center, North Building, 500 E 4th Ave, Eugene, OR

Boise: Idaho Power Cafeteria Conference Room, 3rd Floor, 1221 W Idaho St, Boise, ID

Seattle: Lighting Design Lab, 400 E Pine St, Ste 100, Seattle, WA



# registration form.

Fall 01 Events

## contact LDL.

**Toll-Free**  
800.354.3864

**Fax**  
206.329.9532

**Mail**  
400  
East Pine Street  
#100  
Seattle WA  
98122

**Mail**  
info  
@lightingdesignlab.com

### Payment

If you are paying by check simply enclose payment made out to Lighting Design Lab and mail with this registration form.

If you wish to pay by credit card, you may fax in the registration form.

You may register online using our new secure server, and receive immediate written receipt of your registration and payment.

If you need to use a P.O., you may attend class before we receive the P.O., as long as we receive notice that you are using the P.O. method of payment.

**NEW PAYMENT POLICY: Fees MUST BE PAID IN ADVANCE before attending class.** Purchase Orders, checks, and credit cards are accepted. A credit toward future LDL classes will be issued for unused registration fees.

**NO PAYMENT OR REGISTRATION WILL BE ACCEPTED AT THE DOOR.**

Secure Online registration is available at [www.lightingdesignlab.com/calendar](http://www.lightingdesignlab.com/calendar)

### registration fee paid by. (circle one)

credit card • enclosed check • purchase order • credit from previous LDL event •

### registration information.

Name • \_\_\_\_\_

Company • \_\_\_\_\_

Profession • \_\_\_\_\_

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

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

Phone • \_\_\_\_\_

E-Mail • \_\_\_\_\_

Fax • \_\_\_\_\_

Address • \_\_\_\_\_

City, State, Zip • \_\_\_\_\_

Credit Card (Visa / MC / AMEX) / Number • \_\_\_\_\_

Expiration Date • \_\_\_\_\_

### please check the circles of the class(es) and event(s) you wish to attend.

#### 1 • lighting & human perception.

- Spokane: monday 9/17 • 4:00pm - 6:00pm • \$20
- Bozeman: tuesday 9/18 • 4:00pm - 6:00pm • \$20
- Portland: tuesday 9/25 • 4:00pm - 6:00pm • \$20
- Eugene: wednesday 9/26 • 4:00pm - 6:00pm • \$20
- Boise: wednesday 10/3 • 4:00pm - 6:00pm • \$20
- Seattle: tuesday 10/9 • 4:00pm - 6:00pm • \$20

#### 2 • lighting impacts & policies.

- Spokane: wednesday 10/10 • 4:00pm - 6:00pm • \$20
- Bozeman: thursday 10/11 • 4:00pm - 6:00pm • \$20
- Portland: tuesday 10/16 • 4:00pm - 6:00pm • \$20
- Eugene: wednesday 10/17 • 4:00pm - 6:00pm • \$20
- Boise: wednesday 10/24 • 4:00pm - 6:00pm • \$20
- Seattle: tuesday 10/30 • 4:00pm - 6:00pm • \$20

#### 3 • lighting design considerations.

- Spokane: tuesday 10/30 • 4:00pm - 6:00pm • \$20
- Bozeman: thursday 11/1 • 4:00pm - 6:00pm • \$20
- Portland: tuesday 11/6 • 4:00pm - 6:00pm • \$20
- Eugene: wednesday 11/7 • 4:00pm - 6:00pm • \$20
- Boise: wednesday 11/14 • 4:00pm - 6:00pm • \$20
- Seattle: tuesday 11/20 • 4:00pm - 6:00pm • \$20

#### 4 • open house.

- Seattle: wednesday 12/5 • 10:00am - 2:00pm • Free

#### 5 • daylighting for schools - full quarter.

- Seattle: begins monday 9/24 • 11:00am - 1:00pm • \$50

#### 6 • resources for sustainable design.

- Seattle: thursday 10/11 • 4:30pm - 6:00pm • Free



## electronic ballast types.

Virtually all energy-efficient lamps used today are rapid-start lamps, intended for use with rapid-start ballasts. But electronic ballasts can have different starting characteristics for the purpose of saving more energy.

- **Rapid start ballasts**

- >> preheat the cathodes before striking the arc between the cathodes
- >> use around 62W using 2 T-8 lamps
- >> provide 20,000 hours of lamp life using standard linear lamps

- **Instant start ballasts**

- >> do **not** preheat the cathodes before striking the arc
- >> use around 59W using 2 T-8 lamps
- >> provide 15,000 hours of lamp life using standard linear lamps

- **Program start ballasts**

- >> monitor cathode temperature and strike the arc when optimum
- >> use around 60W using 2 T-8 lamps
- >> provide up to 30,000 hours of lamp life using standard linear lamps
- >> provide end-of-life protection to keep from firing a failed lamp

- **Troubleshooting**

- >> avoid instant start lamps when switching frequently, such as with occupancy sensors
- >> most lamp manufacturers advise against using anything other than program start ballasts with linear T-5 lamps

## utility incentives for retrofits.

If you are planning a project for saving lighting energy in your commercial building, keep in mind that your local utility **may** help you pay for the job. Here is a partial list of contacts for utility programs in the region.

- **Seattle City Light**

206-684-3254  
[www.cityofseattle.net/light/conserve](http://www.cityofseattle.net/light/conserve)

- **Puget Sound Energy**

800-562-1482, option 1  
[www.pse.com](http://www.pse.com)

- **Snohomish PUD**

425-783-8290  
[www.ci.snopud.com](http://www.ci.snopud.com)

- **Tacoma Power**

253-502-8377  
[www.ci.tacoma.wa.us/power](http://www.ci.tacoma.wa.us/power)

- **Portland General Electric**

503-603-1680  
[www.portlandgeneral.com](http://www.portlandgeneral.com)

- **PacifiCorp**

800-842-8458  
[www.pacificorp.com](http://www.pacificorp.com)

- **Avista**

800.227.9187  
[www.avistautilities.com](http://www.avistautilities.com)

- **Idaho Power**

800-488-6151  
[www.idahopower.com](http://www.idahopower.com)

- **BC Hydro**

604-431-9463  
[www.bchydro.bc.ca/powerpartnerships](http://www.bchydro.bc.ca/powerpartnerships)

- **Montana Power**

406-497-3000  
[www.mtpower.com/energy\\_home.htm](http://www.mtpower.com/energy_home.htm)

If your utility is not listed, contact the Energy Ideas Clearinghouse at 1-800-872-3568 or [www.energyideas.org](http://www.energyideas.org).

## new ldl lighting curriculum.

The LDL has changed how we offer our classes. We have standardized our class list, adopted a new reference textbook, and offer a new certificate to those students who complete the class series. In addition, we will offer longer and more advanced workshops that expand on the concepts presented in the class series. Paid registrants receive a CD-ROM with the reference textbook on it.

- **Complete class series**

Lighting & Human Performance  
Energy Impacts & Policies  
Lighting Design Considerations  
Lighting Applications  
Light Sources & Ballast Systems  
Luminaires & Light Distribution  
Lighting Controls  
Audits & Retrofits

- **New reference textbook**

*The Advanced Lighting Guidelines — 2001 Edition*

This excellent update is a comprehensive guide to the technology, practices, and standards of the lighting industry today. This update from the 1993 Edition is a joint effort of the Department of Energy, Electric Power Research Institute, California Energy Commission, and many electric utilities. It is published by the New Buildings Institute, and is available for download on their website — [www.newbuildings.org](http://www.newbuildings.org)

- **Certificate of Completion**

The students who complete the entire class series will receive a certificate of completion. In addition, all of our classes are eligible for continuing education credits by lighting, architectural and design-related professional associations. Students must report directly to their organizations for learning unit credits. For AIA members, our classes qualify for HSW credits.

lighting design lab



400 East Pine Street #100, Seattle WA 98122  
www.lightingdesignlab.com

PRSR STD  
U.S. POSTAGE  
**PAID**  
SEATTLE, WA  
PERMIT #5130

lighting design lab news  
is published by the lighting design lab  
400 E. Pine Street #100 Seattle WA 98122

## to contact us.

General Phones **206.325.9711**  
**800.354.3864**

Fax **206.329.9532**

Project Manager **Diana Grant** - ext 24  
diana@lightingdesignlab.com

Schedule Coordinator **Front Desk** - ext 0  
info@lightingdesignlab.com

Electric Lighting Specialists **Michael Lane** - ext 26  
michael@lightingdesignlab.com

Mockup Coordinator **Eric Strandberg** - ext 28  
eric@lightingdesignlab.com

Daylighting Specialist **Joel Loveland** - ext 32  
joel@lightingdesignlab.com

Librarian, Webmaster & Newsletter Editor **Randy Smith** - ext 29  
randy@lightingdesignlab.com

## our sponsors.

Northwest Energy Efficiency Alliance  
Seattle City Light  
Puget Sound Energy  
Snohomish PUD  
Tacoma Power  
British Columbia Hydro  
U.S. Department of Energy  
State of Alaska

The Northwest Energy Efficiency Alliance is a nonprofit group of electric utilities, state governments, public interest groups, and industry representatives committed to bringing affordable, energy-efficient products to the marketplace.



**NORTHWEST  
ENERGY  
EFFICIENCY  
ALLIANCE**  
www.nwalliance.org