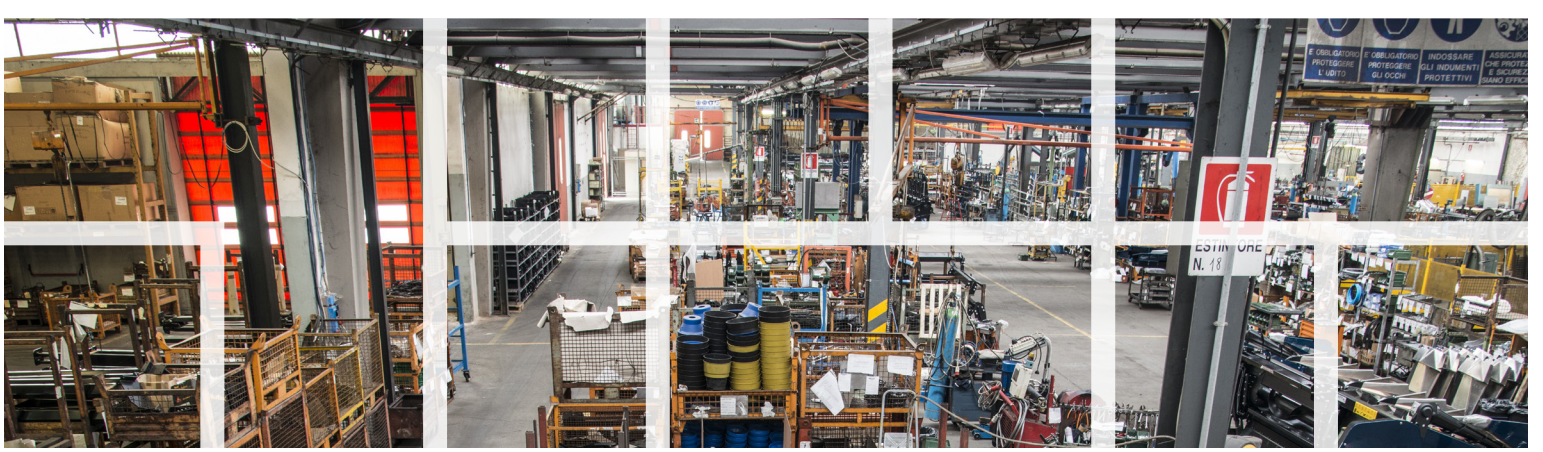
Northwest Trade Ally Network

Commercial & Industrial Lighting

FIELD GUIDE 2016

February Edition



Welcome to the Northwest Trade Ally Network's 2016 Field Guide, your handbook to our current series of lighting workshops.

We've pulled together a great team of senior lighting professionals who will teach you everything you need to know about the latest in lighting technologies, sharpen your lighting design skills, and help you discover your inner salesperson to learn new ways to engage customers in energy efficiency projects.

In 2015, we hosted workshops in 17 locations across four states and drew more than 630 attendees. Participant reviews of our workshop sessions and speakers were impressive – awarding us average scores of six points on a severn-point scale.

While we want these workshops to add value to your bottom-line, they are also an essential part of our mission to increase energy efficiency across the Northwest. The strategy is working because the savings numbers continue to be amazing. In the past year, your work with local public utilities and the EnergySmart Grocer program helped us complete over 3,000 separate projects in the region– and achieve **90 million kWh** in energy savings. That's no small feat, and it couldn't happen without you.

Equally important, a recent third-party evaluation has reported that Bonneville Power Administration's (BPA's) lighting program has delivered a high realization rate, which means that utility program managers and trade allies are doing the job in the field exactly right. Our collective investment in these workshops is worthwhile and making an impact. Together we are doing important work. Your participation matters and we are grateful for your support.

Sincerely,
John A. Wilson
Commercial Sector Lead
Bonneville Power Administration

To request additional copies, please contact lighting@bpa.gov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TRADE ALLIES DRIVE SAVINGS

"Trade allies play an integral role in our efforts to reshape the energy landscape across the Pacific Northwest. Our success is directly tied to their success."

- Richard Génecé, Vice President of Energy Efficiency
Bonneville Power Administration

BEST PRACTICES FOR SITE AUDITS

WORKSHOP LEARNING AIDS

RESOURCES

Note: While certain products may be used in this handout and during workshop demonstrations, in no way does NWTAN or BPA endorse these products over other competing products. Each contractor should use products from manufacturers they know and trust.

BEST PRACTICES FOR SITE AUDITS

Effective site audits can make all the difference between successful and unsuccessful projects.

BEFORE THE AUDIT

1. Research the company you are auditing so you can be knowledgeable about their business.

2. Ask for resources before you arrive. Make sure they know it will be best if you have someone to walk the facility with you or provide a layout.

3. Make sure all your audit tools are assembled in a handy bag:

- ☑ Foot-candle meter
- ☑ Audit check off sheets
- ☑ Digital camera
- ☑ Discriminator
- ☑ Safety glasses
- ☑ Ladder
- ☑ Tape measure or laser equivalent
- ☑ Clipboard
- ☑ Counter
- ☑ Hard hat
- ☑ Ear plugs
- ☑ Extra batteries
- ☑ Anything else?

BEST PRACTICES TIP

Energy audits are a crucial part of any retrofit project. Visit nwlightingnetwork.com for resources to help you perform a thorough and organized audit.

DURING THE AUDIT

1. Make sure you ask lots of questions to ensure you propose the correct solution.
2. Utilize the Lighting Retrofit Guidelines for Energy Audits at www.nwlightingnetwork.com/tools to help cover all your bases. See example on pages 8-9.
3. Utilize other available resources to assist with collecting information in an efficient way, such as tablet apps or ready-made audit sheets.

AFTER THE AUDIT

1. While the audit is still fresh in your mind, review the information you collected and ask any additional questions.
2. Enter the information into a lighting calculator and follow up with the local utility to answer any questions they may have about the proposed project.
3. Get back to your customer as soon as possible to show them you are interested in meeting their needs.

BY THE NUMBERS

564 Companies represented in NWTAN

1,104 NWTAN members in the Pacific Northwest

SALES TIP

$ **A sales rep can close a deal but an account manager builds a relationship. How service is delivered is what the customer will remember.**

ENERGY AUDIT TEMPLATE

Lighting Retrofit Guidelines for Energy Audits

These Energy Audit Guidelines can help you streamline the process by providing several key questions to consider throughout the process, line-item checklists to reference, and important final steps to remember while wrapping up. Use the retail and industrial companion guidelines to help you with application specific audits.

Facility Information Checklist

Legal Business Name _____

Facility Address _____

Hours of Operation _____

Facility Type _____

Sq. Ft./Ceiling Ht. _____

HVAC Type/Fuel _____

Utility/Acct # _____

Walkthrough Tools Checklist

- ☐ Pen & Audit Sheets
- ☐ Ballast Discriminator
- ☐ Digital Camera
- ☐ Light Meter
- ☐ Counter
- ☐ Monocular (Binocular)

Don't forget to include necessary safety equipment!

Consider the Space

What is the age of the building and of existing light fixtures?
Bldg. _____ Fixtures _____

Is there an existing lighting control system?
☐ Yes ☐ No
What is it? _____

What tasks are being performed in each space?

_____

_____

What is the average age of workers? _____

Any natural light: windows or skylights? _____

_____

What about exterior lights; what are they (if any)?

_____

Will customer use company labor or outside contractors for installation? _____

Will customer use outside contractor or vendor to do the audit?

_____

Will there be more than one bid?
☐ Yes ☐ No

Do the fixtures need to be removed or relocated?
☐ Yes ☐ No

Sales Details

- ☐ Confirm potential utility program eligibility. _____
- ☐ Is there a budget for energy upgrades? If so, what is the figure for the lighting/controls? _____
- ☐ What is the approximate time frame of lighting retrofit decision process? _____
- ☐ Who is the decision maker? _____
- ☐ Is there an opportunity to install samples for customer to see? ☐ Yes ☐ No
- ☐ What is the customer's main motivation for the retrofit? Energy savings? Better quality lighting?

_____

- ☐ Satisfying a green initiative? _____
- ☐ Have I shown direct energy savings benefits and the indirect financial benefits? (i.e. better sales in a retail environment, better security...) _____
- ☐ Have I shown before and after picture from previous jobs from similar spaces? _____
- ☐ Do I have references from past satisfied customers? _____
- ☐ Why should the customer use my company? How can I communicate that in as few words as possible?

_____

Project Details

- ☐ Count all the fixtures in the building by location and include hours they are "on" for each space.
- ☐ What condition are the fixtures in? Consider new or retrofit options.
- ☐ Verify fluorescent ballasts - magnetic or electronic. Use your discriminator!
- ☐ Verify each lamp type - wattage, color and size. Snap photos if possible!
- ☐ Do not forget exit signs!
- ☐ Measure light levels at the task level of each space.
- ☐ What are the recommended light levels for key spaces? Check IES lighting level recommendations.
- ☐ What lighting technology should be considered for retrofit or redesign?
- ☐ What color temperature should the new lighting system be?
- ☐ Make note of switch locations for each space to determine controls style and quantity.
- ☐ As you walk through each space, get a picture of main fixtures types or anything unusual.
- ☐ Talk to employees - are they satisfied with current light levels? Make note of any employee comments. They will be helpful in what you propose.
- ☐ Talk to managers about any upcoming changes within the spaces. Discuss future needs.

Final Steps...

- ☐ Take all information and thoughtfully create a list of proposed fixtures.
- ☐ Input audit into utility provided spreadsheet.
- ☐ Utilize lighting reps and distributors if assistance is needed in gathering specification sheets, technical data, and assisting with design layouts.
- ☐ Refer to the IESNA Lighting Handbook 10th Edition for guidelines and light levels recommendations.
- ☐ Provide customer with options based on feedback from site audit. Always provide owners more than one option.

INSTALLING LED TROFFER KITS

OBJECTIVE Attendees will be able to use the types of products demonstrated in this session in future projects to provide proper light levels while saving more energy.

Following are four examples of the range of troffer retrofit kits currently available but is not an all-inclusive list. Many manufacturers carry troffer kit options, so be sure to use suppliers with whom you are comfortable doing business.

LITHONIA VT LED TROFFER KIT
2X4, NEW HIGH PERFORMING LENS INCLUDED

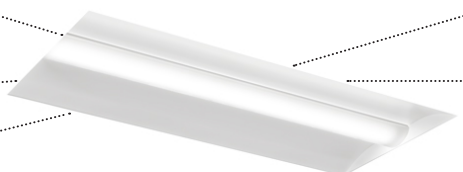
PHILIPS EVOKIT
2X4, NEW HIGH PERFORMING LENS INCLUDED

TECH TIP

Work with your manufacturer to test samples before installation to ensure proper fit and uniform illumination.

MAXLITE LRK TROFFER KIT
2X4

P-2 TKC KIT
2X4



DID YOU KNOW?

Troffer kits have come a long way in the last several years and offer countless options. New kits are easier than ever to install and deliver appropriate light levels for your customers while maximizing energy savings.

From Your NWTAN Lighting Experts

LEDs are not rated like fluorescent technology. When they hit their rated life, they are producing 30 percent less light and still have not failed. When fluorescents hit their rated life, 50 percent have failed. LEDs require significantly less money to maintain, which should be incorporated into bids.

WIRELESS LIGHTING CONTROLS

OBJECTIVE Attendees will be able to use the types of wireless controls demonstrated in this session, and will have a better understanding of how to use and install the technology.

INTERIOR WIRELESS SENSORS AND CONTROL TYPES:

Ceiling Mount

Passive infrared or dual technology sensing technology

500 to 2,000 square feet of sensing coverage area

Lens can be masked to direct sensing where it is needed

Great for open offices, retail, restrooms, and other large open spaces

Wall Mount

Passive infrared or dual technology sensing technology

1,000 to 1,600 square feet of sensing coverage area

Great for open offices, private offices, hallways, dining areas, and other spaces where a wall switch sensor may be obscured

WORKSHOP LEARNING AIDS

High Bay

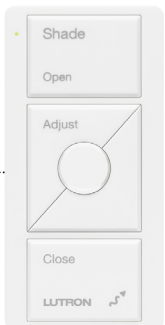
Great option for adding to existing lighting systems

Interchangeable lenses for area, aisle or directional sensing

Great option for low occupancy areas such as warehouses, storage areas and mechanical rooms

Switch

Can be added to an existing system to supplement other wired switches



SALES TIP

Wireless controls can help improve a project's ROI and the likelihood the customer purchases from you.

TECH TIP

Wireless controls offer an opportunity to include controls without the costly addition of pulling wire, which makes them a possibility for most projects.

DID YOU KNOW?

As wireless control systems continue to improve, they are beginning to integrate with other building systems to create "smart" buildings.

WORKSHOP LEARNING AIDS

Desktop

Can be used to provide on/off and dimming control on a desk, lectern, podium or other

Daylight

Will dim luminaires to ideal level based on daylight entering the space

Practical to use with LED technology

Great option for bringing a retrofit project up to today's code

BENEFITS OF INTERIOR WIRELESS CONTROLS:

- Easy to install
- Can be easily moved if space changes
- Up to 10-year battery life, some include small PV panel or kinetic technology
- Great for hard ceilings
- Easy to commission
- Wirelessly connect with other devices for 25 to 100 feet

SALES TIP

$

With the proliferation of LED exterior technology, don't forget to include wireless controls to gain the full energy savings from the project.

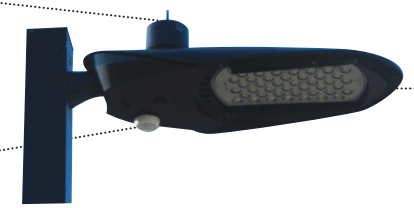
TECH TIP

Exterior controls can be scheduled to meet space demand. For example, a system can be set to come on at dusk, then dim to 50% at 10:00 PM and dim again to 10% at midnight, then come back to 50% if the space is occupied between midnight and dawn.

EXTERIOR WIRELESS SENSORS AND CONTROLS:

Photo control overrides occupancy sensor during daylight hours

Occupancy sensor can dim fixture down to preset level, then come back to full brightness instantaneously when it senses activity



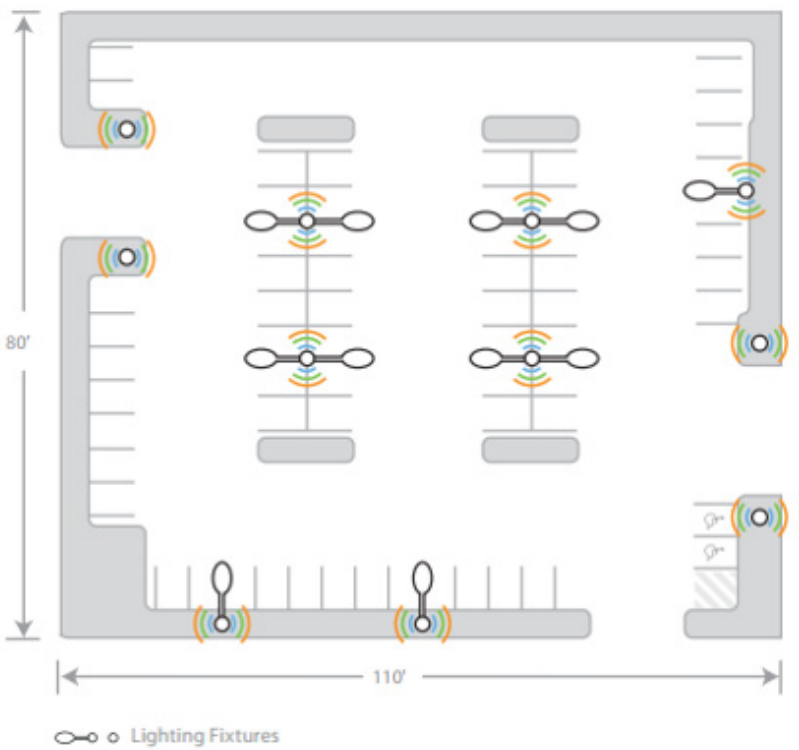
Commands for switching and dimming schedules are made from software on a computer and communicated wirelessly

BENEFITS OF EXTERIOR WIRELESS CONTROLS:

- Luminaires can be controlled individually or grouped into zones
- Timed events can be set for groups of luminaires to meet varying business hours
- Luminaires can dim or turn off after hours
- Occupancy sensors can be added to system to override scheduled dim or off time

SAMPLE EXTERIOR PROJECT:

- New LED pole lights replaced HID
- Each LED luminaire had an onboard node that included photo cell and receiver
- Control strategy was set-up using a tablet
- Groups were programmed based on multiple store's hours that shared the parking lot in this retail setting
- Schedules can be reprogrammed if business hours change



MANAGING AND MAINTAINING CUSTOMERS

OBJECTIVE Attendees will be able to manage customer accounts, maintain relationships, secure long-term strategic partnerships and improve effectiveness through best practices for customer engagement.

TWO POSSIBLE SALES OUTCOMES

WIN THE SALE!

Find out why you won the business. Was it your:

- Knowledge and expertise
- Diverse solutions
- Agreement terms and conditions
- Track record and references
- Communication skills

You'll understand what you did right and learn if there was something you could have done better.

LOSE THE SALE!

Be gracious in defeat:

- Thank the client for their consideration
- Request an exit interview to learn the reasons why you lost the business
- Ask to stay in touch
- Schedule time to send them a note or call them after a set period of time.

Your positive demeanor tells your client that there are no hard feelings, and you would like to provide proposals for future opportunities.

DOS and *DON'TS* OF EXIT INTERVIEW

Customers often appreciate the opportunity to offer feedback. Some may not be comfortable with a face-to-face exit interview, but will be willing to talk via phone or answer questions via email. Be open to all forms of communication.

DO

- Create a list of questions prior to the meeting
- Learn what went wrong
- Take action to improve based on the feedback

DON'T

- Be defensive
- Whine about the lost sale
- Criticize your competition

REMEMBER

Perception is reality. If the customer interpreted some of your information incorrectly, that is good insight into your process. Don't use this as an opportunity to tell them they didn't understand, rather acknowledge you didn't make it clear.

GETTING THE SALE IS JUST THE BEGINNING: 4 STEPS TO A SUCCESSFUL RELATIONSHIP

1. **Ensure success – Don't walk away until you're sure the project is a success.**
   - Define your work with the client
   - Be precise on how you will deliver
   - Stay true to your word
   - Your client will remember what you promised
   - Don't leave things to chance

2. **Communicate – Make sure everyone on your team understands the client's wants and needs.**
   - Keep track of the project and update your customer
   - Be in tune with the client's communication style and adapt to it
   - Remind them of key project dates and issues; don't assume they remember everything you've told them

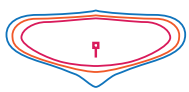
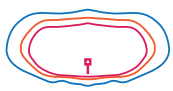
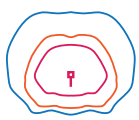
3. **Long Term Sales Opportunities – After the initial sale, take a step back and ask yourself if they should be a part of your strategic plan for sales growth. Will they:**
   - Have long-term profitability
   - Provide additional opportunities
   - Fit your company goals
   - Provide referrals
   - Value a strategic partner

4. **Account Plans**
   - Share what they can expect from you
   - Keep up to date on trends in their business
   - Find out how you can make their day-to-day life easier
   - Agree upon a check-in time to develop the relationship

EXTERIOR LIGHTING DESIGN CONCEPTS

OBJECTIVE Attendees will be able to read the iso-footcandle lines on a spec sheet and understand appropriate light level requirements for exterior lighting, while achieving maximum energy efficiency.

Exterior luminaires offer five distribution types to choose from to deliver appropriate coverage.

DISTRIBUTION TYPE	SHAPE	ISOLINE EXAMPLES
Type I (1)		
Type II (2)		
Type III (3)		
Type IV (4)		
Type V (5)		

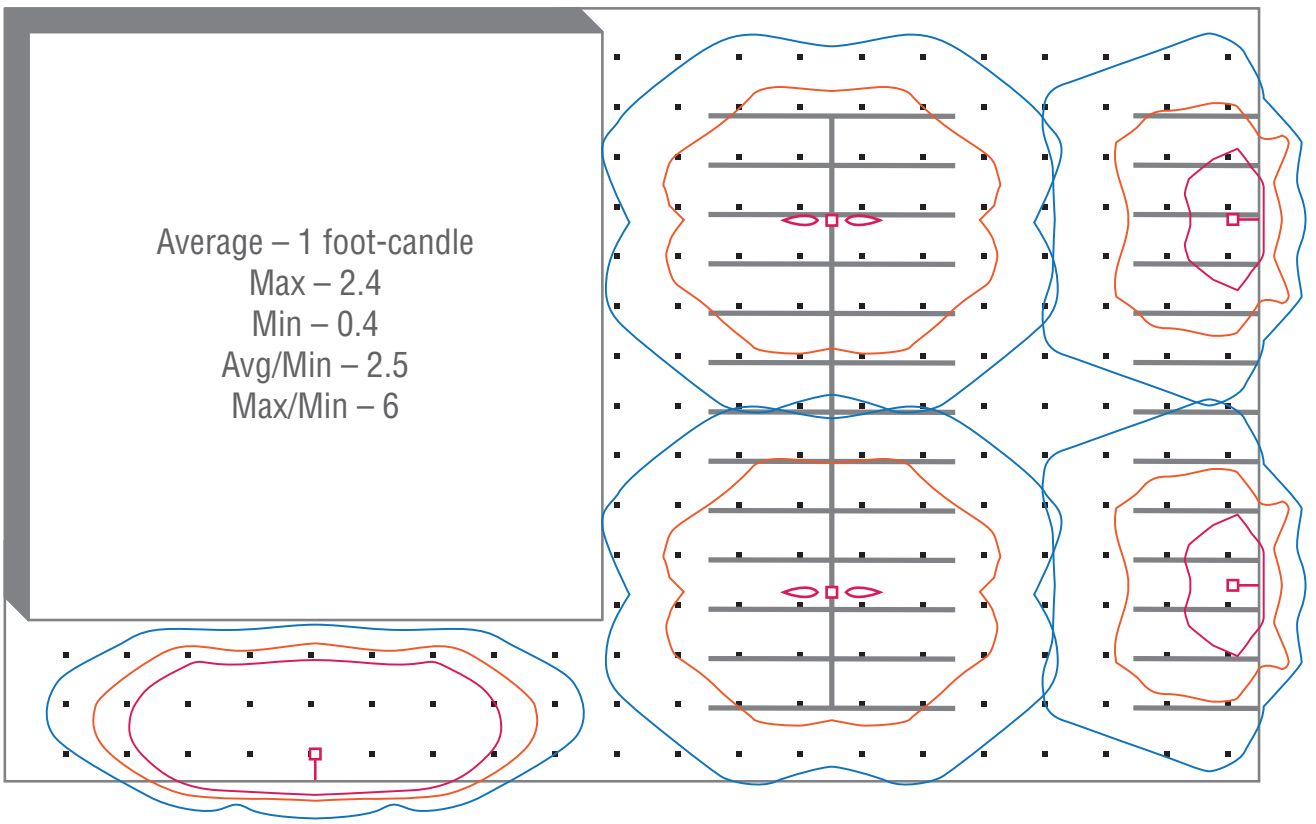
RECOMMENDED USAGE FOR COMMON APPLICATIONS:

- Single lane road – Type 1
- Center of parking lot – Type 5
- Two lane road – Type 2
- Perimeter parking lot – Type 3
- General parking and wide roads -Type 5

DID YOU KNOW?

LED lighting technology presents a significant new option for lighting parking lots, surface streets and building exteriors. When upgrading to LED luminaires, trade allies must make certain they are re-lighting spaces with appropriate design concepts to ensure uniformity, safety and security.

Example: This diagram shows an example parking lot using type 5, type 3 and type 2 distributions. This layout gives full coverage of the example parking lot and provides an average of one footcandle, which is recommended by the IES 10th edition.



SALES TIP

$

New LED exterior lighting products are coming into the market all the time. Stay up to date with the latest product changes to make sure you pick the right solution for your next project.

TECH TIP

Lower maximum to minimum ratios mean better uniformity for the area. Use dimming options when installing new LED fixtures to ensure maximum energy savings.

From Your NWTAN Lighting Experts

Include exterior lighting when conducting audits, and propose outdoor sensors or other controls when appropriate for additional energy savings and extending system life.

INTRODUCING AN ALL-NEW NORTHWEST LIGHTING NETWORK WEBSITE

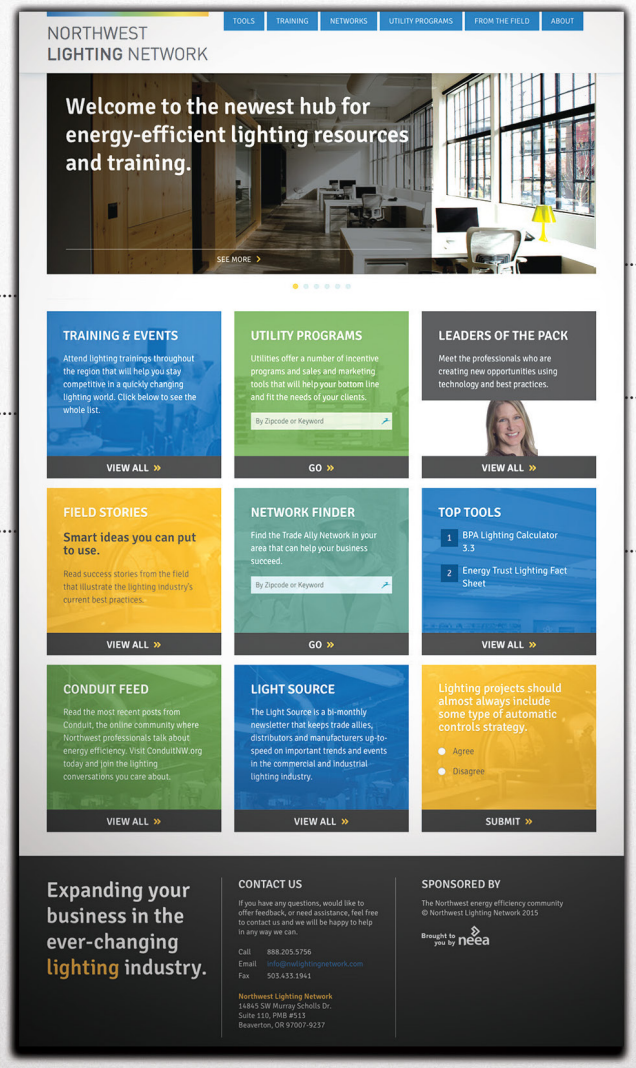
Your hub for energy efficient lighting resources and training

Now our website runs as deep as our expertise in commercial lighting. And it is new and improved with current tools and resources to help you grow your business and deliver high value to your customer.

Find valuable incentive programs

Learn about the latest technologies

Locate regional trainings and workshops



Read about people and practices leading the industry

Contact experienced lighting specialists throughout the region

Download tools and resources to help with your next lighting project

NORTHWEST
LIGHTING NETWORK

Visit nwlightingnetwork.com today!

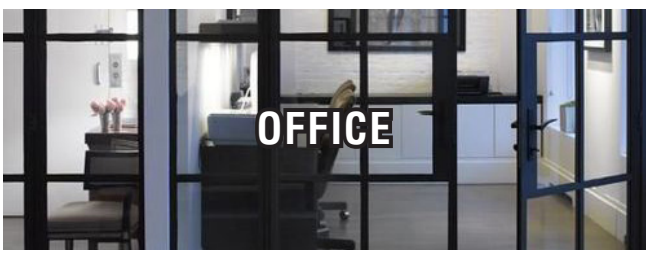

SAFETY

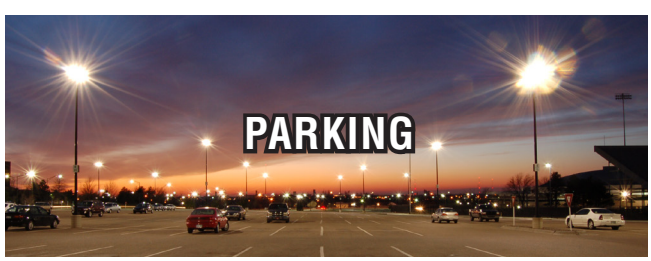
LIGHTING LAYOUT GUIDES

AVAILABLE ONLINE at NWLightingNetwork.Com/tools

Lighting layout guides are available to help you provide your customer with recommended light levels and appropriate fixture spacing. You will be able to improve your customer's return on investment and differentiate yourself from competitors.

Guides are available for:





TECH TIP

When in doubt — do a lighting layout.

AVAILABLE ONLINE at NWLightingNetwork.Com/tools

Each guide describes the space being considered and products used for the example.

LIGHTING LAYOUT GUIDE SERIES

WAREHOUSE GUIDE 3

WAREHOUSE

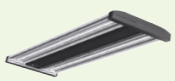
LED HIGH BAY

ROOM CHARACTERISTICS

Length: 72'
Width: 150'
Height: 28' Open Ceiling
Reflectivity:

Ceiling	= 80%
Walls	= 30%
Floor	= 20%
Product	= 30%

PRODUCT SPECIFICATIONS



Dimensions: 15" x 48"
Optics: Narrow Distribution
Light Source: High Output LEDs
CCT: 4000K
CRI: 70
Lumens: 12,500 delivered
Depreciation: 0.95 @ 60,000 hrs.
Rated Life: 100,000 hrs.
Watts: 125

THE OPPORTUNITY

In a typical high, open ceiling warehouse application, it is possible to provide high-quality lighting that adequately illuminates the warehouse shelves while meeting or beating the local energy code. The situation requires luminaires with optical control capable of effectively distributing light onto the vertical surfaces. This provides excellent product recognition and improved productivity.

THE SOLUTION

Install industrial LED high bay luminaires centered within each aisle. Luminaires with narrow teardrop shaped optical distributions will provide reasonable uniformity on the vertical face of the shelves while pushing light all the way down to the floor.

DESIGN CONSIDERATIONS

The luminaires must be installed where the bottom of the fixture is at the same level or higher than the top of shelved product. The stack layout must correspond to the lighting layout to minimize shadows. Tall stacks have a large impact on the illumination of the space. Vertical surfaces absorb and block light.

lighting design lab
www.lightingdesignlab.com

NORTHWEST LIGHTING NETWORK
www.nwlightingnetwork.com

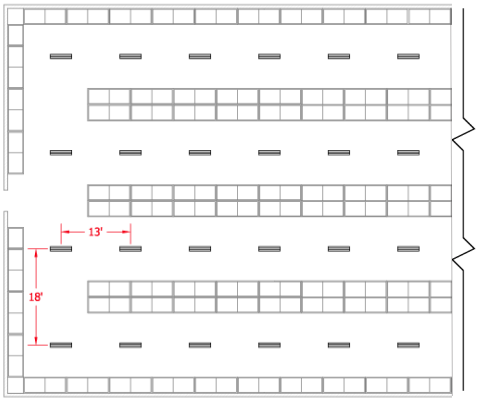
SALES TIP

Offer creative solutions to your customer. It demonstrates your willingness to solve their challenge and shows your expertise at the same time.

Most guides offer more than one layout option.

LAYOUT OPTIONS

Warehouse LED High Bay | 18' x 13' Spacing



INSTALLATION SPECS

Number of Luminaires: 40
Luminaire Spacing: 18' x 13'
Mounting Condition: Pendant
Mounting Height: 24'
Average Illumination:
~23 fc horizontal
~9.5 fc vertical
Watts/sq. ft.: ~0.46

IES Recommended Footcandles (fc):
10 - 30 fc horizontal
5 - 15 fc vertical

CONTROLS STRATEGY

Many jurisdictions require automatic OFF occupancy sensors in warehouses, and even if it is not required, occupancy control is an excellent strategy.

Controlling each aisle independently is also a good energy saving strategy. Mounting sensors on each fixture can increase savings in spaces with long aisles. This is called luminaire level lighting controls and can simplify the commissioning and increase the granularity of the control.

ENERGY SAVING STRATEGIES

STRATEGY	BENEFITS	LIGHT LEVELS
Daylight dimming in primary daylight zone	Can balance light levels within a space while using only enough wattage to maintain target light levels	Light levels maintained from daylight
Luminaire Level Lighting (LLLC) Controls	Combines multiple controls into one device	Target light levels maintained during occupancy and non-daylit times
Integrated occupancy sensor	Simple to commission and minimizes installation cost	Light levels remain equal to base design

ENERGY CODE INFORMATION

JURISDICTION	CODE	LIGHTING POWER ALLOWANCE
Seattle	2012 Seattle Energy Code	0.50 w/sq. ft. (0.58 space x space)
Washington	2012 WSEC	0.50 w/sq. ft. (0.58 space x space)
Oregon	2014 OEESC	0.66 w/sq. ft. (0.58 space x space)
Idaho	2012 IECC	0.60 w/sq. ft. (0.60 space x space)
Montana	2012 IECC	0.60 w/sq. ft. (0.60 space x space)

LIGHTING LAYOUT GUIDE SERIES

WAREHOUSE | LED HIGH BAY

Rev. 10/2015

From Your NWTAN Lighting Experts

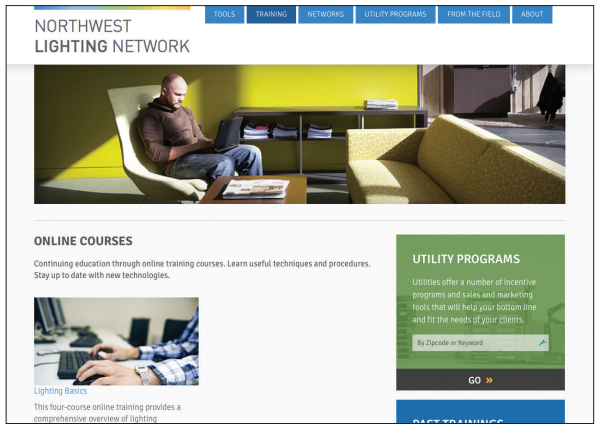
Considering LED highbays for a warehouse application? Look for product that has a L70/L85 test of over 100,000 hours, which will save the owner more money in the long run.

ONLINE LIGHTING RESOURCES

NORTHWEST LIGHTING NETWORK TRAINING - LIGHTING BASICS

Lighting Basics is a four-course online training that provides a comprehensive overview of lighting fundamentals for those who work in the commercial lighting retrofit market. The course topics include: basic lighting terms; light sources and basic controls; how to conduct an audit; and identifying market resources. The training also provides guidance on navigating utility incentive programs and communicating value to your customers through energy and non-energy benefits.

To enroll in this FREE training, visit www.nwlightingnetwork.com/training



LIGHTING CONTROLS

The Lighting Controls Association, administered by the National Electrical Manufacturers Association, is dedicated to educating the professional building design, construction and management communities about the benefits and operation of automatic switching and dimming controls. These benefits include energy savings, flexibility and higher-quality building environments. As the lighting controls authority, the Lighting Controls Association is proud to offer free, comprehensive online education about lighting controls technology and application.

Visit http://lightingcontrolsassociation.org

SALES TIP

HOW TO WIN MORE BUSINESS: OUTCOME

Customers don't care about your product or solution; they care about their company and how you can make it even better. Keep it simple and align your proposal to meet their business objectives.

IES LIGHTING LEVEL GUIDELINES

WHAT IS IES?

The Illuminating Engineering Society of North America (IES) provides recommended lighting level guidelines for various lighting applications such as office, hospitality, exterior, retail, restaurant, educational, sports and many others. Trade allies who understand and consistently use these guidelines will give their clients assurance that the recommendations they receive are well-informed and in their best interest.

IES LIGHTING LEVEL GUIDELINES**	AVERAGE MAINTAINED FOOT-CANDLES (HORZ.)	LOCATION (AFF = ABOVE FINISHED FLOOR)
BANK		
ATM - walk up (indoor)	20	at 3' AFF
Lobby	10	at 0' AFF
Teller Window/Writing Table	30	at 0' AFF/writing surface
BAR		
General Seating	5	at 2' AFF
Lounge/Work Surfaces	10	at 2' AFF or work surface
CORRIDOR/INDEPENDENT PASSAGEWAY	10	AT 0' AFF
DINING (NON HOSPITALITY)		
Cafeteria	15	at tabletop
Coffee Shop	10	at tabletop
EDUCATIONAL		
General Classroom*	40/5	General/AV Modes at 2.5' AFF
Whiteboard	15/30	Vertical - Reference/Presented

*See IES 10th Edition Handbook for specialty classes/complete guidelines

SALES TIP

HOW TO WIN MORE BUSINESS: PROVIDE OPTIONS

Customers need options to help them compare, contrast and consider their choices. Provide more than one idea in your proposal to showcase your creativity and problem solving skills.

IES LIGHTING LEVEL GUIDELINES**	AVERAGE MAINTAINED FOOT-CANDLES (HORZ.)	LOCATION (AFF = ABOVE FINISHED FLOOR)
ELEVATOR (PUBLIC)		
Interior/Cab/Threshold	5	at 0' AFF
EXTERIOR — SEE IES 10TH EDITION HANDBOOK		
ENTRY VESTIBULE (INDOOR)		
High Activity	15/10	Day/Night at 5' AFF
Medium Activity	10/5	""
Low Activity	7.5/4	""
FILING	30/15/10	ACTIVE/MODERATE/INACTIVE - 2.5' AFF
FITNESS CENTER		
Aerobics	15	at 0' AFF
Group Exercise	30	at 0' AFF
Personal/Strength Training	40	at 0' AFF
GARAGES – SERVICE		
Active traffic areas	15	at 0' AFF
Repairs	75	at 0' AFF
Write-up	30	at 3' AFF
GYM		
General exercise & recreation	30	at 0' AFF
School exhibitions & matches	50	at 0' AFF
*see IES 10th Edition Handbook for Tournament, University Level & Televised Events		
HOSPITALITY — SEE IES 10TH EDITION HANDBOOK		
IT AREA		
Admin	30	at 2.5' AFF
Programming	10	at 2.5' AFF
LOBBY*		
Day	10/5	Day/Night at 0' AFF
**should also be based on interior/exterior adaptation and steps/curbs/ramps*		

IES LIGHTING LEVEL GUIDELINES**	AVERAGE MAINTAINED FOOT-CANDLES (HORZ.)	LOCATION (AFF = ABOVE FINISHED FLOOR)
MACHINE AREA		
Equipment Service	50	at 0' AFF
General	10	at 0' AFF
KITCHEN		
Dishwashing/Equipment Storage	20	at 2.5' AFF
Food Prep	50	at work surface
Food Storage	10	at 0' AFF
LIBRARY		
Stacks	20	0' AFF (Vertical 10 f.c. at 1' AFF, 20 f.c. at 2.5')
Reading	50	at 2.5' AFF
General	15	at 2.5' AFF
MAIL		
General	10	Floor
Security Inspection	100	3.5' AFF
Sorting	30	2.5' AFF
MALL		
Concourse	10	at 0' AFF
Information Desk/Kiosk	30	at 3.5' AFF
Dressing Rooms	30	at 0' AFF
Retail	See Below	
OFFICE		
Workspace	30	at 2.5' AFF
READING & WRITING		
Handwritten:		
Graphite Pencil	30	at 2.5' AFF
Red Pencil	50	at 2.5' AFF
Black Pen	30	at 2.5' AFF
Other Pen	40	at 2.5' AFF

IES LIGHTING LEVEL GUIDELINES**	AVERAGE MAINTAINED FOOT-CANDLES (HORZ.)	LOCATION (AFF = ABOVE FINISHED FLOOR)
READING & WRITING (CONT.)		
Print Media:		
6-pt font	50	at 2.5' AFF
8 & 10-pt font	30	at 2.5' AFF
12-pt font	20	at 2.5' AFF
Xerograph:		
Color	30-50	at 2.5' AFF
B&W	20-30	at 2.5' AFF
RESTAURANT		
Casual Dining	10	at tabletop
Fast Food Dining	20	at tabletop
Fine Dining	3	at tabletop
RECEIVING/SHIPPING		
Dock	10	at 0' AFF
Receiving/Staging	30	at 0' AFF
RESTROOM		
Fixtures	15	at top of plumbing fixture
Showers	10	at floor
Lockers	5	at floor
RETAIL* — GENERAL HORIZONTAL	(2.5' AFF)	CIRCULATION HORIZONTAL (0' AFF)
Automotive	50	10
Department Store	40	15
Designer Boutique	20	7.5
Discount	50	20
Drug & Convenience	50	20
Fine Jewelry	40	15
Furniture	20	7.5
Grocery	50	20
Warehouse Store	50	20
Sales Transactions		
*See IES 10th Edition Handbook for Display Lighting		

IES LIGHTING LEVEL GUIDELINES**	AVERAGE MAINTAINED FOOT-CANDLES (HORZ.)	LOCATION (AFF = ABOVE FINISHED FLOOR)
SPORTS — SEE IES 10TH EDITION HANDBOOK		
STAIRS		
High Activity	10	at 0' AFF
Typical	5	at 0' AFF
VESTIBULE (INDOOR)		
High Activity	15/10	Day/Night (0' AFF)
Low Activity	10/5	Day/Night (0' AFF)
WAREHOUSING & STORAGE	HORIZONTAL (AT 0' AFF)	VERTICAL
Inactive	5	2
Inactive: bulky items; large labels	10	5
Active: small items; small labels	30	15

**At least half of users are in in the 25-65 age range.
**Consult handbook for more detailed information on above or other applications.
** Horizontal - horizontal plane that average maintained foot-candles are measured.
** Vertical - vertical plane that average maintained foot-candles are measured.
**It is the responsibility of the specifier to determine and provide appropriate lighting levels for each space.

From Your NWTAN Lighting Experts

If a customer has a certain number of fixtures of a specific wattage and lumen output, it doesn't mean they need an equivalent number of fixtures producing an equivalent number of lumens. Refer to IES guidelines to learn more about recommendations for that space type and design to the customer's actual needs.

NWTAN LIGHTING EXPERTS

OUR NWTAN TEAM of experienced lighting professionals is here to help you with the lighting calculator, technology questions, design ideas, creative inspiration and trade ally support. See page 34 for the lighting specialist serving your region or visit nwlightingnetwork.com/contact-us for a list of lighting specialists.

TOP TEN TIPS YOU NEED TO KNOW ABOUT LIGHTING IN 2016:

1. LEDs are a great retrofit option for existing fluorescent high bay systems—T5HO or T8—especially if they did not install controls the first time. Look for facilities with higher hours of operation such as retail, production or exterior lighting. LED systems can achieve enough savings when maintenance is included to be attractive, especially when replacing older systems where the owner is starting to see lamp/ballast replacements become common.
2. When retrofitting with new T8s be sure to use reduced-wattage 28W or 25W lamps as they have longer life compared to 32W lamps. Although they have slightly lower lumen output, most customers cannot see the difference when comparing them side by side.
3. LED lumens are delivered differently than all of the other technologies, so a lumen to lumen comparison of fixtures doesn't always provide a complete picture.
4. Consider the fixture efficiencies for the incumbent technologies when comparing to LED.
5. Install samples to ensure application effectiveness and help make the sale to your customer.
6. Consider the lumen output for a new LED fixture, not just the wattage.
7. Projects can be implemented in small phases to fit the customer's budget and gain more credibility for those wary of new technology.
8. In many cases, there is no reason to leave exterior lights on at 100% output. With the proliferation of LED exterior technology, include occupancy sensors to bring the lights up to full brightness when needed and dim them down when not needed. This will save energy and show your customer you provide added value.
9. LED technology has brought a huge variety of products of varying quality to our markets. When evaluating products, consider the lifecycle cost in addition to the initial installed cost. Discuss with the customer in terms that they can understand to help them make an informed decision.
10. Consider task lighting to supplement ambient lighting. Don't raise the lumen level in an entire space so a specific task can be performed in one section of that area. Add another fixture over the task with higher lighting requirements, lower the fixture closer to the task or implement the use of a high efficiency portable light.

EXAMPLE CUSTOMER PROPOSAL LETTER

Lighting Project Proposal

John Doe
1979 Championship Drive
Aberdeen, WA 98520

This project is pending utility approval. All figures should be considered estimates.

Dear John Doe,

Based on the lighting retrofit proposal that has been prepared by Lights R Us at 1979 Championship Drive, we have estimated the project's energy savings and the incentives that would be available from City of Port Angeles for this proposed project. These are estimates only, as actual savings and incentives may vary based on final installed measures and investment costs. The incentives provided by your local utility cover 49% of the total installation costs of the project. The following tables display the project's estimated energy savings, simple payback, and return on investment.

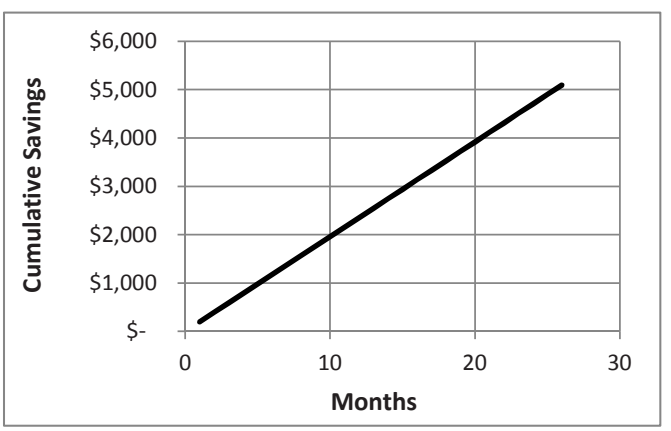
Project Overview

Estimated Project Cost:	$9,900	**Estimated Yearly Utility Savings: (from consumption and demand)**	$2,054
Est. Utility Incentive:	$4,863	**Estimated Yearly O&M Savings**:**	$297
Customer Balance:	$5,037	**Estimated Simple Payback:**	2.1 years
Estimated kWh/Yr Saved:	31,170	**Return On Investment (ROI):**	46.7%
Estimated kW Reduction:	7.50		

Cost of Waiting

The longer you wait to replace your out-of-date equipment, the more savings you miss out on. Upgrading your lighting system now will reduce your costs and energy consumption. How much money are you losing waiting to upgrade?

Time		Costs
6 Months	$	1,175
1 Year	$	2,351
3 Years	$	7,052
5 Years	$	11,753



How quickly will you recoup your investment in energy efficient lighting? With an estimated monthly savings of $196, it would take approximately 26 months to pay off your investment with a utility incentive.

Project Name: Green and Gold

Project Detail Summary*

Measure	Measure Description	Quantity***	Units	Incentive per Unit	Total Incentive
Decommissioning	Decommissioning	1,521	kWh	$0.18	$274
Fixture Increase	Increased fixture count	1,246	kWh	$0.18	$224
F3-75%	LED Screw In & Small Fixtures	5	fixture(s)	$30	$150
G1-50%	LED Tubes and Troffers	8	fixture(s)	$30	$240
G1-60%	LED Tubes and Troffers	30	fixture(s)	$40	$1,200
H3-60%	LED Exterior	22	fixture(s)	$120	$2,640
Non-standard	Non-standard	364	kWh	$0.18	$65
N1	Controls	2	controller(s)	$35	$70
				Total	**$4,863**

Explanation of Utility Incentive

A. Itemized Incentive Total:	$4,863
B. Total Estimated Project Costs:	$9,900
C. 70% of Estimated Project Costs Incentive Cap:	N/A
D. Maximum $0.50 per kWh (Project Level) Incentive Cap:	N/A
E. Total Incentive = Lesser of "A", "C", and "D" above:	**$4,863**

* The dollar amounts listed in the Project Detail Summary are estimated based on the available utility incentives for which this project may qualify. Actual incentives paid may vary based on, but not limited to, the following factors: 1) all non-standard and advanced control measures must be approved by BPA; and 2) utility incentives may be capped based on a predetermined maximum incentive per project.

** The default value for annual O&M savings is 3% of the project cost. Your utility can override this value.

*** The kWh savings reported in the Project Detail Summary may differ from those reported above in the Project Overview due to adjustments made to savings in the Project Detail Summary. Savings figures in the Project Overview are estimated on-site savings that a customer may realize, while savings figures in the Project Detail Summary have been adjusted for federal standards and BPA busbar.

For even more lighting resources, visit nwlightingnetwork.com

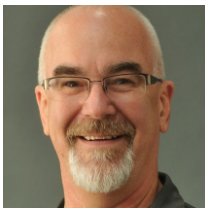
SALES TIP

Do you confirm appointments, send follow-up material quickly, and stay in contact after the sale? When you exceed the expectations of the customer, you show you are someone they can trust.

LIGHTING SPECIALIST CONTACT INFORMATION

The NWTAN team of lighting specialists is here to support the Northwest lighting community. Please contact the specialist serving your geographic region if you have any questions or need information.

WASHINGTON



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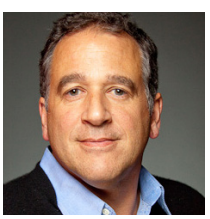
SOUTHEAST IDAHO, NEVADA AND WYOMING



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dan.kuhl@northwest-lighting.org

NORTHERN IDAHO AND MONTANA

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Northern Idaho and Western Montana
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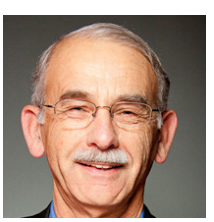
NORTHWEST TRADE ALLY NETWORK

Eric Wilson, Program Manager
503.893.4955
eric.wilson@northwest-lighting.org



Mike Porter, Operations Manager
503.730.3122
mike.porter@northwest-lighting.org

UTILITY PROGRAM MANAGER CONTACT LISTS

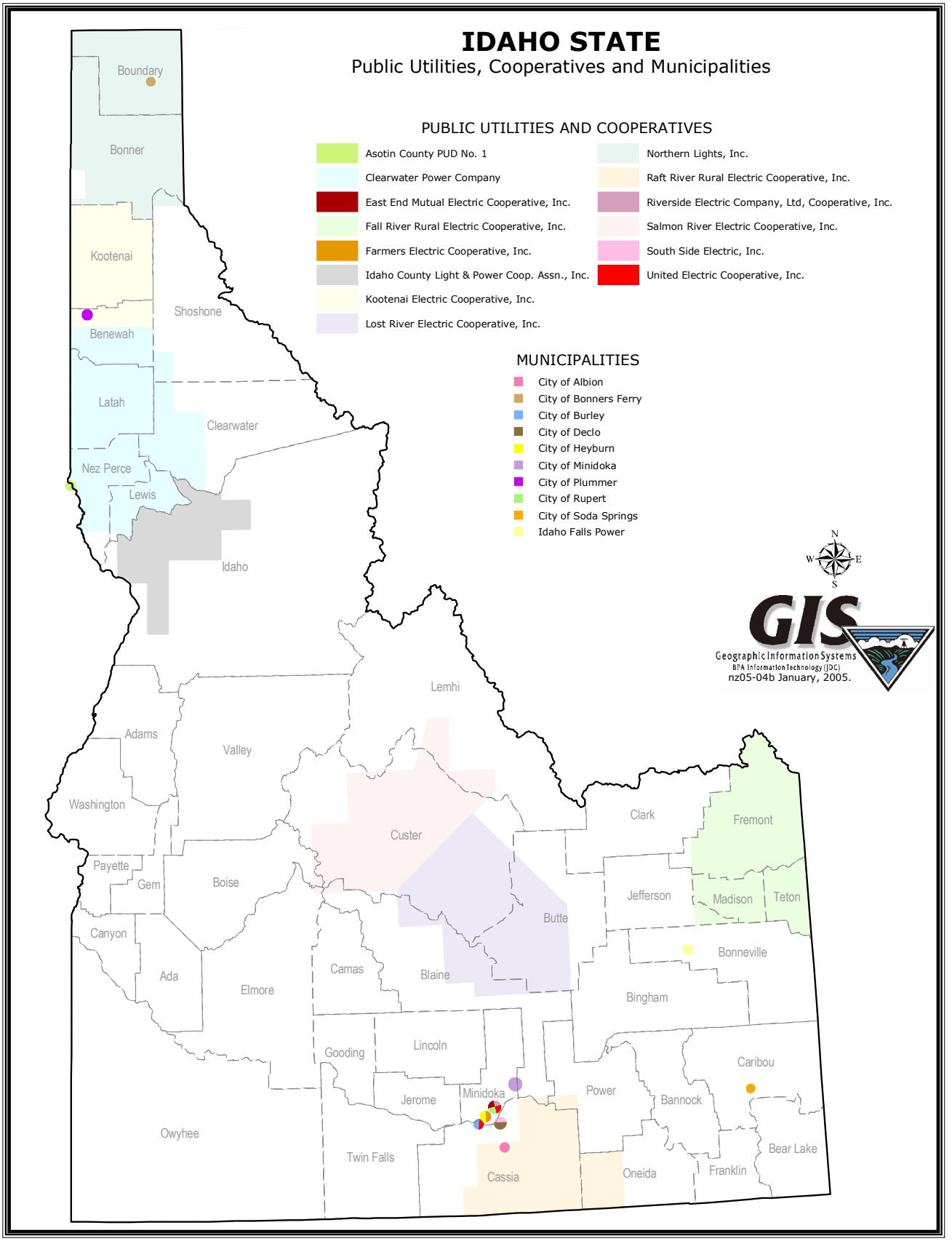
IDAHO

UTILITY NAME	CITY	ST	REP	PHONE	EMAIL
Albion, City of	Albion	ID	Paul Rich	1(888) 883-9879	paul@esgroupllc.com
Avista Utilities	Spokane	WA	Camille Martin	(509) 495-4276	Camille.martin@avistacorp.com
Bonners Ferry, City of	Bonners Ferry	ID	Steve Boorman	(208) 267-3105	sboorman@bonnersferry.id.gov
Burley, City of	Burley	ID	Paul Rich	1(888) 883-9879	paul@esgroupllc.com
City of Plummer	Plummer	ID	Debbie Argelan	(208) 686-1641 x22	debbie@cityofplummer.org
Clearwater Power Co.	Lewiston	ID	Greg Hansen	(208) 743-1501	ghansen@clearwaterpower.com
Declo, City of	Declo	ID	Paul Rich	1(888) 883-9879	paul@esgroupllc.com
East End Mutual Electric Co., Ltd	Rupert	ID	Paul Rich	1(888) 883-9879	paul@esgroupllc.com
Fall River Rural Electric Co-op	Ashton	ID	Jan Dean	(208) 652-7431	jan.dean@fallriverelectric.com
Farmers Electric Co., Ltd	Rupert	ID	Paul Rich	1(888) 883-9879	paul@esgroupllc.com
Heyburn, City of	Hayburn	ID	Paul Rich	1(888) 883-9879	paul@esgroupllc.com
Idaho Falls Power	Idaho Falls	ID	Wid Ritchie	(208) 612-8143	writchie@ifpower.org
Idaho Power	Boise	ID	Shelley Martin	(208) 388-5872	smartin@idahopower.com
Inland Power & Light	Spokane	WA	Lindsey Hobbs	(509) 789-4249	lindseyh@inlandpower.com
Kootenai Electric	Hayden	ID	Don Crawford	(208) 292-3213	dcrawford@kec.com
Lost River Electric Cooperative	Mackay	ID	Denise Johnson	(208) 588-3311	denise@lrecoop.com
Lower Valley Energy	Jackson	WY	Tony Allen	(307) 885-6122	tony.allen@lvenergy.com
Northern Lights, Inc.	Sagle	ID	Elissa Glassman	(208) 263-5141	elissa.glassman@nli.coop
Riverside Electric Company	Rupert	ID	Paul Rich	1(888) 883-9879	paul@esgroupllc.com
Rocky Mountain Power	Boise	ID	Camille Cooper	(208) 830-0132	camille.cooper@evergreen-efficiency.com
Rupert, City of	Rupert	ID	Paul Rich	1(888) 883-9879	paul@esgroupllc.com
Soda Springs, City of	Soda Springs	ID	Paul Rich	1(888) 883-9879	paul@esgroupllc.com
South Side Electric Lines	Delco	ID	Barbara Anderson	(208) 654-2313	barbaraa@atcnet.net
United Electric Coop., Inc	Heyburn	ID	Chris Seibold	(208) 679-2222	cseibold@unitedelectric.coop
Weiser, City of	Weiser	ID	Paul Rich	1(888) 883-9879	paul@esgroupllc.com

IDAHO LIGHTING SPECIALIST:

Dan Kuhl
Southeast Idaho

John Wilmoth
Northern Idaho


IDAHO STATE
Public Utilities, Cooperatives and Municipalities
PUBLIC UTILITIES AND COOPERATIVES
Asotin County PUD No. 1
Clearwater Power Company
East End Mutual Electric Cooperative, Inc.
Fall River Rural Electric Cooperative, Inc.
Farmers Electric Cooperative, Inc.
Idaho County Light & Power Coop. Assn., Inc.
Kootenai Electric Cooperative, Inc.
Lost River Electric Cooperative, Inc.
Northern Lights, Inc.
Raft River Rural Electric Cooperative, Inc.
Riverside Electric Company, Ltd, Cooperative, Inc.
Salmon River Electric Cooperative, Inc.
South Side Electric, Inc.
United Electric Cooperative, Inc.
MUNICIPALITIES
City of Albion
City of Bonners Ferry
City of Burley
City of Declo
City of Heyburn
City of Minidoka
City of Plummer
City of Rupert
City of Soda Springs
Idaho Falls Power
N
W
E
S
GIS
Geographic Information Systems
BPA Information Technology (JDC)
nz05-04b January, 2005.
Boundary
Bonner
Kootenai
Shoshone
Benewah
Latah
Clearwater
Nez Perce
Lewis
Idaho
Lemhi
Adams
Valley
Washington
Custer
Clark
Fremont
Payette
Gem
Boise
Jefferson
Madison
Teton
Butte
Canyon
Ada
Elmore
Camas
Blaine
Bonneville
Bingham
Gooding
Lincoln
Caribou
Jerome
Minidoka
Power
Bannock
Owyhee
Twin Falls
Cassia
Oneida
Franklin
Bear Lake

WASHINGTON

UTILITY NAME	CITY	ST	REP	PHONE	EMAIL
Avista Utilities	Spokane	WA	Camille Martin	(509) 495-4276	Camille.martin@avistacorp.com
Benton PUD	Kennewick	WA	Kevin Fischer	(509) 585-5395	fischerk@bentonpud.org
Benton Rural Electric Association	Prosser	WA	Eric Miller	(509) 786-2913	emiller@bentonrea.org
			Ron Mitchell	(509) 786-2913	rMitchell@BentonREA.org
Blaine, City of	Blaine	WA	Ravyn Whitewolf	(360) 332-8820	rwhitewolf@ci.blaine.wa.us
Big Bend Electric Cooperative, Inc.	Ritzville	WA	Dale Anderson	(509) 659-1700	danderson@bbec.org
Centralia, City of	Centralia	WA	Curtis Roe	(360) 330-7512	croe@cityofcentralia.com
Chelan County Public					
Utility District No. 1	Wenatchee	WA	Scott Standford	(509) 661-4187	scott.stanford@chelanpud.org
Cheney, City of	Cheney,	WA	Daryce Hoffman	(509) 498-9230	dhoffman@cityofcheney.org
Chewelah, City of	Chewelah	WA	Richard Hixson	(509) 935-8330	rhixson@cityofchewelah.org
Clallam County PUD No. 1	Port Angeles	WA	Mattias Jarvegren	(360) 565-3263	mattiasj@clallampud.net
Clark Public Utilities	Vancouver	WA	Bill Hibbs	(360) 992-3053	bhibbs@clarkpud.com
Clearwater Power Co.	Lewiston	ID	Greg Hansen	(208) 743-1501	ghansen@clearwaterpower.com
Columbia Rural Electric Association	Walla Walla	WA	Doug Case	(509) 526-4041	DCase@columbiarea.com
Cowlitz County PUD	Longview	WA	Rob Salberg	(360) 577-7555	rsalberg@cowlitzpud.org
			Doug Swier	(360) 577-7544	dswier@cowlitzpud.org
Eatonville, Town of	Eatonville	WA	Keri Murphy	(360) 832-3301 x114	kmurphy@eatonville-wa.gov
Ellensburg, City of	Ellensberg	WA	Shan Rowbotham	(509) 962-7251	rowbothams@ci.ellensberg.wa.us
Elmhurst Mutual Power & Light Co.	Tacoma	WA	Dan Brooks	(253) 531-4646	dan@elmhurstmutual.org
Ferry County PUD	Republic	WA	Ed Forsman	(509) 775-3325	eforsman@fcpud.com
Franklin PUD	Pasco	WA	Victor Hubbard	(509) 542-5904	vhubbard@franklinpud.com
Grant County PUD No. 2	Moses Lake	WA	Eric Hector	(509) 793-1596	ehector@gcpud.org
Grays Harbor PUD No. 1	Aberdeen	WA	Jacob Henry	(360) 538-6416	jhenry@ghpud.org
Inland Power & Light	Spokane	WA	Lindsey Hobbs	(509) 789-4249	lindseyh@inlandpower.com
	Ellensburg	WA	Kelly Carlson	(509) 933-7200	kelly.carlson@kittitaspud.com
Jefferson PUD	Port Townsend	WA	Bill Graham	(360) 385-8375	bgraham@jeffpud.org
Klickitat PUD	Goldendale	WA	Anita Clever	(509) 773-7622	aclever@klickpud.com
Lakeview Light & Power Co.	Lakewood	WA	Alan Kakaley	(425) 785-7709	alandse@comcast.net
Lewis County PUD No. 1	Chehalis	WA	Norm Goodbla	(360) 740-2430	norm@lcpud.org
Mason County PUD 1	Shelton	WA	Greg Kester	(360) 877-5249	gregk@hctc.com
Mason County PUD No. 3	Shelton	WA	Justin Holzgrove	(360) 426-8255	justinh@masonpud3.org
McCleary, City of	McCleary	WA	Todd Baun	(360)-495-3667	toddb@cityofmccleary.com
Modern Electric Water Co.	Spokane Valley	WA	Terri Richey	(509) 928-4540	Trichey@mewco.com
Nespelem Valley Electric Co-op, Inc.	Nespelem	WA	Cortney Tillman	(509) 634-4571	cortney@nvec.org
Okanogan County PUD	Okanogan	WA	Debra Peters	(509) 422-8427	DebraP@okpud.org
Okanogan Electric Cooperative	Winthrop	WA	David Gottula	(509) 996-2228	dgottula@ocec.coop
Orcas Power & Light Cooperative	Eastsound	WA	Lindsay Curtis	(360) 376-3587	lcurtis@opalco.com

Pacific County PUD No. 2	Raymond	WA	Jim Dolan	(360) 942-2411	jim@pacificpud.org
Pacific Power	Yakima	WA	William Gatchel	(541) 377-7943	william.gatchel@evergreen-efficiency.com
Parkland Light & Water Co.	Tacoma	WA	Alan Kakaley	(425) 785-7709	alandse@comcast.net
Pend Oreille PUD	Newport	WA	Mark "Bubba" Scott	(509)447-6375	mscott@popud.org
Peninsula Light Company	Gig Harbor	WA	Jim Bellamy	(253) 853-1386	JimB@penlight.org
Port Angeles, City of	Port Angeles	WA	Bob Kajfasz	(360) 417-4718	rkajfasz@cityofpa.us
Puget Sound Energy	Bellevue	WA	Michael Lane	(425) 424-6458	Michael.Lane@pse.com
Richland Energy Services, City of	Richland	WA	Joe Fernandi	(206) 684-3870	joseph.fernandi@seattle.gov
	Seattle	WA	Wayne Knipple	(206) 684-4286	wayne.knipple@seattle.gov
Seattle City Light	Seattle	WA	Art Conrad	(206) 684-3870	art.conrad@seattle.gov
Skamania County PUD No. 1	Carson	WA	Mark Gosvener	1(888) 883-9879	mark@esgroupllc.com
Snohomish County PUD	Everett	WA	Erika Coveny	(425) 783-1906	EMCoveny@snopud.com
Sumas, City of	Sumas	WA	Ruben Hernandez	(360) 988-5711	ruben.hernandez@cityofsumas.com
Tacoma Public Utilities	Tacoma	WA	Roger Peery	(253) 502-8138	rpeery@ci.tacoma.wa.us
Tanner Electric Cooperative	Northbend	WA	Lisa Peabody	(425) 888-0623	lisa@tannerelectric.coop
Vera Water & Power	Spokane Valley	WA	Paul Rich	1(888) 883-9879	paul@esgroupllc.com
Wahkiakum PUD	Cathlamet	WA	Lia Sealund	(360) 795-3266	lsealund@wahkiakumpud.org
Whatcom County PUD #1	Ferndale	WA	Paul Siegmund	(360) 384-4288	paul.siegmund@pudwhatcom.org

WASHINGTON LIGHTING SPECIALIST:

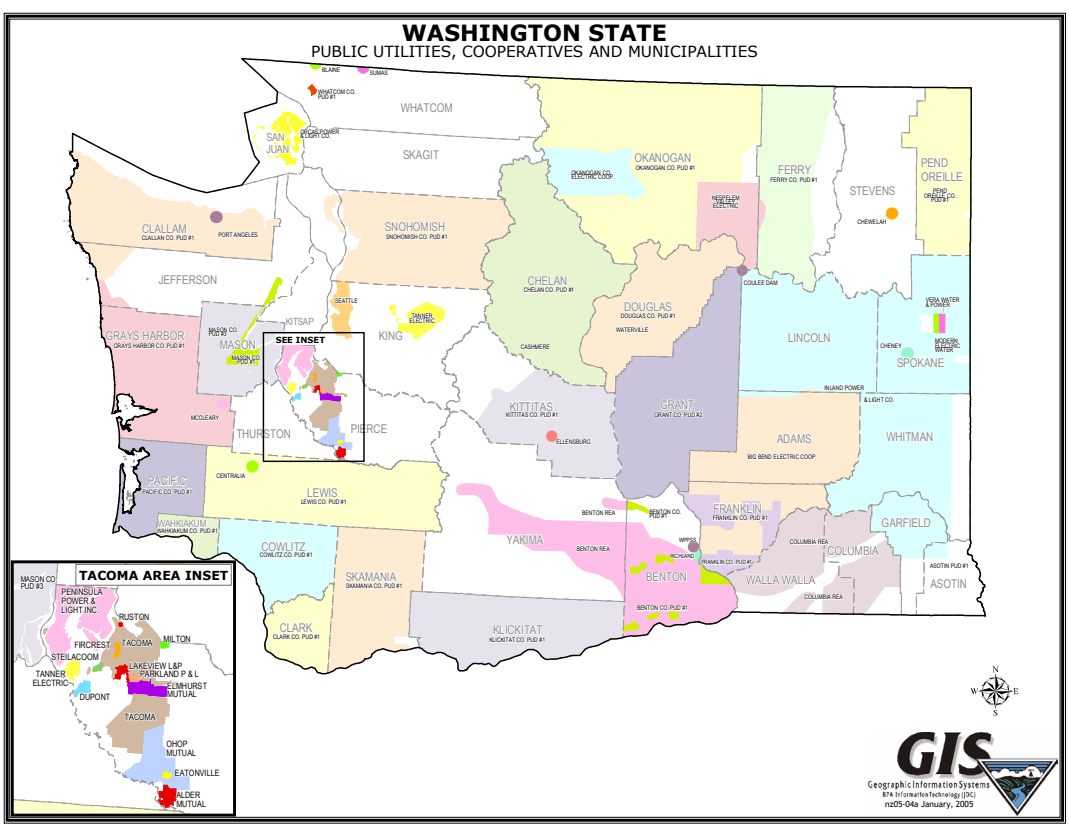
Jeff Anderson
Western Washington

Nancy Roth
Southwest Washington

Andy Gerde
Western Washington

John Wilmoth
Northeast Washington

Nick Jones
Central & Southeast Washington



OREGON

UTILITY NAME	CITY	ST	REP	PHONE	EMAIL
Ashland, City of	Ashland	OR	Larry Giardina	(541) 552-2065	giardin@ashland.or.us
Bandon, City of	Bandon	OR	Paul Rich	1(888) 883-9879	paul@esgroupllc.com
Canby Utility Board	Canby	OR	Mark Gosvener	1(888) 883-9879	mark@esgroupllc.com
Cascade Locks, City of	Cascade Locks	OR	Mark Gosvener	1(888) 883-9879	mark@esgroupllc.com
Central Electric Cooperative	Redmond	OR	Vern Rice	(541) 312-7775	vrice@cec.coop
Central Lincoln People's Utility	Newport	OR	Paul Rich	(888) 883-9879	paul@esgroupllc.com
Clatskanie People's Utility District	Clatskanie	OR	Brian Fawcett	(503) 308-4575	brian@clatskaniepud.com
Clearwater Power Co.	Lewiston	ID	Greg Hansen	(208) 743-1501	ghansen@clearwaterpower.com
Columbia Power Coop Association	Monument	OR	Josh Hamilton	(541) 934-2311	josh.hamilton@centurytel.net
			Cathy Cartmill	(503) 366-3262	ccartmill@crpud.org
Columbia River PUD	St. Helens	OR	Tim Lammers	(503) 397-8155	tlammers@crpud.org
Consumers Power Inc.	Philomath	OR	Thomas Elzinga	(541) 929-8532	thomase@cpi.coop
Coos-Curry Electric Coop, Inc.	Brookings	OR	Duffell Gray	(541) 332-8182	dgray@cooscurryelectric.com
Douglas Electric Cooperative	Roseburg	OR	Todd Munsey	(541) 673-6616	tmunsey@douglaselectric.com
Emerald People's Utility District	Eugene	OR	Rob Currier	(541) 744-7402	rob@epud.org
Energy Trust of Oregon	Portland	OR	Lisa Hull	(503) 559-7379	lisa.hull@evergreen-efficiency.com
Eugene Water & Electric Board	Eugene	OR	Joe Vaccher	(541) 685-7370	joe.vaccher@eweb.org
Forest Grove Light & Power	Forest Grove	OR	Michael Stoltz	(503) 992-3296	mstoltz@forestgrove-or.gov
Hermiston Energy Services	Hermiston	OR	Kathy Moore	(541) 564-4357	kathy.moore@umatillaelectric.com
Hood River Electric Co-op	Hood River	OR	Chuck Wiesman	(541) 354-1233	chuckw@hrec.coop
Idaho Power (Oregon)	Boise	ID	Shelley Martin	(208) 388-5872	smartin@idahopower.com
Lane Electric Cooperative	Eugene	OR	John Murray	(541) 484-1151	john.murray@laneelectric.com
McMinnville Water & Light	McMinnville	OR	Matt Deppe	(503) 435-3114	mgd@mc-power.com
Midstate Electric Cooperative	LaPine	OR	John Thomas	(541) 536-2126	jthomas@midstateelectric.coop
Milton-Freewater, City of	Milton	OR	Pat Didion	(541) 938-8237	pat.didion@milton-freewater-or.gov
Monmouth Power & Light	Monmouth	OR	Paul Rich	1(888) 883-9879	paul@esgroupllc.com
Northern Wasco County PUD	The Dalles	OR	Lance Kublick	(541) 298-3311	lance-kublick@nwasco.com
Oregon Trail Electric CC	Baker City	OR	Sandra Ghormley	(541) 523-3616	sghormley@otecc.com
Pacific Power	Portland	OR	Lisa Hull	(503) 559-7379	lisa.hull@evergreen-efficiency.com
Portland General Electric	Portland	OR	Lisa Hull	(503) 559-7379	lisa.hull@evergreen-efficiency.com
Salem Electric	Salem	OR	Willie Ball	(503) 362-3601	ball@salemelectric.com
Springfield Utility Board	Springfield	OR	David Harris	(541) 744-3775	davidh@subutil.com
		OR	Jack Foster	(541) 744-3765	jackf@subutil.com

Tillamook People's Utility District	Tillamook	OR	Dave Wimpy	(503) 842-2535	davew@tpud.org
Umatilla Electric Cooperative	Hermiston	OR	Kathy Moore	(541) 564-4357	kathy.moore@umatillaelectric.com
Wasco Electric Cooperative	The Dalles	OR	Traci Brock	(541) 296-5051	tracib@wascoelectric.com
West Oregon Electric Cooperative	Vernonia	OR	Mark Gosvener	(888) 883-9879	mark@esgroupllc.com

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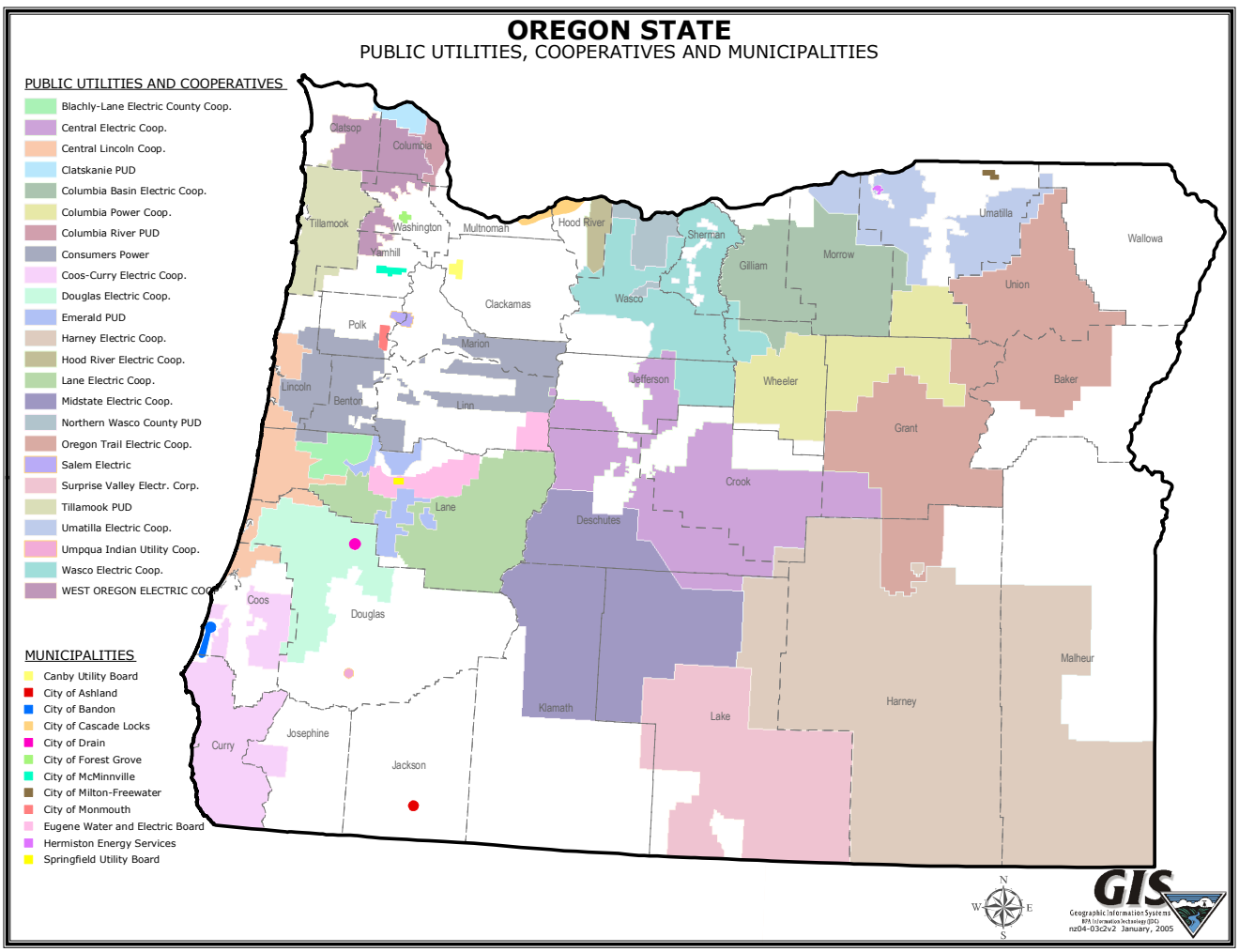
Southern and Central Oregon

Nick Jones
Eastern Oregon

Nancy Roth
Portland Metro

Kandis Bray
Central Oregon

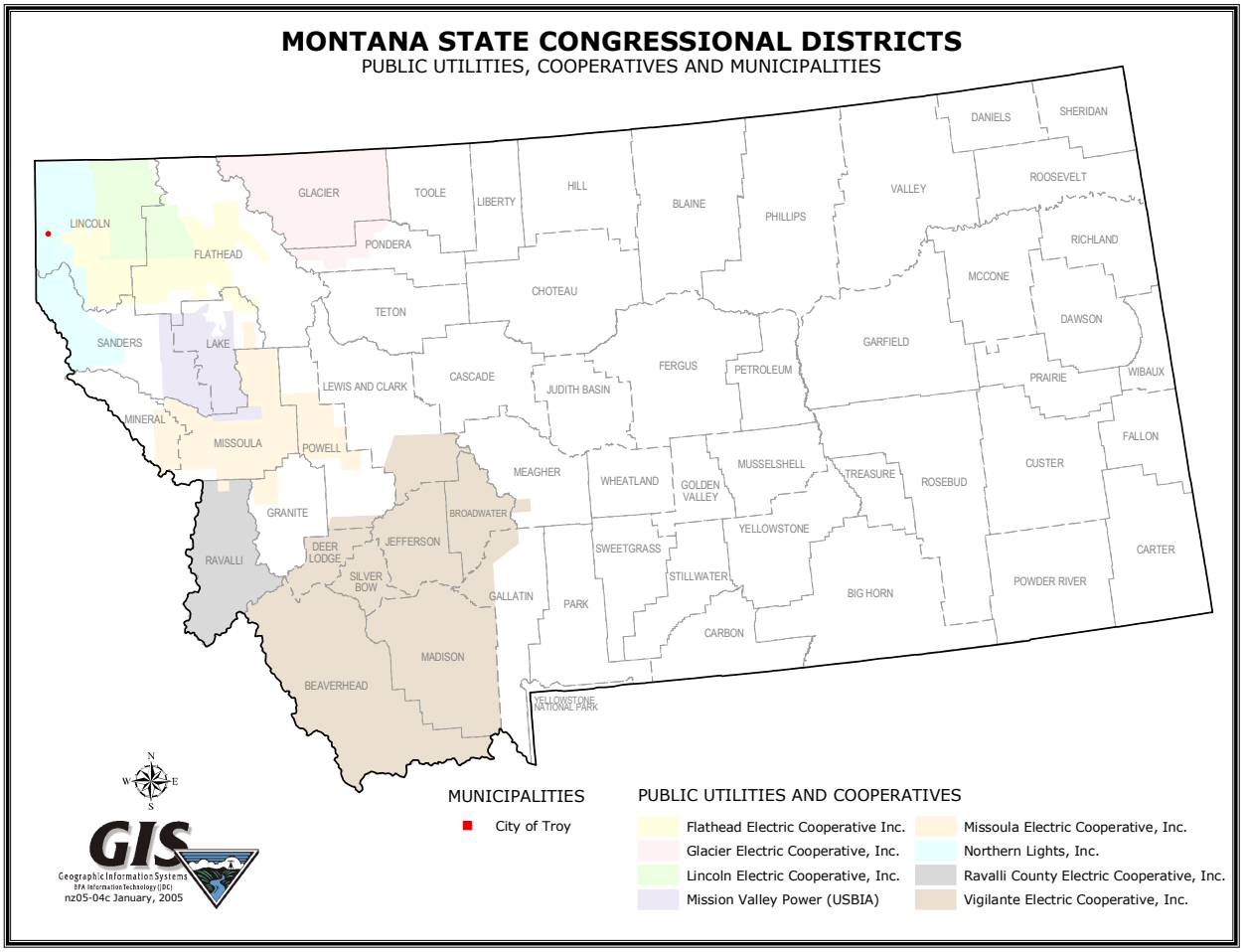


MONTANA

UTILITY NAME	CITY	ST	REP	PHONE	EMAIL
Flathead Electric	Kalispell	MT	Mike Stahlberg	(406) 751-1876	m.stahlberg@flathead.coop
Glacier Electric Coop., Inc.	Cut Bank	MT	Keelie Montalban	(406) 873-5566	lmontalban@glacierelectric.com
Lincoln Electric Cooperative, Inc	Eureka	MT	Brent Holder	(406) 882-3307	brentholder@lincolnelectric.coop
Mission Valley Power	Pablo	MT	Lyle Neiss	(406) 883-7910	neiss@missionvalleypower.org
Missoula Electric Cooperative	Missoula	MT	Dan Rogers	(406) 541-6333	danr@meccoop.com
Northern Lights, Inc.	Sagle	ID	Elissa Glassman	(208) 263-5141	elissa@norlight.org
Northwestern Energy	Butte	MT	Ryan Schwochert	(800) 823-5995	ryan.schwochert@dnvgl.com
Ravalli County Electric Co-op	Corvallis	MT	Jim Maunder	(406) 961-3001	jmaunder@ravallielectric.com
Troy, City of	Troy	MT	Clint Taylor	(406) 295-4540	citytroy@troymt.net
Vigilante Electric Cooperative	Dillon	MT	Rod Siring	(406) 683-2327	contact@vec.coop

MONTANA LIGHTING SPECIALIST:

John Wilmoth
Western Montana



WYOMING

UTILITY NAME	CITY	ST	REP	PHONE	EMAIL
Lower Valley Energy	Jackson	WY	Tony Allen	(307) 739-6022	tony.allen@lvenergy.com

WYOMING LIGHTING SPECIALIST:

Dan Kuhl
Wyoming

NEVADA

UTILITY NAME	CITY	ST	REP	PHONE	EMAIL
Wells Rural Electric Co.	Wells	NV	Paul Rich	(888) 883-9879	paul@esgroupllc.com

NEVADA LIGHTING SPECIALIST:

Dan Kuhl
Nevada

Take a load off. Join the Network.

As a commercial or industrial lighting contractor you have the expertise to improve lighting energy efficiency for your customers, saving them energy and money. The Northwest Trade Ally Network for Commercial & Industrial Lighting supports your business with services and training to help you make new connections with customers and seal the deal on more projects. Membership is loaded with benefits and there is no cost to you. All you have to do is sign up.

WHAT'S IN IT FOR YOU?

- ✔ Technical support and free workshops
- ✔ Information on lighting tools, resources and best practices
- ✔ Access to utility contacts and lighting incentives
- ✔ Increased revenue through more projects

WHAT'S IN IT FOR YOUR CUSTOMER?

- ✔ Updated lighting to improve the work environment
- ✔ Latest energy-efficient technologies to reduce operating costs
- ✔ Utility incentives to reduce project costs and improve payback

Sponsored by Bonneville Power Administration with support from Northwest utilities and energy efficiency organizations

JOIN THE NORTHWEST TRADE ALLY NETWORK TODAY
Call us at 888.205.5756 or email us at info@northwest-lighting.org.

REGIONAL ENERGY EFFICIENCY ORGANIZATIONS

For the last 30 years, the Northwest has been a leader in treating energy efficiency and conservation as a power resource. The Northwest Power Act of 1980 called on the Northwest to give energy conservation top priority in meeting its power needs. The region quickly learned that a megawatt saved is the equivalent of a megawatt produced. Market transformation to energy efficiency and "purchasing" energy efficiency through incentives (known as resource acquisition) is less expensive than creating new power plants or purchasing electricity on the open market.

As of 2009, energy efficiency accounted for only one percent of all electricity production in the United States. But in the Northwest, it accounted for 12 percent, thanks to collaboration among a number of entities.

Key players in this collaboration include the following organizations:

BONNEVILLE POWER ADMINISTRATION (BPA)

BONNEVILLE
POWER ADMINISTRATION

BPA is a federal nonprofit agency based in the Pacific Northwest. Although part of the U.S. Department of Energy, it is self-funding and covers its costs by selling its products and services. BPA markets wholesale electrical power from 31 federal hydro projects in the Columbia River Basin, one nonfederal nuclear plant and several other small nonfederal power plants. About one-third of the electric power used in the Northwest comes from BPA.

BPA also operates and maintains about three-fourths of the high-voltage transmission in its service territory, which includes Idaho, Oregon, Washington, western Montana and small parts of eastern Montana, California, Nevada, Utah and Wyoming.

As part of its shared commitment to meeting the region's power needs, BPA promotes energy efficiency, renewable resources and new technologies. They guide the delivery of energy efficiency opportunities and programs and provide tools, technical support and financial resources to their utility customers.

bpa.gov

NORTHWEST POWER AND CONSERVATION COUNCIL

Northwest **Power** and
Conservation Council

The Council was created by the Northwest Power Act of 1980 to develop and maintain a regional power plan and a fish and wildlife program to balance the Northwest's environmental and energy needs. The Council's three tasks are:

1. Develop a 20-year electric power plan to provide adequate and reliable energy at the lowest economic and environmental cost to the Northwest.

2. Develop a program to protect and rebuild fish and wildlife populations affected by hydropower development in the Columbia River Basin.

3. Educate and involve the public in the Council's decision-making processes.

The Council sets the regional energy efficiency target through power plans. The Sixth Power Plan set public power's share of the regional target at 504 aMw for 2010-2014.

nwcouncil.org

REGIONAL TECHNICAL FORUM (RTF)

Formed by the Northwest Power and Conservation Council in 1999, the RTF selects, develops and maintains methods for estimating savings, costs and lifetimes from the delivery of energy efficiency measures.

A volunteer organization comprised of 20-30 voting members and 60+ corresponding members, the RTF helps review the technical elements of energy efficiency in the Council's power plan, including analysis of the region's progress toward its energy-efficiency goals.

rtf.nwcouncil.org

NORTHWEST ENERGY EFFICIENCY ALLIANCE (NEEA)

NEEA is a nonprofit organization working to increase energy efficiency to meet our future energy needs. NEEA is supported by, and works in collaboration with, BPA, Energy Trust of Oregon, and more than 140 Northwest public and investor-owned utilities to accelerate the innovation and adoption of energy-efficient products, services and practices.

NEEA leverages the region's market power within the commercial, industrial and residential sectors to remove barriers to adoption of energy-efficiency measures, aggregate and synthesize knowledge, convene and collaborate with the region and provide an independent perspective.

neea.org

NORTHWEST TRADE ALLY NETWORK (NWTAN)

Northwest Trade Ally Network
Commercial & Industrial Lighting

NWTAN supports both trade allies and utilities with valuable resources and information relevant to commercial and industrial lighting opportunities across the Northwest. Through networking opportunities, access to expert lighting specialists, free hands-on workshops and more, trade allies gain an increased understanding of utility incentives, lighting calculator tools, sales techniques, best practices and emerging lighting technologies. By enrolling, trade allies are able to deliver better service and energy savings to their customers, which yields more projects and business expansion.

NWTAN also helps utilities connect their customers with key players in the lighting industry including electrical contractors, distributors, manufacturer reps and designers in order to make cost-effective, energy-efficient lighting choices. NWTAN expands utility capacity to serve its business customers, promote more lighting projects and meet energy efficiency targets and goals in the areas of retrofit and new construction lighting.

nwlightingnetwork.com

NORTHWEST LIGHTING NETWORK (NWLN)

NORTHWEST
LIGHTING NETWORK

Developed in partnership with regional utilities and their trade ally networks, the NWLN provides online resources and information to trade allies and utilities to make energy efficient lighting more accessible throughout the region. The robust network website is a one-stop resource for lighting trade allies to keep up to date on workshop and training opportunities, acquire information on relevant trends and technologies, access tools and resources for planning lighting projects, and find contact information for utilities and lighting specialists throughout the region.

nwlightingnetwork.com

LIGHTING DESIGN LAB

lighting
design
lab

The Lighting Design Lab focuses on commercial and industrial lighting and provides education and consultations to over 900 people each year. As an interactive facility that is funded by major Northwest electric utilities and conservation partners, the Lab's services are free or supplemented so it is accessible to all businesses seeking guidance. Their goal is energy efficiency transformation. The Lab also maintains the LED Qualified Products List, which is a resource for regional utilities and trade allies in planning lighting efficiency projects.

The Lab is supported by a core team of Partners in Conservation at Seattle City Light, Northwest Energy Efficiency Alliance, Puget Sound Energy, Bonneville Power Administration, Snohomish PUD, Tacoma Power, Idaho Power, Energy Trust of Oregon, BC Hydro, Washington State University—Extension Energy Program and South Seattle Community College.

lightingdesignlab.com

ANNUAL LIGHTING SURVEY OF
NORTHWEST ELECTRICAL DISTRIBUTORS
2014-2015

OCTOBER 2015

SUBMITTED TO:

Northwest Energy Efficiency Alliance

Bonneville Power Administration

PREPARED BY:

Navigant Consulting, Inc. and Cadeo Group

REPORT HIGHLIGHTS

LED unit sales more than doubled from 2012 to 2014

Linear fluorescents lamps (LFLs) remain by far the most common lamp technology, dominated by 32W T8 lamps

Unit sales of tubular LEDs (TLEDs) grew rapidly, albeit from a small base

Screw-in LED sales growth appears to be slowing relative to TLEDs and luminaire shipments

HID unit sales continue to decline rapidly

Interviews indicate a growing interest in lighting controls

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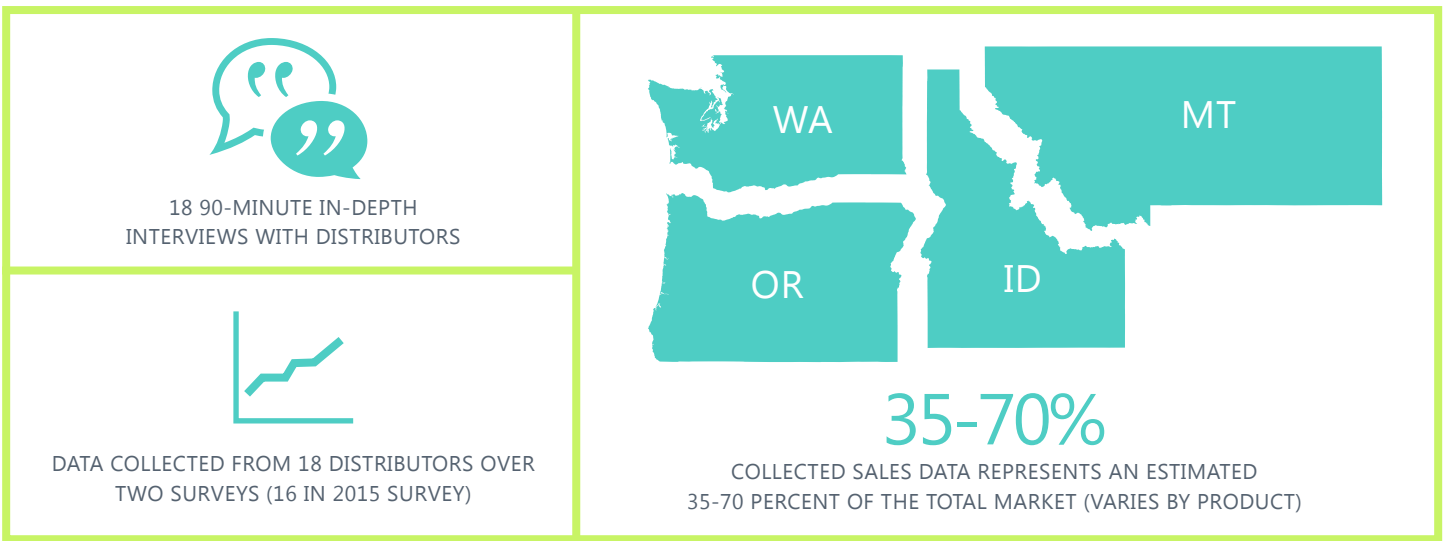
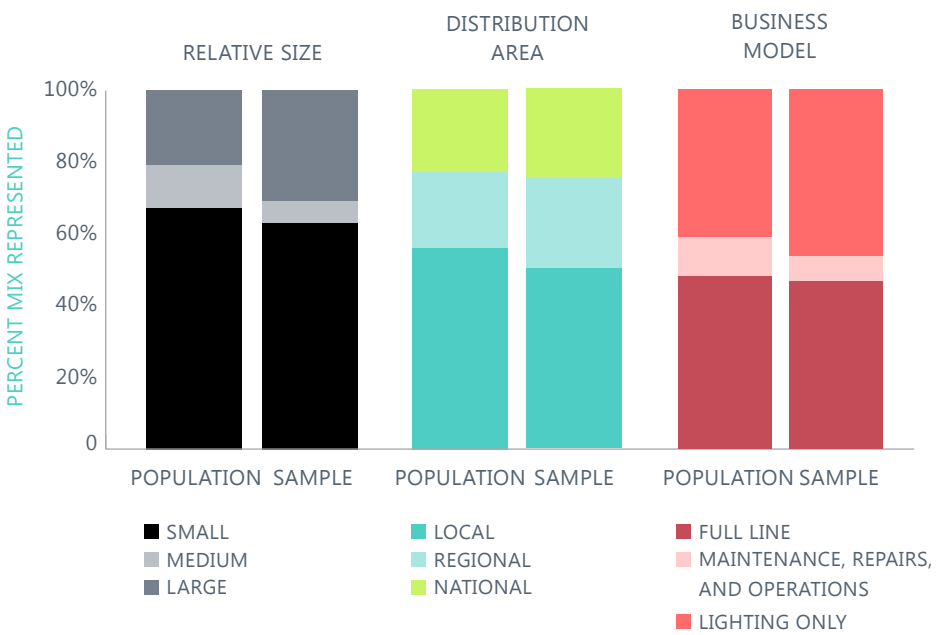
REPORT OVERVIEW

This report presents the results of the second annual BPA and NEEA Northwest Electrical Distributor Lighting Survey. The first survey, conducted in 2013, analyzed lighting sales data from 2010-2012. This survey builds on that initial effort – it presents sales data for 2013 and 2014 and includes responses from more distributors than the first survey. From the fall of 2014 to early 2015, the research team conducted 18 90-minute interviews with Northwest lighting distributors and collected detailed sales data from 16 of them.[1] The research team estimates the total sales of these distributors represented 35 percent to 70 percent of the total Northwest non-residential distributor market, depending on the product.[2]

COMPOSITION OF PARTICIPANTS



MIX OF DISTRIBUTORS IN THE SAMPLE COMPARED TO THE POPULATION



Source: Navigant and Cadeo analysis of distributor sales data

In developing the Northwest lighting study, the team worked with NEEA program staff, BPA program staff, and the Northwest Lighting Network to gather an initial list of all known electrical distributors in the Northwest region and categorized the distributors as "large," "medium," or "small" based on their number of branches in the region. The research team attempted to collect data from all large distributors, as well as, a representative mix of medium and small distributors, urban and rural markets, and end-use market segments. The chart to the left shows the mix of participating distributors by relative size, distribution area, and business model, compared to the mix of the population of distributors in the Northwest.

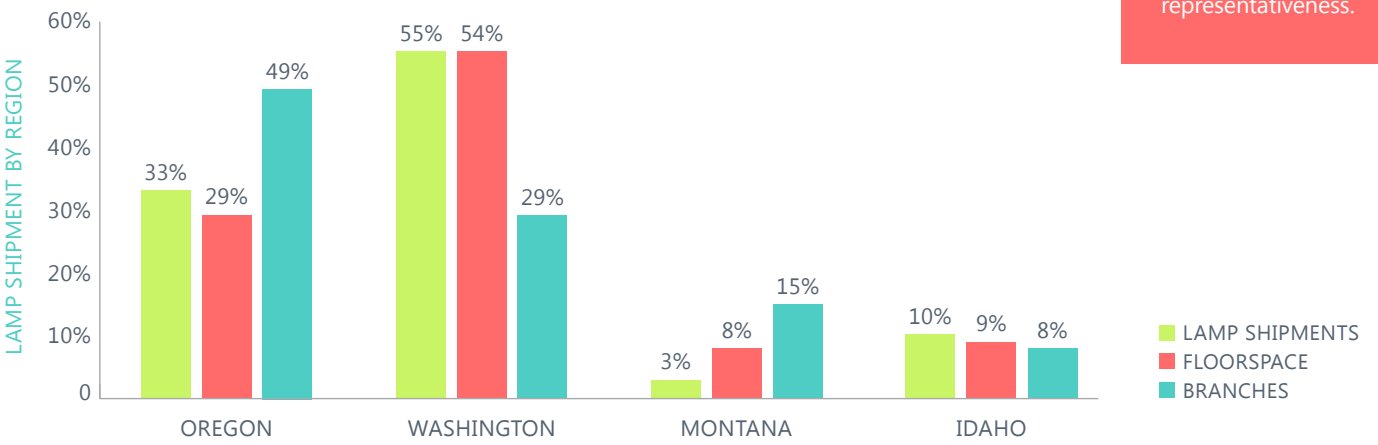
[1] 12 distributors submitted data in the 2013-14 survey for 2010-2012 sales. 10 of these distributors submitted data again in the 2014-15 study (for 2013 and 2014 sales). Six new distributors participated in the 2014-15 study, in most cases submitting sales data dating back to 2010. Two of the original participants did not submit 2013 and 2014 sales data in the 2014-15 study. A combined 18 unique distributors have provided data in the two surveys.

[2] Total non-residential lighting shipments in the Northwest were calculated by scaling national sales data estimates to the Northwest region based on commercial floor space.

The report characterizes the presented sales data as either "reported" or "estimated market average." Reported values represent actual sales data from distributors that have not been adjusted to account for sales from non-responders and other channels. The term "estimated market average" in this report refers to sales data that have been adjusted for representativeness.

The table below shows the data received by state, along with state shares of total commercial floor space and known distributor branch locations by state for context. Relative to commercial floor space, shipment quantity appears to be largely representative of the region with the majority of sales going to Washington (55%) and Oregon (33%).

DISTRIBUTOR LAMP SHIPMENTS, FLOORSPACE, AND BRANCHES BY STATE



Source: Navigant and Cadeo analysis of distributor sales data, total Northwest branches and square footage

SURVEY METHODS

The research team used a pre-constructed data request form to eliminate ambiguity in survey responses. The quantity and quality of data collected allowed the team to draw conclusions about trends within the major lighting technology categories of linear fluorescent, HID, and LED. The survey also requested sales data for controls, but only a few distributors submitted data. Due to limited responses, the team could not be confident these data represented the non-residential lighting market in the region, and only provided qualitative interview findings for controls.

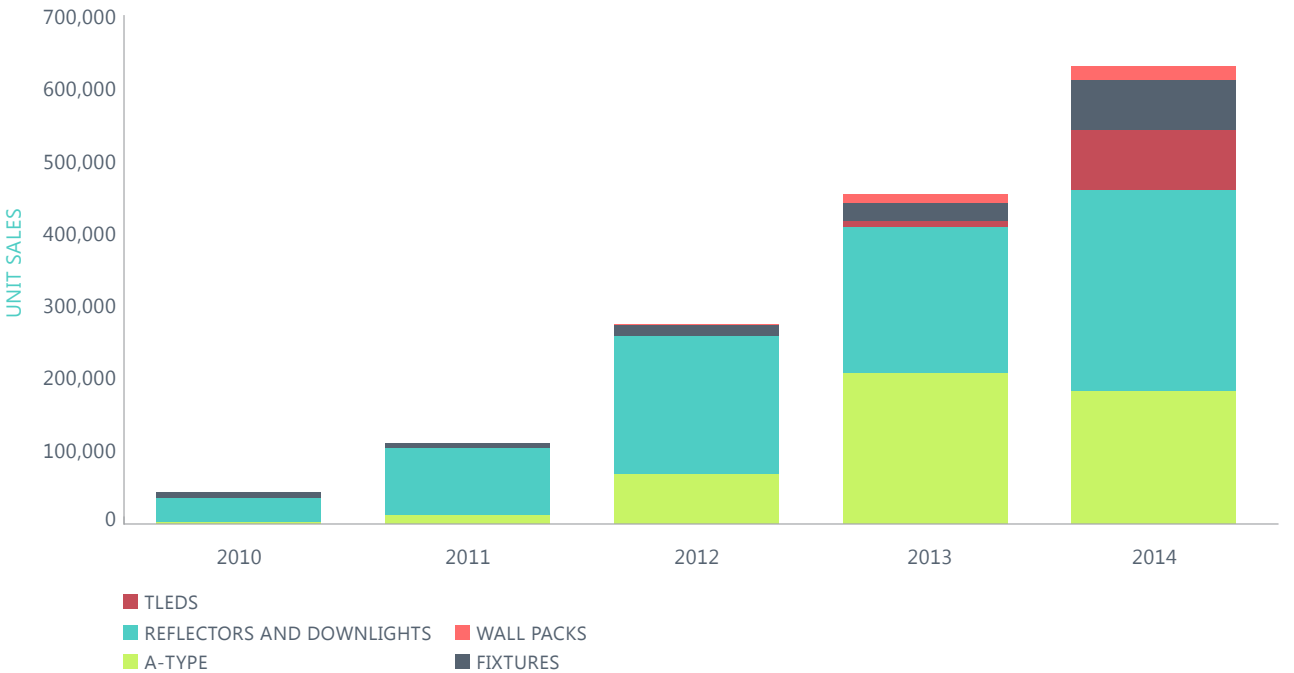
SURVEY RESULTS

LFLs accounted for the majority of the reported sales across the Northwest non-residential lighting market in 2014. Compared to other lamp types on a per unit basis, LFLs made up 83 percent of the reported sales in the 2013 survey, and 59 percent in the 2015 survey. This change is primarily due to the fact that more distributors included incandescent and CFL sales in their reported data submittals, but may also be affected by the small but growing share of LED lamp shipments. LED shipments represented eight percent of reported sales in 2014, up from only four percent in 2012. Due to the continued underrepresentation of incandescent and CFL sales in reported data, the team believes that actual LED market share is lower than these data show.

LED LAMPS

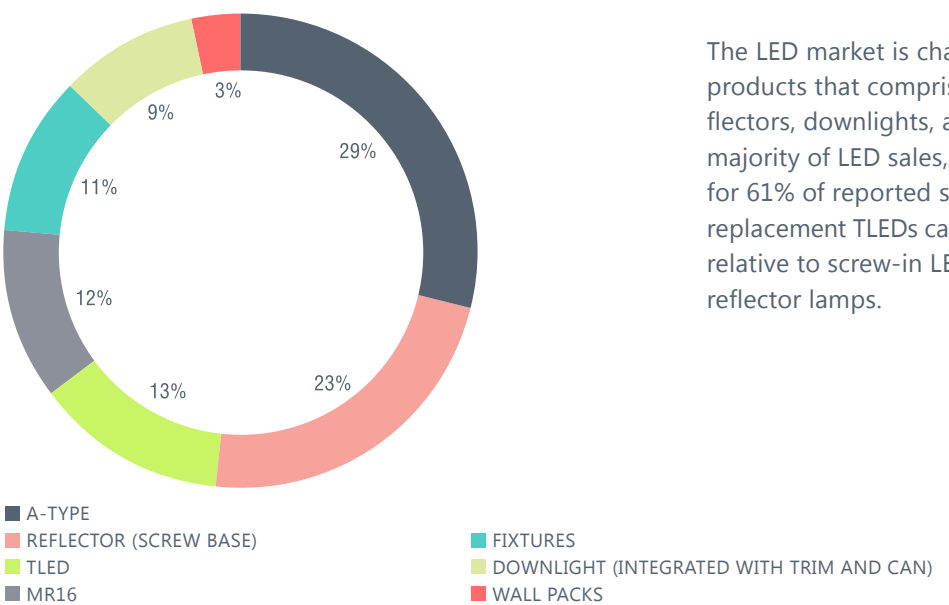
LED lamp technology has progressed quickly since 2010. Costs have come down, reliability has increased, and as a result, sales of LEDs in the Northwest region have grown steadily. The number of total reported LED sales more than doubled between 2012 and 2014 with growth in all LED technology categories.

REPORTED LED SHIPMENTS, 2010-2014



Source: Navigant and Cadeo analysis of distributor sales data

PERCENT OF REPORTED LED SHIPMENTS BY PRODUCT TYPE, 2014



Source: Navigant and Cadeo analysis of distributor sales data

The LED market is changing quickly, and so are the LED products that comprise its sales. FFrom 2010-2012, reflectors, downlights, and A-type lamps constituted the majority of LED sales, and these categories still accounted for 61% of reported sales in 2014. LED fixtures and linear replacement TLEDs captured increased market share in 2014 relative to screw-in LED technologies such as A-type and reflector lamps.

LINEAR FLUORESCENT LAMPS AND TLEDS

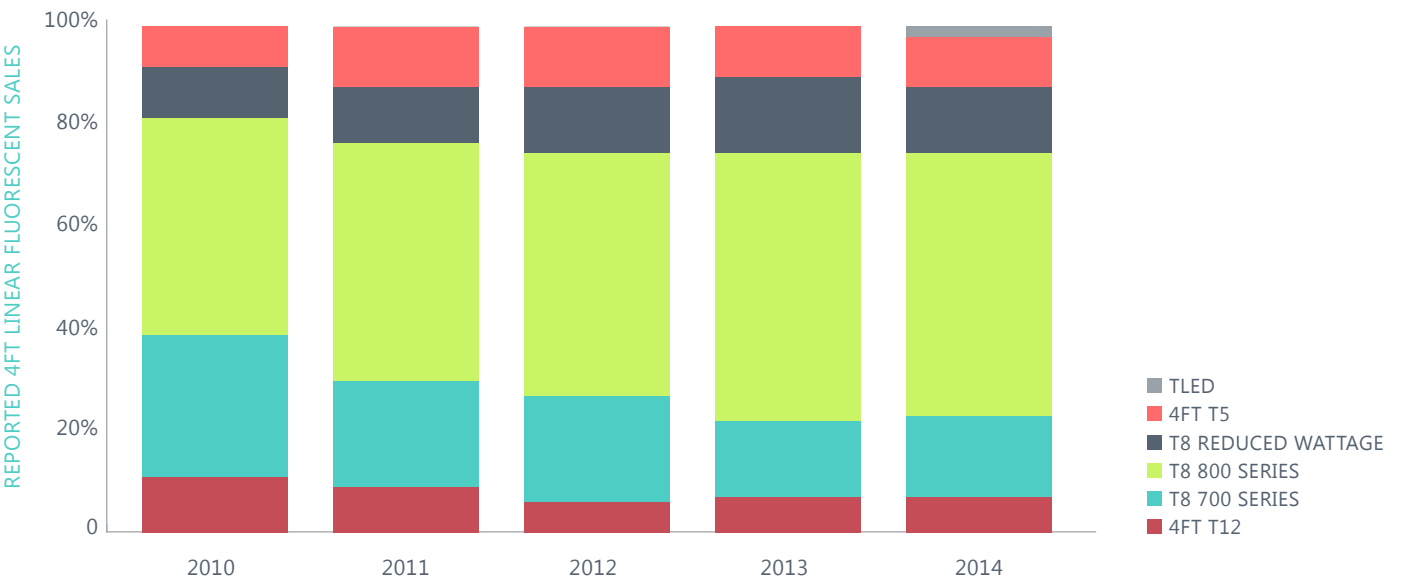
LFLs have been the dominant commercial lighting technology across all five years of the Northwest lighting study. However, data over this five-year span shows decreasing unit sales of LFLs with low efficacies (i.e., how well the lamp produces visible light), such as 700 series T8s and four-foot T12s. A combination of 800 series 32 watt T8s and reduced wattage T8s and T5 lamps, absorbed this changing market share leading to an overall increase in average efficacy across the Northwest. 32W T8 and T12 lamps still represent almost 90% of the market, meaning a shift to reduced wattage lamps (25W and 28W) still offers significant energy savings potential and a market opportunity for distributors.

The new technology on the block was TLED. Although still extremely small compared to the fluorescent market, they have established a presence in the linear market. For purposes of this report, TLEDs consist of all linear LEDs used to replace LFLs. These include three main categories:

1. Direct Lamp Replacement: "Plug and play" lamps which use the existing fluorescent ballast and converts current using internal circuitry
2. Driver/Ballast Swap: Replacement of fluorescent lamp and ballast with LED lamp and driver
3. Ballast Bypass: Existing fluorescent ballast is bypassed but not removed

The direct lamp replacement is presumably the easiest of the replacement options, because it requires only the removal of the existing fluorescent tube, although some distributors mentioned concerns with selling TLEDs that run off the existing ballast. Due to internal circuitry, the direct lamp replacement has an inherently lower efficacy than the other TLED categories, but still has the shortest payback due to its low installation cost.

LINEAR LAMP UNIT SALES, BY TYPE 2013 - 2104



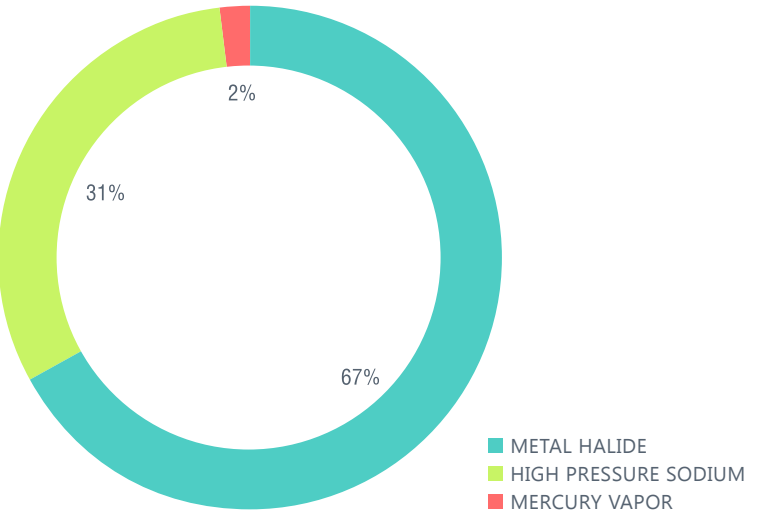
Source: Navigant and Cadeo analysis of distributor sales data

HIGH INTENSITY DISCHARGE LAMPS

Metal halide sales remain the top choice in the HID market with an estimated average market share of 67 percent of all HID sales in 2014. High pressure sodium lamps grew from an estimated average market share of 23 percent of HID sales in 2012 to 31 percent in 2014. Mercury vapor lamps, banned by the federal government in 2009, continue to have an estimated average market share of two percent of HID sales.

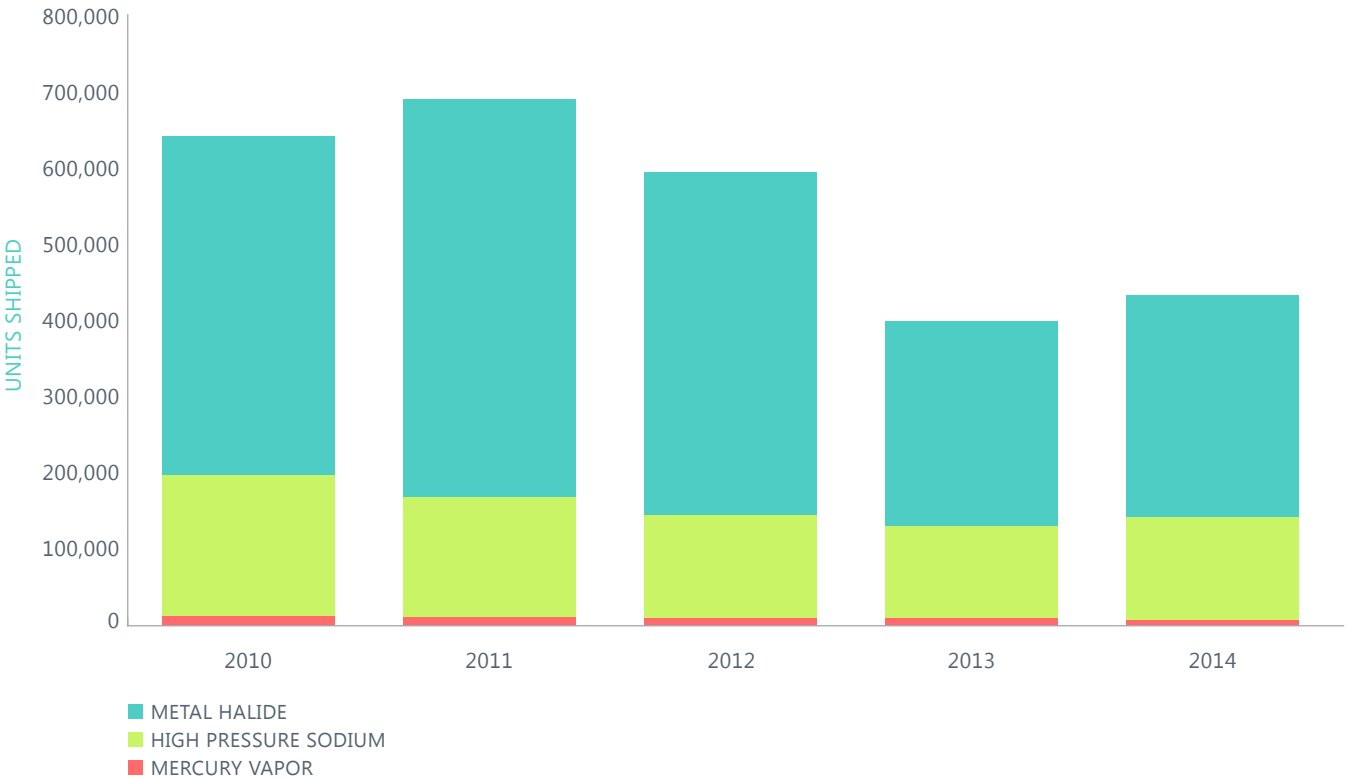
Distributors reported HID lamp shipments in the Northwest region dropped from an estimated 650,000 units in 2012 to 430,000 units in 2014. This also represents a decline in HID share relative to other technologies. Some of the decrease could be accounted for by distributors switching to LED fixtures in recent years.

HID SALES BY TYPE, 2014



Source: Navigant and Cadeo analysis of distributor sales data

HID UNIT SALES BY TYPE, 2010-2014



Source: Navigant and Cadeo analysis of distributor sales data

CONTROLS

Most distributors expect strong growth in the controls segment, while a few expect flat sales. No distributors projected declining sales. There is a large and growing interest in dimming products and integrated controls, but these technologies are still considered too expensive to install without a utility incentive. Distributors said that there is a high awareness of integrated controls, but consumers know very little about them. Cost and education are major barriers to the adoption of these technologies, as is compatibility among brands. At the moment, the complexity of these systems is not enough to justify the cost of installation for many distributors and end-users.

SUPPLIER FEEDBACK

The research team asked interviewees for the number of LED suppliers they had worked with over the last two years. Larger distributors reported working with 20-40 suppliers over the past two years, whereas smaller distributors worked with as few as four suppliers.

TOP LED SUPPLIERS

PHILIPS* SYLVANIA* AcuityBrands® TCP* LITHONIA LIGHTING®*

**Named as one of top three LED suppliers by three or more distributors*

Distributors were also asked to comment on the criteria used to select their suppliers. Several distributors mentioned warranties and longevity of the manufacturing company as deciding factors. The reasons behind the selection criteria were very straightforward; if the manufacturer goes out of business, all warranties for their products become worthless. Other considerations distributors noted were price, personal relationships (with manufacturers or their representatives), customer brand preferences, and Design Lights Consortium or ENERGY STAR certifications.

SUPPLIER SELECTION CRITERIA

Lighting Project Lifecycle

ENTITY	PHASE I Introduction	PHASE II Scoping	PHASE III Implementation	PHASE IV Project Inspection	PHASE V Incentive Processing
					
Trade Allies Electric Contractor, Distributor, manager, representative	Identifies potential project with customer	■ Assists with completion of utility lighting calculator ■ Provides project cost estimate	Completes all work scoped in utility lighting calculator	Makes any corrections or project modifications as suggested	Provides Lighting Specialists and utility with final documentation
NWTAN Lighting Specialists supported by BPA	■ Conducts initial audit-lite in order to estimate project potential ■ Recommends local lighting trade allies	■ Assists in completion of audit with trade ally and lighting tool ■ Ensures owner and trade ally both understand the project specifications ■ When project is ready to proceed, LS engages the utility to confirm proper paperwork is in place	**Not responsible for project management or job oversight**	■ Provides final project audit based on request from utilities ■ Updates calculator and submits to utility for BPA reporting/invoicing	Ensures utility has complete paperwork for incentive processing
Business owner or facilities manager	■ Shows interest in potential project ■ Contacts local utility	■ Participates in initial project scoping activities ■ Reviews trade ally Proposals	Signs agreement with utility (and sometimes trade allies)	Signs off on completed project	Receives incentive payment within estimated 6-8 weeks
Utility Your local utility	Identifies potential project with customer	■ Ensures any pre-project paperwork is complete ■ Approves non-standard measures & incentives	Signs agreement with business owner or facilities manager (and sometimes trade ally)	■ Directly completes audit ■ Signs off on Lighting Specialist audit	Processes Incentive Payment (estimated 6-8 weeks)

*Some NWTAN services may not be available for all projects and are made available based on requests from utility program staff. Actual incentive payments vary by project and utility. For more information contact your local utility or lighting@bpa.gov.

NOTES

NOTES

Northwest Trade Ally Network
Commercial & Industrial Lighting

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