# *2021 Oregon Energy Code & Luminaire Level Lighting Controls*


Panel:
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Moderators:
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# Presenters

Dan Kuhl – Evergreen Consulting

Nathan Beck – Solus

# Todays Session

- Commercial provisions of the OEESC
- New Buildings Lighting Calculator for Code Compliance
- Code Compliance with Luminaire Level Lighting Controls (LLLC)
- Resources/Q&A

Photo Credit: Cooper Lighting Solutions

*We will be referencing various technologies today.*
*We do not endorse any specific manufacturer.*
*Any reference in the presentation today is for educational purposes.*

# *Poll Question*

Q) What is your discipline/role?

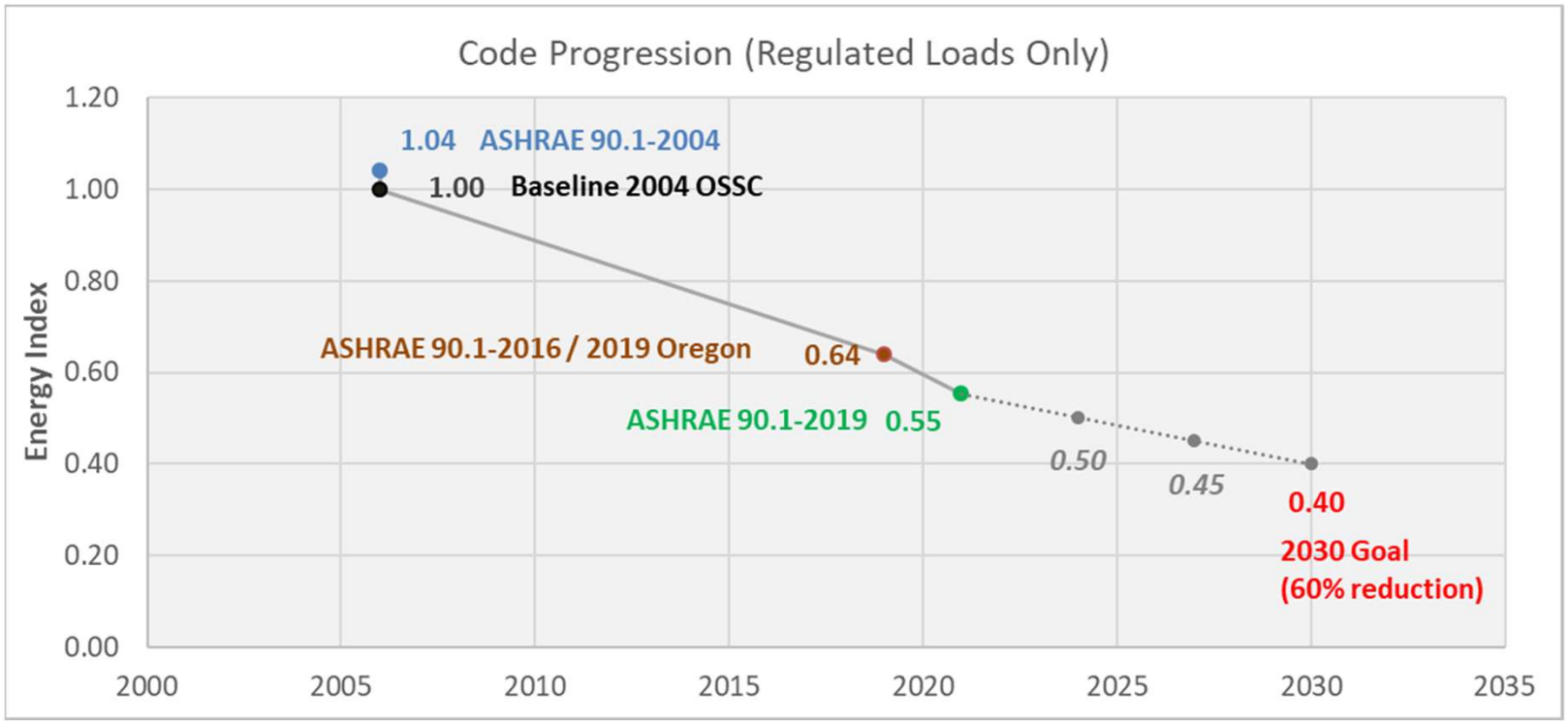
1) Architect
2) Electrical Engineer/Designer
3) Contractor/Installer
4) Manufacturer Rep
5) Facility

# *2021 Oregon Zero Energy Efficiency Specialty Code*

2021 Oregon Energy Efficiency Specialty Code became effective April 1, 2021


90.1-2019

# Code Progression




Codes are becoming more and more efficient, and Controls are a major factor

# Code Updates – Lighting Power Allowance

Reduction in allowed watts per square foot – Table 9.5.1

| Building Type | 2014 | 2019 |
|---|---|---|
| Automotive Facility | 0.79 | 0.71 |
| Health Care Clinic | 0.89 | 0.82 |
| Manufacturing Facility | 1.24 | 0.90 |
| Office | 0.91 | 0.79 |
| Parking Garage | 0.25 | 0.15 |
| Retail | 1.32 | 1.06 |
| Warehouse | 0.66 | 0.48 |

# Code Updates – Lighting Power Allowance

Reduction in allowed watts per square foot for Space By Space– Table 9.6.1

**Table 9.6.1** *Lighting Power Density* **Allowances Using the Space-by-Space Method and Minimum** *Control* **Requirements Using Either Method**

| | | | The *control* functions below shall be implemented in accordance with the descriptions found in the referenced paragraphs within Section 9.4.1.1 For each *space* type:<br>(1) All REQs shall be implemented.<br>(2) At least one ADD1 (when present) shall be implemented.<br>(3) At least one ADD2 (when present) shall be implemented. | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Informative Note:* This table is divided into two sections; this first section covers *space* types that can be commonly found in multiple *building* types. The second part of this table covers *space* types that are typically found in a single *building* type. | | | Local *Control* (See Section 9.4.1 [a]) | Restricted to *Manual* ON (See Section 9.4.1 [b]) | Restricted to Partial *Automatic* ON (See Section 9.4.1 [c]) | Bilevel Lighting *Control* (See Section 9.4.1 [d]) | *Automatic* Daylight Responsive *Controls* for Sidelighting (See Section 9.4.1 [e][6]) | *Automatic* Daylight Responsive *Controls* for *Toplighting* (See Section 9.4.1 [f][6]) | *Automatic* Partial OFF (See Section 9.4.1 [g] [Full Off complies]) | *Automatic* Full OFF (See Section 9.4.1 [h]) | Scheduled Shutoff (See Section 9.4.1 [i]) |
| Common *Space* Types[1] | *LPD* Allowances, W/ft$^2$ | *RCR* Threshold | a | b | c | d | e | f | g | h | i |
| Atrium | | | | | | | | | | | |
| <20 ft in height | 0.39 | NA | REQ | ADD1 | ADD1 | | REQ | REQ | | ADD2 | ADD2 |
| ≥20 ft and ≤40 ft in height | 0.48 | NA | REQ | ADD1 | ADD1 | REQ | REQ | REQ | | ADD2 | ADD2 |
| >40 ft in height | 0.60 | 11 | REQ | ADD1 | ADD1 | REQ | REQ | REQ | | ADD2 | ADD2 |
| Audience Seating Area | | | | | | | | | | | |
| Auditorium | 0.61 | 6 | REQ | ADD1 | ADD1 | REQ | REQ | REQ | | ADD2 | ADD2 |
| Gymnasium | 0.23 | 6 | REQ | ADD1 | ADD1 | REQ | REQ | REQ | | ADD2 | ADD2 |
| Motion picture theater | 0.27 | 4 | REQ | ADD1 | ADD1 | REQ | REQ | REQ | | ADD2 | ADD2 |
| Penitentiary | 0.67 | 4 | REQ | ADD1 | ADD1 | | REQ | REQ | | ADD2 | ADD2 |
| Performing arts theater | 1.16 | 8 | REQ | ADD1 | ADD1 | REQ | REQ | REQ | | ADD2 | ADD2 |
| Religious facility | 0.72 | 4 | REQ | ADD1 | ADD1 | REQ | REQ | REQ | | ADD2 | ADD2 |
| Sports arena | 0.33 | 4 | REQ | ADD1 | ADD1 | | REQ | REQ | | ADD2 | ADD2 |
| All other audience seating areas | 0.23 | 4 | REQ | ADD1 | ADD1 | | REQ | REQ | | ADD2 | ADD2 |

# Code Updates – Daylighting Controls

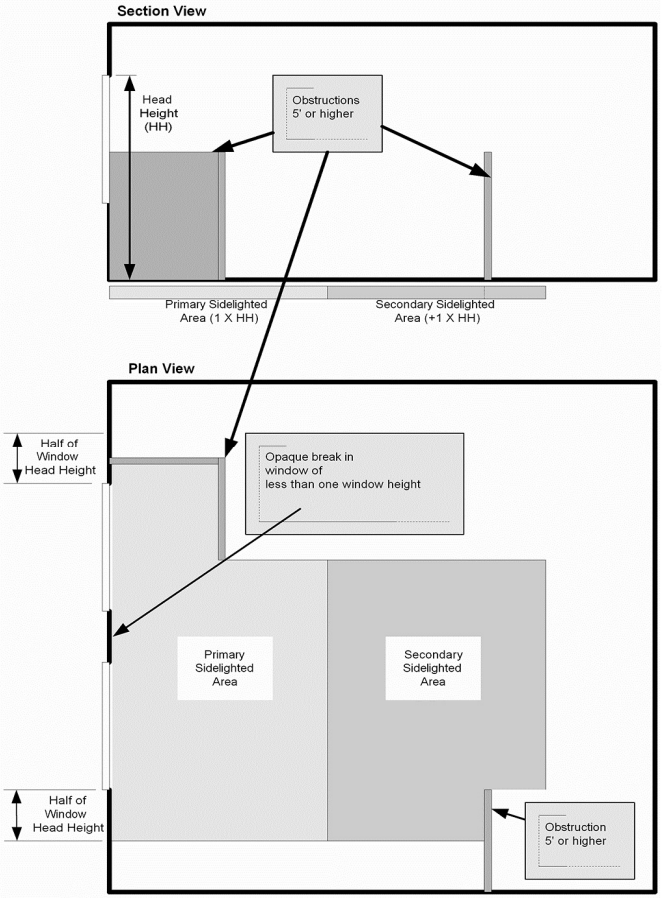
- Continuous daylight dimming required for all spaces
- Step dimming (control points) eliminated from requirements
- Low setting for the photocontrol to reduce electric lighting power in response to available daylight using continuous dimming set to ‘20% or less or off’

# Code Updates – Daylighting Controls

- Sidelighting – Primary & Secondary Zones
- Toplighting – Combination Rules

Examples of control system requirements:

- Calibration adjustment located ≤ 11ft above finished floor
- Reduce electric lighting in response to available daylight using continuous dimming to ≤ 20% and off
- When automatic partial OFF control has reduced to unoccupied set point, daylight responsive control to adjust electric light in response to available daylight (but not above unoccupied set point)



# Code Updates – Parking Garage Controls

*Photo Credit: Cooper Lighting Solutions*

## % reduction & time period

| | 90.1 2016 | 90.1 2019 |
|---|---|---|
| **Time** | 20 | 10 |
| **Reduction** | 30% | 50% |

*Source: DOE*

Continuous daylight dimming down to 50% required for luminaires within 20 ft. of wall openings

# Code Updates – Advanced Controls

## Advanced Controls

An increase in the allowance is also allowed for the use of specified advanced controls that are installed in addition to those already required

*Photo Credit: Cooper Lighting Solutions*

# Energy Trust Forms

520 Lighting Calculator (LC) workbooks for 2014 and 2019 codes can be found on Energy Trust's forms webpage


2019 Code: Form 520LC_2019

2014 Code: Form 520LC

Website: www.energytrust.org/commercial/new-buildings-forms-resources/

# Energy Trust Calculator

- Utilize the design estimator tab to quickly calculate W/sq allowance & incentive estimates
- Includes link and information to submit Project Enrollmer Application (Form 510A)
- Allows Building Area Method OR Space by Space Calculat
- Includes Exterior Lighting Calculations & Incentives

| Select up to 5 Whole Building types* using the drop down list | Enter Building Area (sq. ft.) | Installed Lighting (total W, W/sq. ft. or % better than code) |
|---|---|---|
| *Warehouse* | 50,000 | 15000 Watts |
| | | |
| | | |
| | | |
| | | |

| | |
|---|---|
| Code Year | *2019* |
| Project Type | *New Construction* |

**Self-storage is not an approved building type for this calculator. Please contact the program for assistance.*

**Building Area Method Calculation**

| | |
|---|---|
| Allowable Watts | *24,000* |
| Allowable Watts/sq. ft. | *0.48* |
| Proposed Watts | *15,000* |
| Proposed Watts/sq. ft. | *0.30* |
| Assumed Annual Hours of Operation | *4,050* |

**Savings and Incentive Estimates**

| | |
|---|---|
| Estimated Savings (kWh) | *15,036kWh* |
| Estimated Project Incentives ($) | *$3,007* |

# Code Compliance with Luminaire Level Lighting Controls (LLLC)

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# What is LLLC?

- Integrated Sensors
- Individually Addressable
- Networkable
- Compatible Components

# *Why Luminaire Level Lighting Controls (LLLC)?*

LLLC can be incorporated as a compliance strategy to meet control requirements, including:

- Partial automatic on
- Bilevel lighting control
- Automatic daylight control
- Automatic partial/full off
- Scheduled shutoff

In addition, it offers:

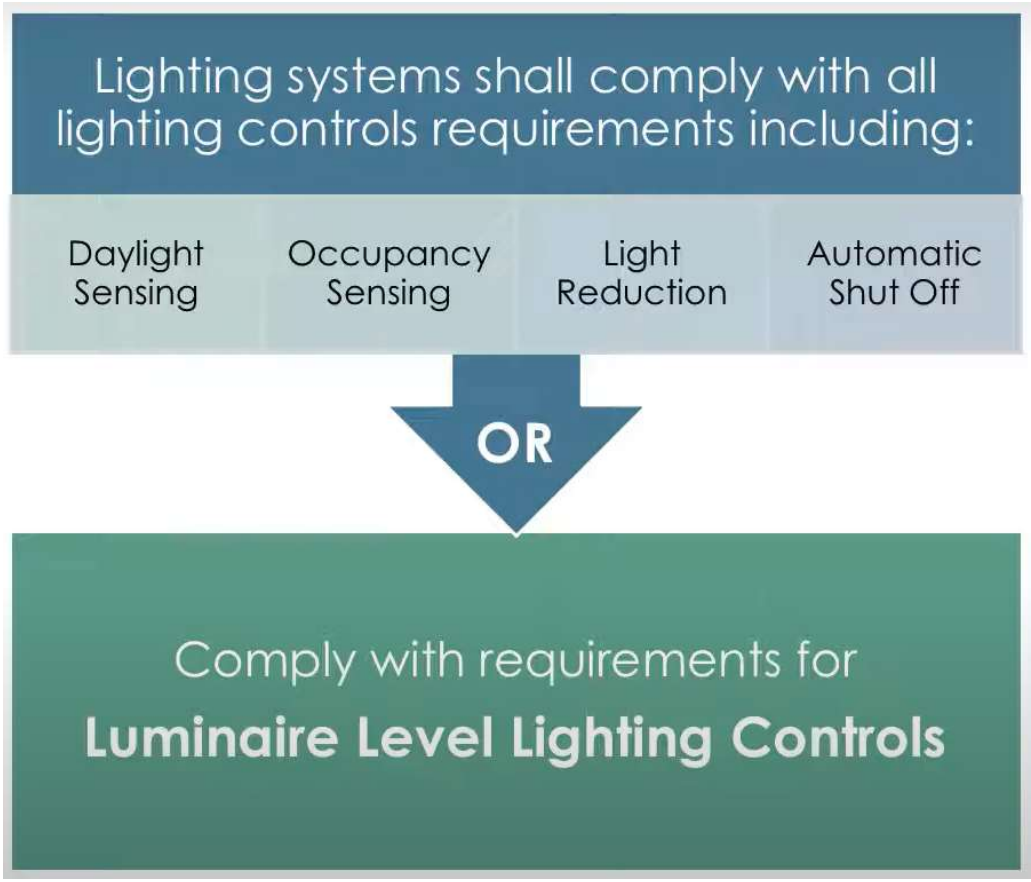
- Additional Energy Savings
- Faster Installation
- Flexibility

*Photo Credit: Cooper Lighting Solutions*

# Design Considerations

Ease of Design & Installation

- Easy to price
- Easy to document
- Part of the fixture
- Flexibility
  - -During design
  - -During construction
  - -Post Occupancy



# LLLC Installation Advantages

- Labor Savings
- Relieved Wiring Frustration
- Faster Project Completion
- Simple Configuration
- Future Expandability
- Reconfigurable

# *Poll Question*

Q) How many of your current projects do you feel would benefit from Luminaire Level Lighting Controls?

1) 10%
2) 25%
3) 50%
4) 75% or higher
5) Not sure

# *Resources Available*

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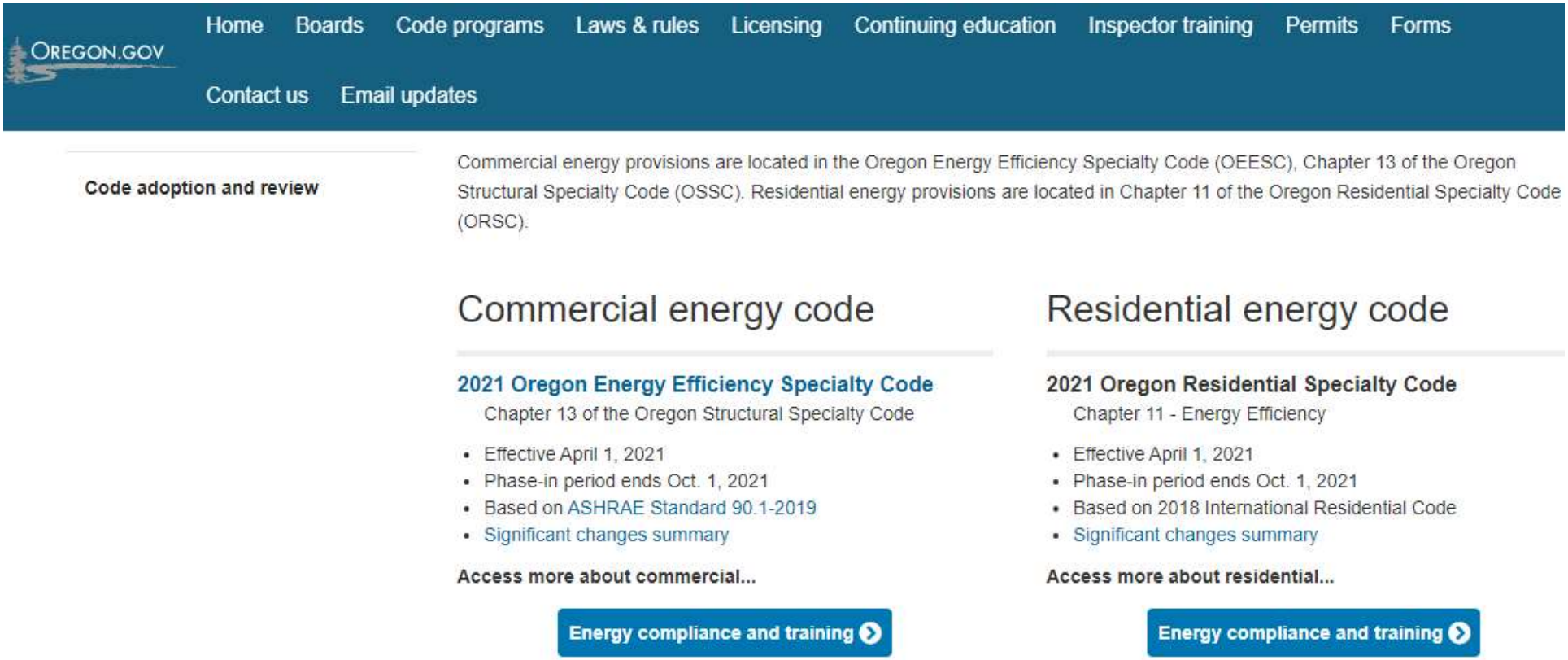
# Resources

## *Find Support Materials at*

**www.betterbricks.com, LLLC**

**www.tradeallynetworknw.com**

# Resources




https://www.oregon.gov/bcd/codes-stand/Pages/energy-efficiency.aspx

# *Questions?*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# *Thank You!*


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