Smart & Healthy Buildings with LLLC

Presented by

BetterBricks | Northwest Energy Efficiency Alliance

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Powerful Energy Ideas. Delivered by NEEA.

Introductions

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Todays Session

- Smart & Healthy Buildings
- LLLC Control Capabilities
- Utility Incentives & Resources
- Q&A Session

Smart & Healthy Buildings Overview

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Buildings and Building Intelligence are **Stuck in the Past**

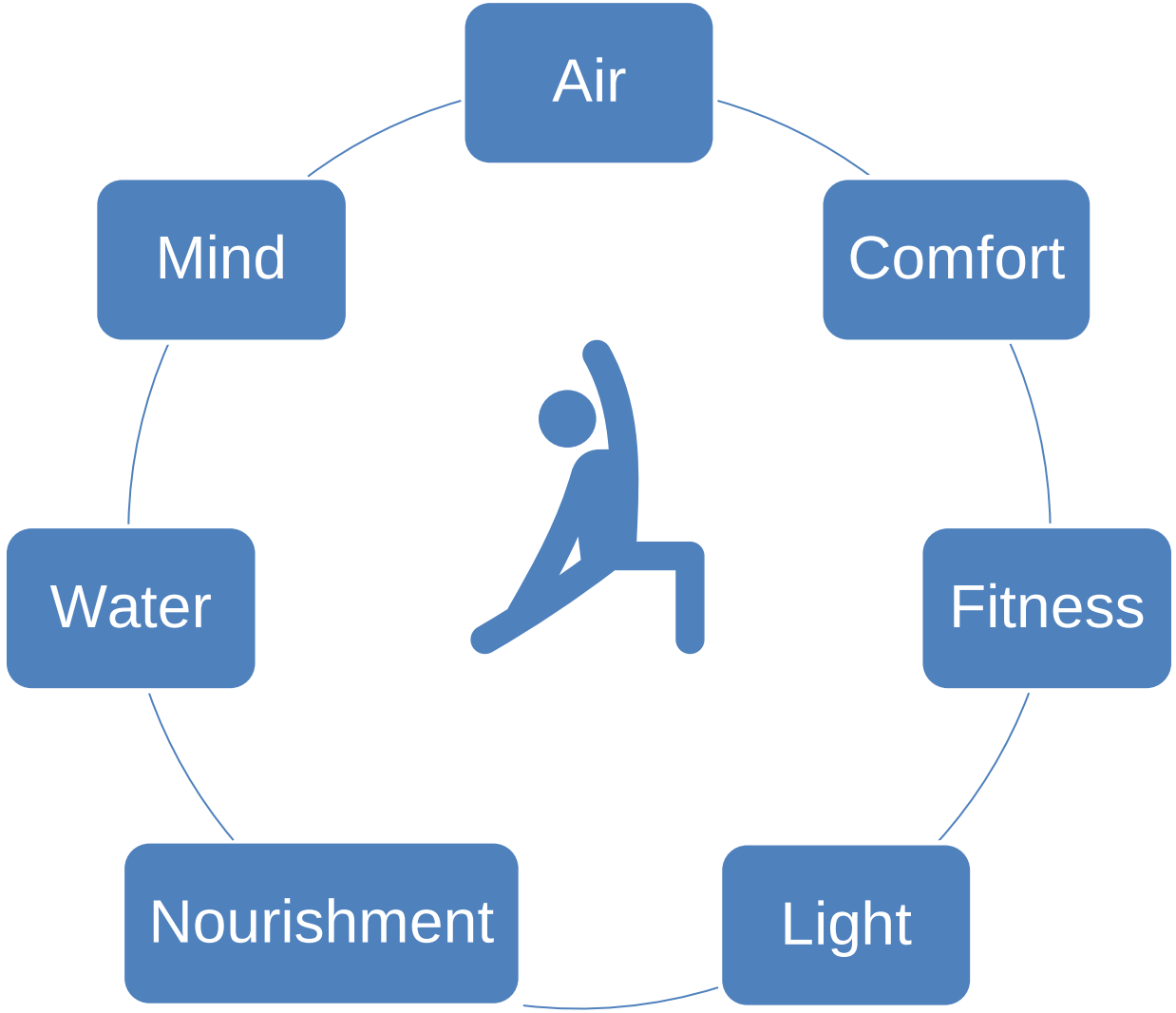
Why are Smart & Healthy Buildings Important?

People can spend up to 90% of their time inside buildings

“67% of US building owners want to create healthier buildings for people”

Sources: Department of Energy & Dodge Data

Well Building Standard



Source: Statistics from International WELL Building Institute (IWBI)

Benefits of Well Buildings

- Improved indoor air quality = 8 -11% higher productivity

80% average occupants are dehydrated

Depression reduced by 27% by fruit & vegetables

Views to outdoor environment increases concentration by 15%

Too warm: productivity 4% lower

Too cold: productivity 6% lower

Noisy environment reduces concentration by 15%

Concentration increases by 6% with views on green (roof)

Source: Statistics from International WELL Building Institute (IWBI)

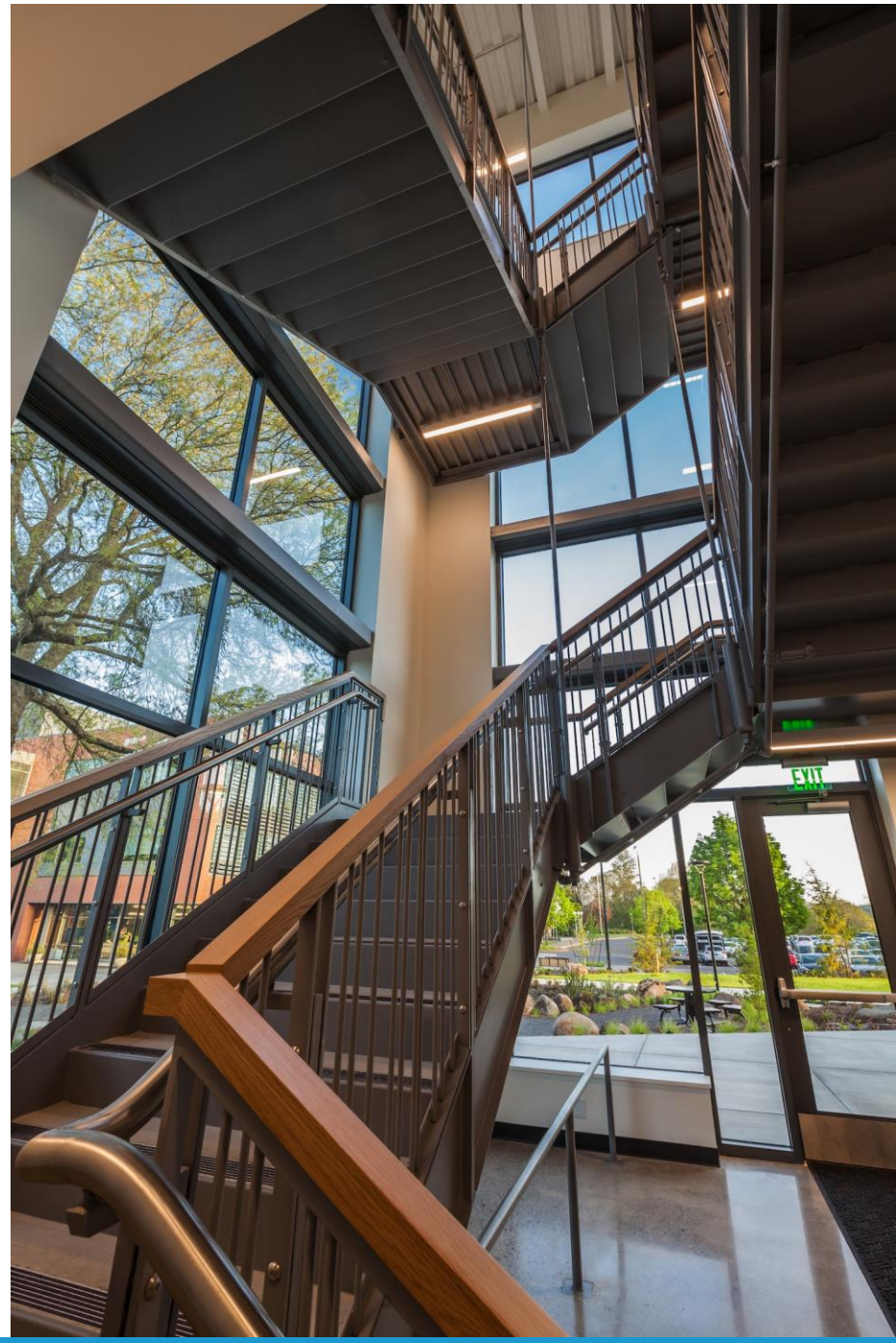
How Does Light Affect Us?

“Both too little and too much light can cause visual discomfort. Important changes in light levels or sharp contrast (which is perceived as glare) can cause stress and fatigue as the human eye is permanently adapting to light levels.”

Source: Indoor Environment And Well-Being – Building Science Handbook

Smart Buildings

Facilities that have intelligent spaces that transform efficiency, comfort, and safety for *people* and *assets*



Smart Buildings

Forces Driving Change in Buildings

Manufacturers:
Range of Players
How to Monetize IoT Products and Services

Customers:
Need for Cost-effective and Easy to Use IoT-enabled products software
Increasing concern over the security, data privacy, ownership and governance

Technology:
High-performance and more reliable wireless networks
moving beyond legacy solutions

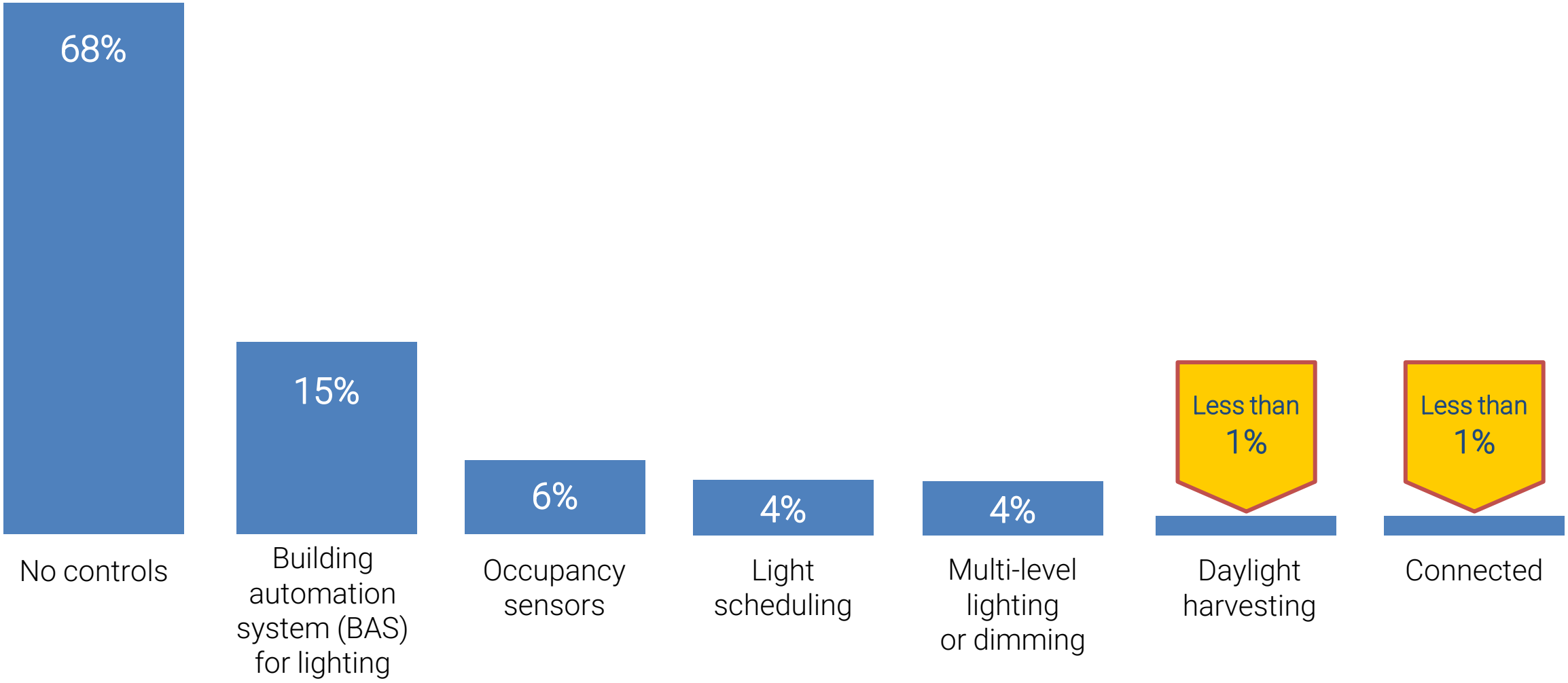
The Future: Lighting

“Increasingly, we see lighting systems playing a critical role in buildings to improve occupant comfort, wellbeing, and productivity as well as to help meet energy savings goals. We anticipate this trend will continue to grow” - Vimal Kapur

Lighting & Control Opportunities

- If a building has people in it, there is a lighting system
- Understood technology and there is a LOT of it
- Cost effective
- Visual improvement

% of Buildings with Lighting Control Strategy



Source: Energy Savings Forecast of Solid-State Lighting in General Illumination Applications, US DOE, 2016

Controls Market Adoption Myths:

- Controls are too expensive to purchase and install

- Lack of information about how controls can provide a more comfortable, human centric focused building for owners and occupants

- The systems are complicated to design and take too much time to specify, install & commission

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LLLC Control Capabilities

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What is LLLC

- Integrated Sensors
- Individually Addressable
- Networkable
- Compatible Components

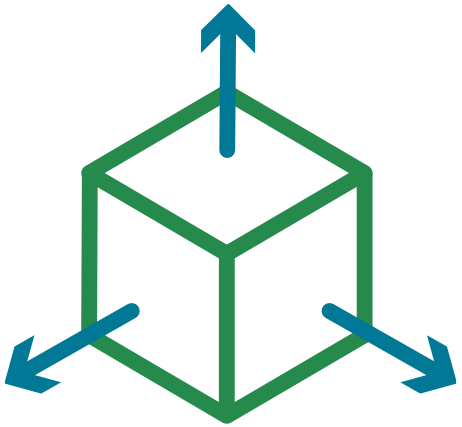
Lighting's Unique Real Estate

- Elevated above us all the time
- Distributed across the building
- Power access at every luminaire

Why Luminaire Level Lighting Controls?

Additional Energy Savings

Occupant Comfort and Flexibility



Occupied Space Adaptability

Energy Code Compliance

The Future: Smart Buildings with LLLC

Simple vs. Expanded LLLC systems

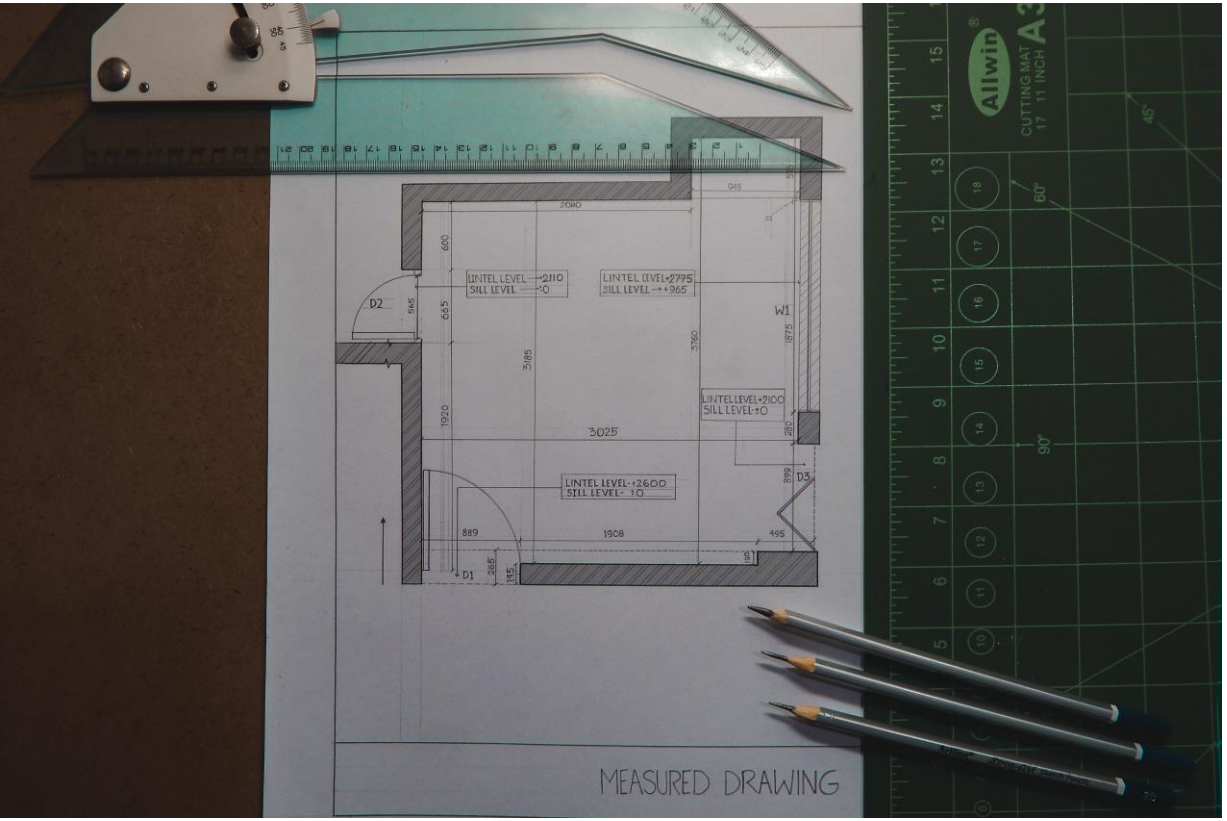
Simple

- Comprehensive or Simple Projects
- Minimal Components
- Standard Control Capabilities/Vocabulary
- Standard Configuration on Site

Expanded

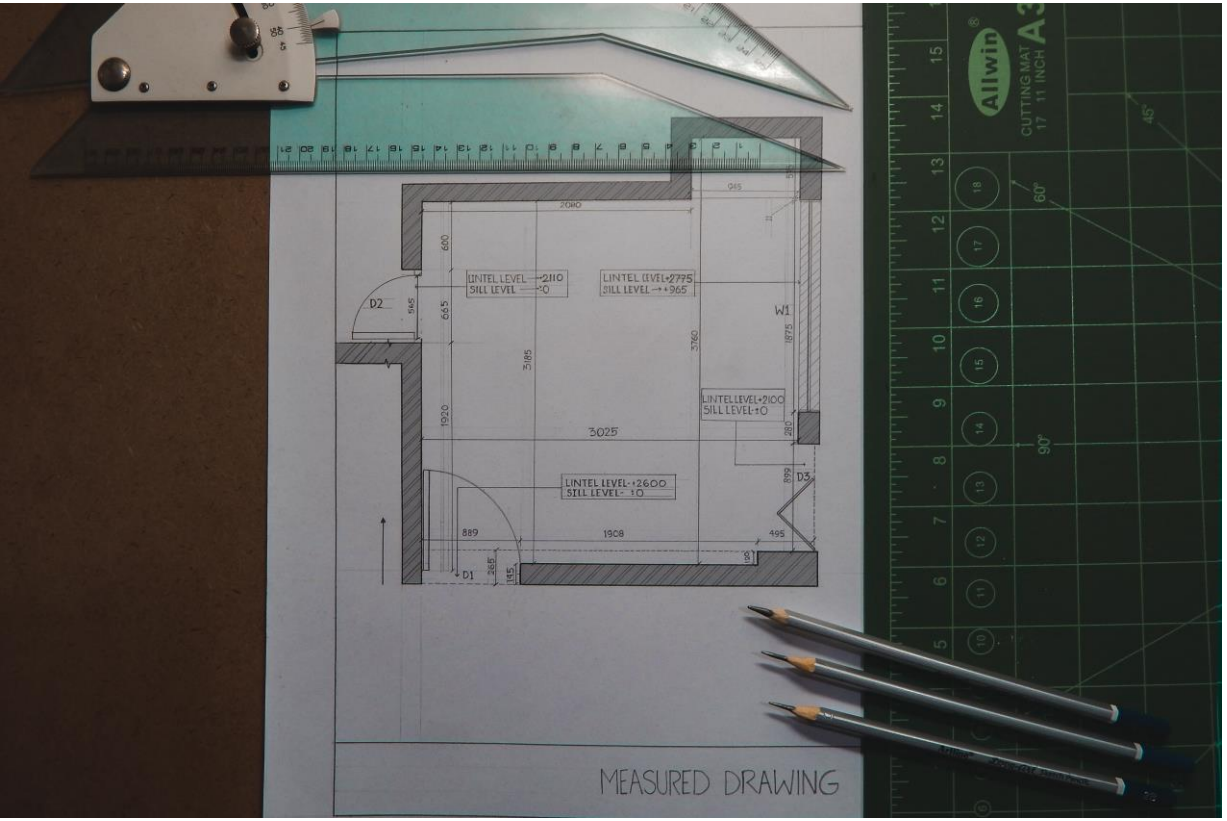
- Larger projects
- Additional Devices Required
- Optional Control Capabilities
- 3rd Party Configuration/Training

Simple LLLC Capabilities



- Occupancy sensing
- Daylight harvesting
- Continuous dimming
- High-end trim/Task Tuning
- Zoning
- Controls persistence

Expanded LLLC Capabilities



- Asset Tracking
- Space Utilization
- HVAC Integration
- Safety & Security
- Circadian Support

Asset Tracking

Space Utilization & Optimization

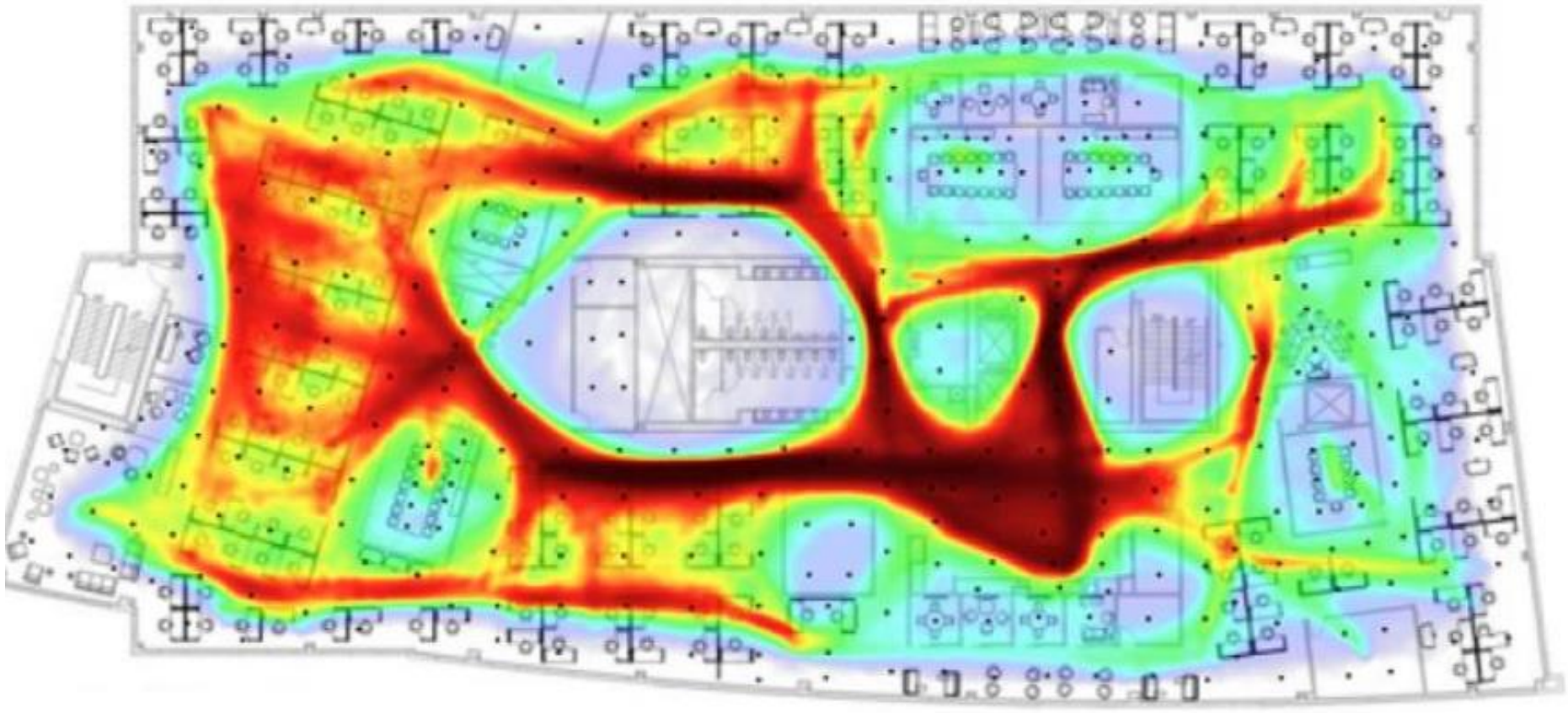
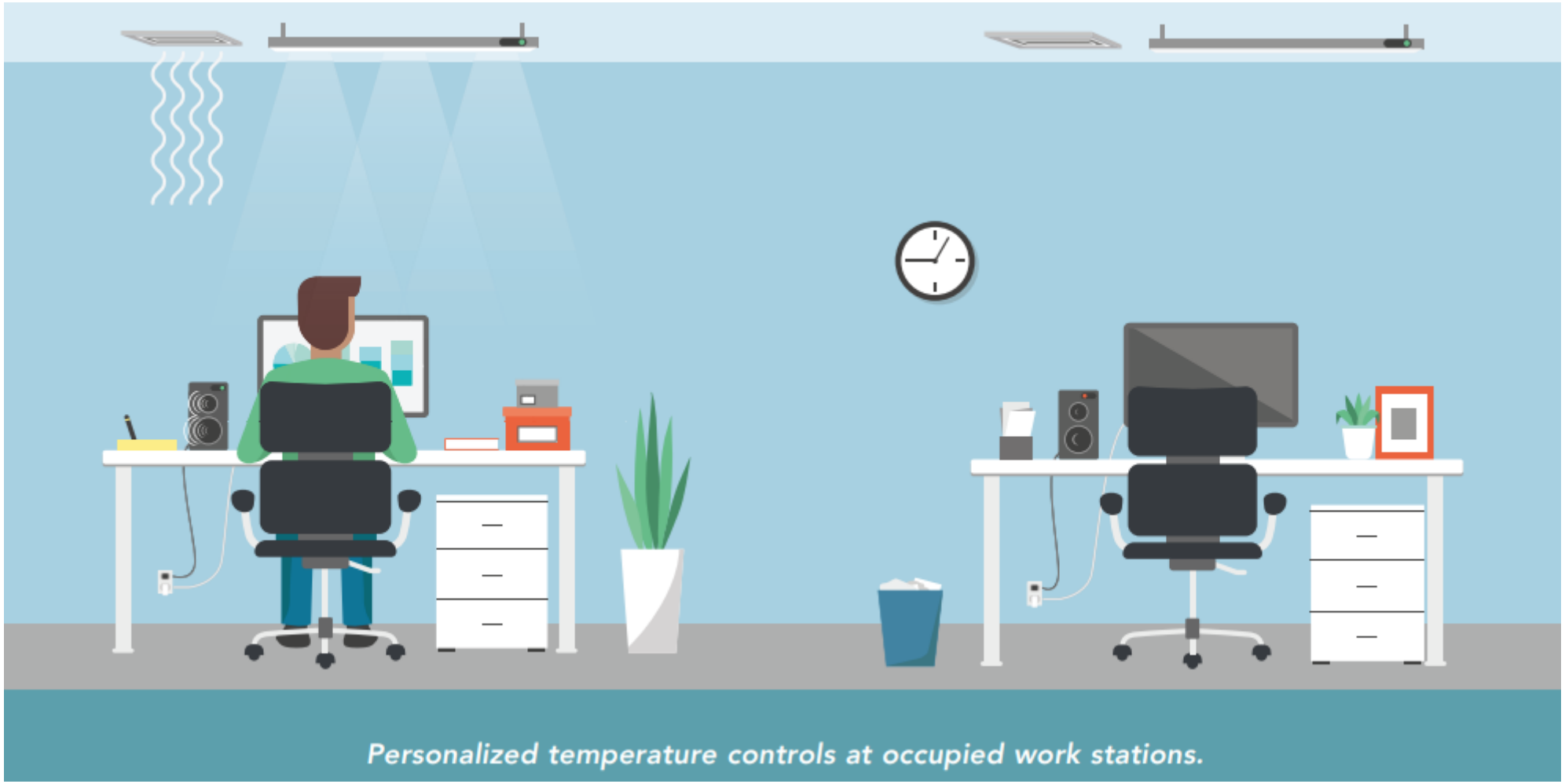


Image courtesy of Enlighted A Siemens Company

Ventilation & Thermal Comfort



Safety & Security

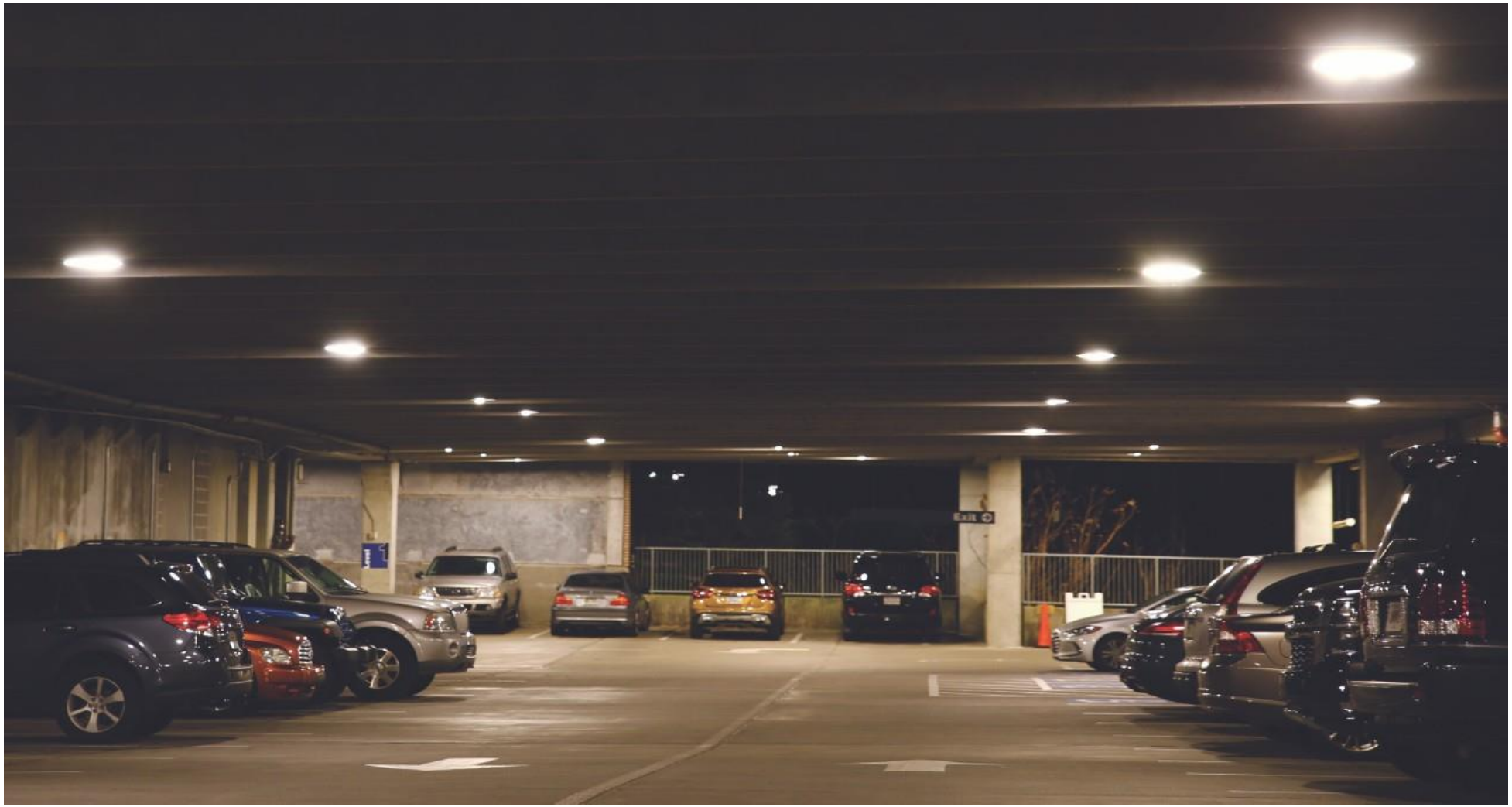
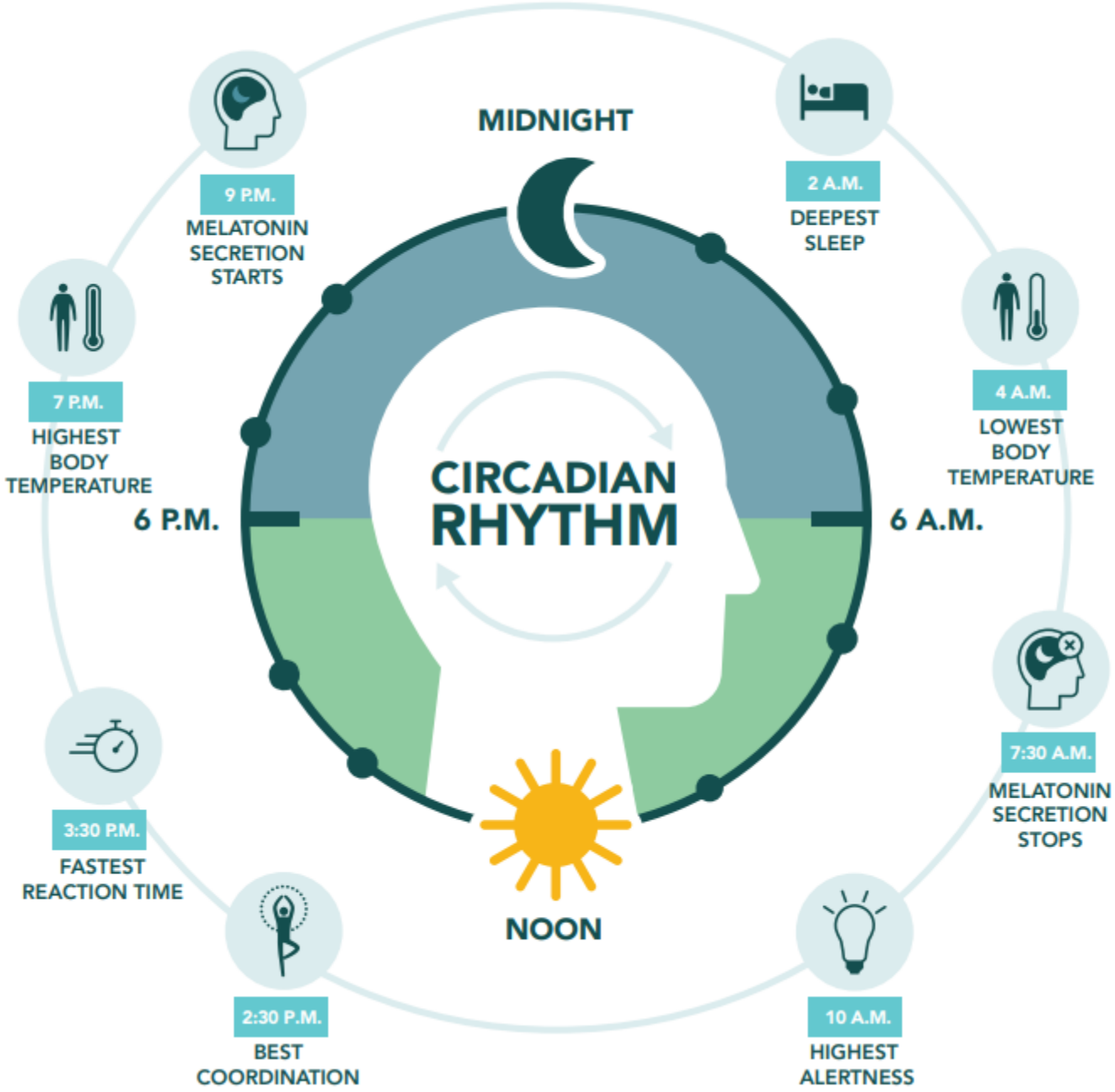


Image Courtesy of Cooper Lighting

Circadian Dosing

The circadian rhythm is a natural physiological function associated with the human sleep-wake cycle and exposure to light.



LLLC Installation Advantages

- Sensors Installed at Factory
- Any Power Connection
- Relieved Wiring Frustration
- Faster Project Completion
- Simple Configuration
- Future Expandability
- Reconfigurable

LLLC Installation Advantages

01

Eliminate up to 60% of your wire runs

02

save 45 minutes per control zone

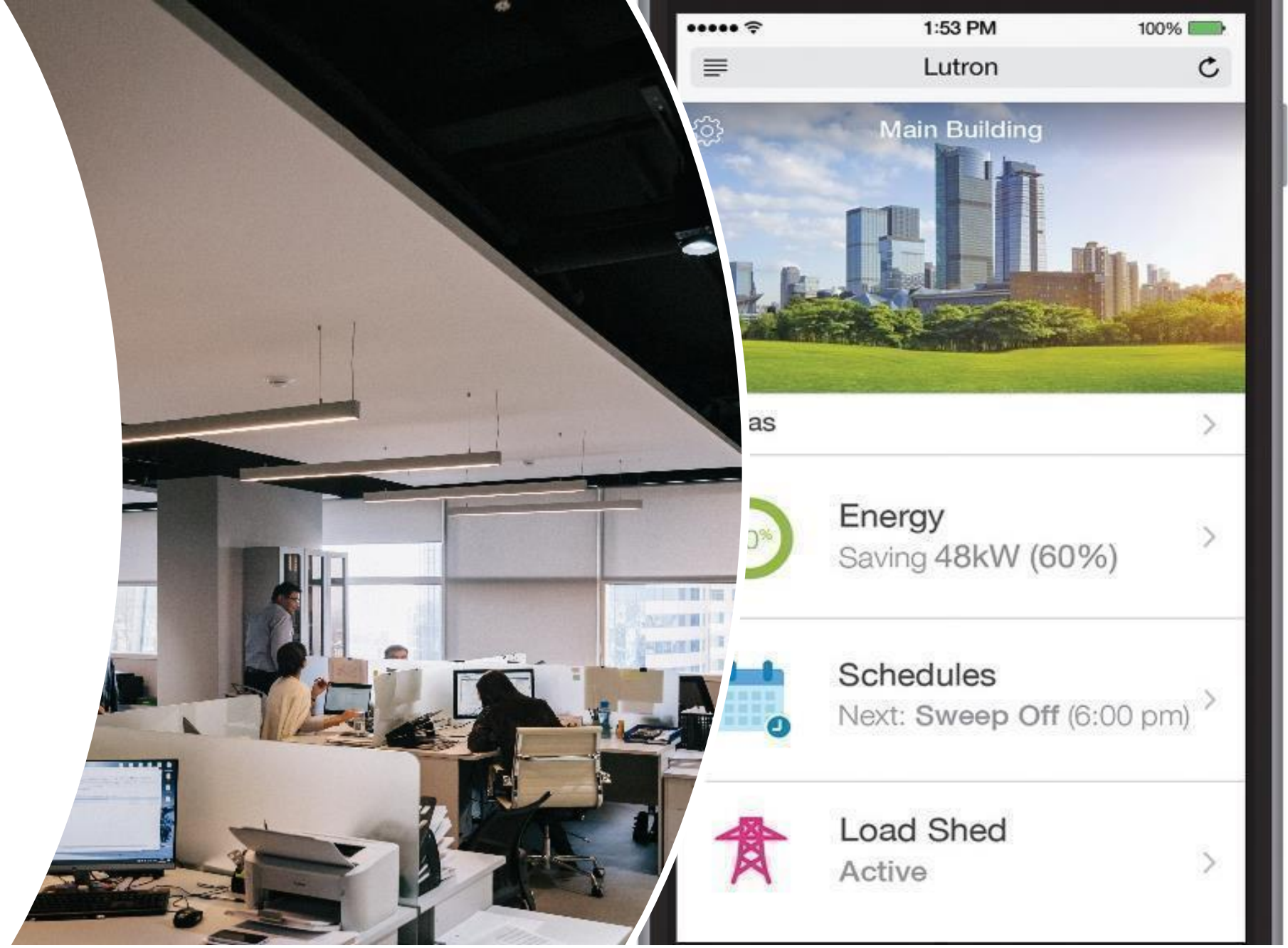
03

get more done with fewer people

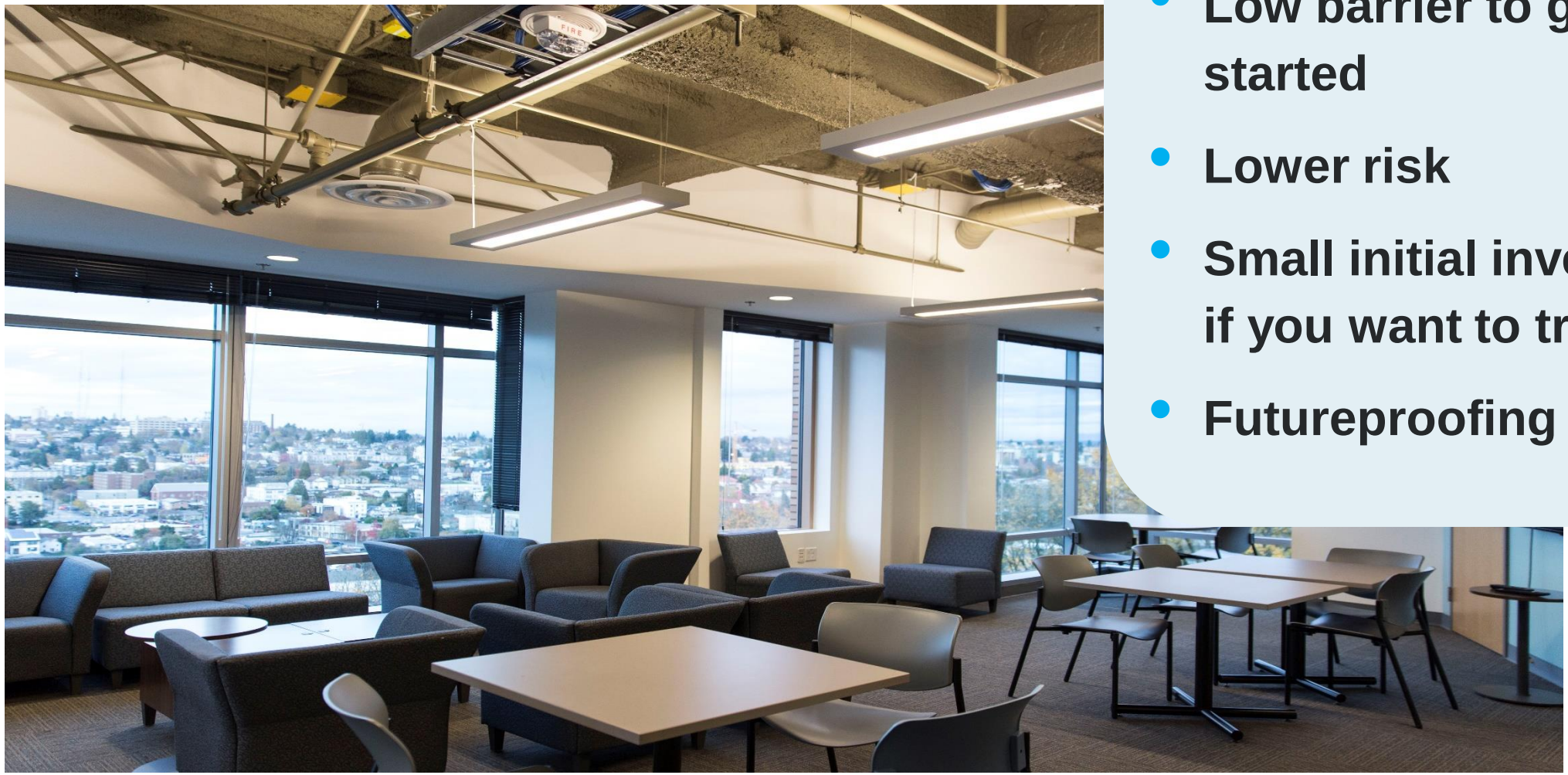
Source: Cooper Lighting

Sensors are the communication director of the building

Simple, Intelligent Lighting



The LLLC Investment



- Incremental lighting upgrades
- Low barrier to getting started
- Lower risk
- Small initial investment if you want to try it out
- Futureproofing

Local Case Study: Enumclaw High School

ENUMCLAW HIGH SCHOOL SAVINGS FROM LLLCS

- No maintenance costs since installation
- Annual 137,218 kWh savings, reducing costs around $13k annually
- Payback after $35,800 incentive from Puget Sound Energy: 3.9 years

Barriers to Adoption

Increasing user expectations

Volatile energy costs

Integration challenges with legacy systems

Systems complexity

Allocating capital to enable flexibility

Operator app fatigue

Resources: Design to Commissioning

- Simplified Systems
- Factory Commissioning Tools
- Remote Access
- Owner/Occupant Education

Summary

LLLC can be the most cost-effective option and easier to purchase and install

“Better Buildings” strategies have positive effects on multiple metrics

Lighting & HVAC will play a large role in healthy buildings in the future

There are resources available to help you with every project type

Utility Incentives & Resources

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SCL Incentives

Faster than a flickering fluorescent

More powerful than getting nothing

Able to leap large project obstacles in a single payment

Seattle City Light

Lighting

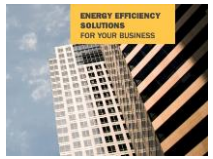



Fixtures*: $0.15/kWh outdoor, indoor, high-bay
LLLC**: $75/fixture + $0.30/kWh (fixture + controls)
Controls: $0.15/kWh

HVAC

Chiller plant upgrades, VSD, compressors: $0.27/kWh
Economizer controls, BAS upgrades: $0.23/kWh
VSD on AHU units: $300/HP

Whole Building



Pay for Performance (P4P): deep retrofits, energy savings 15-20%
Existing Building Commissioning (EBCx): energy savings 7-20%

And much more – stop by the SCL booth and let's talk

* DLC or Energy Star listed
** DLC Networked Lighting Controls (NLC) QPL listed

Puget Sound Energy Incentives

LLLC & Exterior Networked Lighting Controls
Incentivized at $0.35/kWh up to 70% of the installed cost

LLLC Bonus
PSE will incentivize each LLLC fixture at $75
Must be approved by PSE to receive the bonus and must meet the following criteria:

An interior LED lighting luminaires with integrated occupancy and daylight sensors in each luminaire with embedded, lighting control logic and networking capabilities. The control logic shall allow luminaires to detect and share, information with one another to adjust to occupancy and/or daylight in the space. The system must be able to be, programed to allow zoning of the luminaires and have the capability to adjust light levels either individually, or in a zone. Additionally, the system must have local override switching capability, as required by the, Washington State Energy Code.

www.pse.com/business-incentives

Snohomish County PUD

Controls	Wattage Range per Control	Tier 1 (< 4,000 hrs/yr.)	Tier 2 (4,000 - 6,000 hrs/yr.)	Tier 3 (> 6,000 hrs/yr.)
Controls - Networked	1 - 10	$9	$12	$15
	11 - 20	$25	$33	$38
	21 - 30	$37	$50	$58
	31 - 40	$47	$65	$74
	41 - 50	$59	$79	$90
	51 - 60	$61	$83	$95
	61 - 80	$70	$94	$107
	81 - 100	$78	$106	$120
	> 100	$89	$121	$137

www.snopud.com/save-energy/business/rebates

Utilize Your Resources

Contact your Local Utility

Talk to your vendors about technology, training resources and pricing

Consider buildings systems (HVAC, Safety)

Leverage incentive offerings to discuss control options with customers

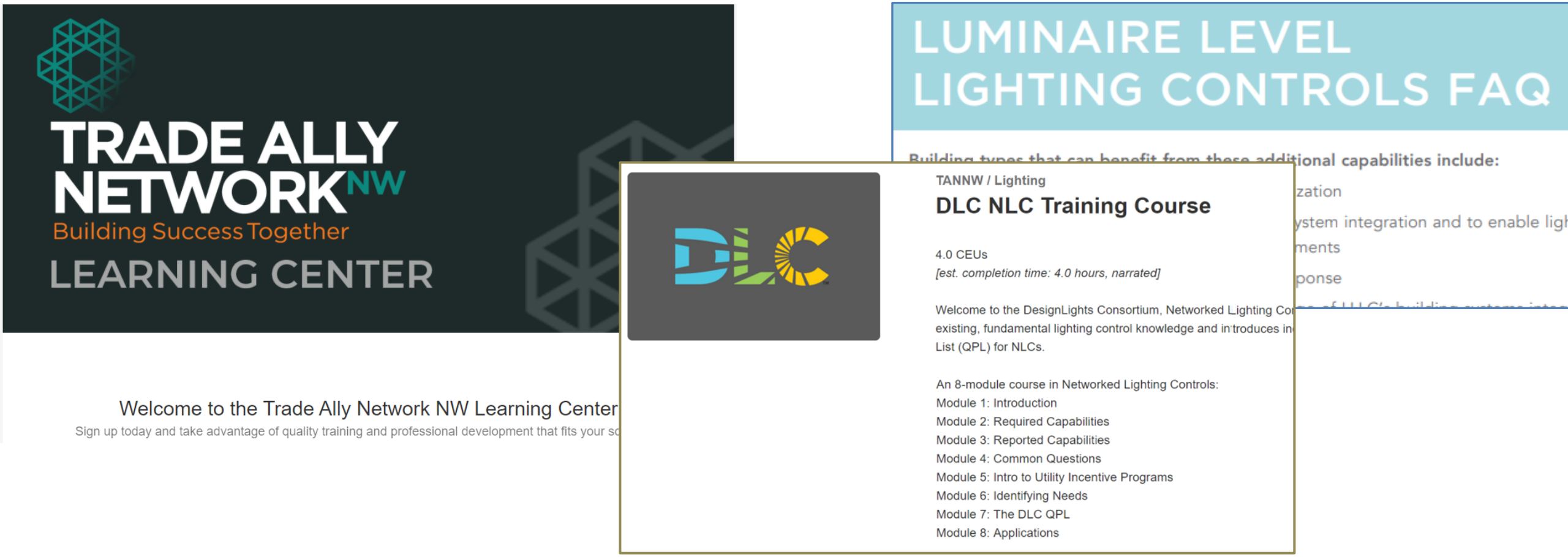
betterbricks.com/resources/lllc-future-healthy-buildings

Resources

Find Support Materials at

www.betterbricks.com, LLLC

www.tradeallynetworknw.com



Questions?

visit BetterBricks.com/LLLC

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Thank You!

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