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U.S. DEPARTMENT OF ENERGY

JUNE 8–11

2020 SUMMIT

A Virtual Leadership Symposium

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U.S. DEPARTMENT OF ENERGY

The Next Frontier in Lighting: Getting Connected with the Integrated Lighting Campaign

Wednesday, June 10, 2020

11:00AM – 12:30PM

Moderator

Gabe Arnold

Pacific Northwest National Laboratory

U.S. DEPARTMENT OF ENERGY

Agenda

1. Introducing the Integrated Lighting Campaign
2. Kenny Seeton – California State University – Dominguez Hills
3. Kandice Cohen – Trane Technologies
4. Michael Myer – Pacific Northwest National Laboratory
5. Q&A / Panel Session + Lauren Morlino – Efficiency Vermont
   Ron Bernstein – RBCG Consulting

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Practice Poll Questions

Submit Poll Responses

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Select "***The Next Frontier in Lighting***" **from the dropdown menu**

Felipe Leon

Pacific Northwest National Laboratory

Pacific Northwest
NATIONAL LABORATORY

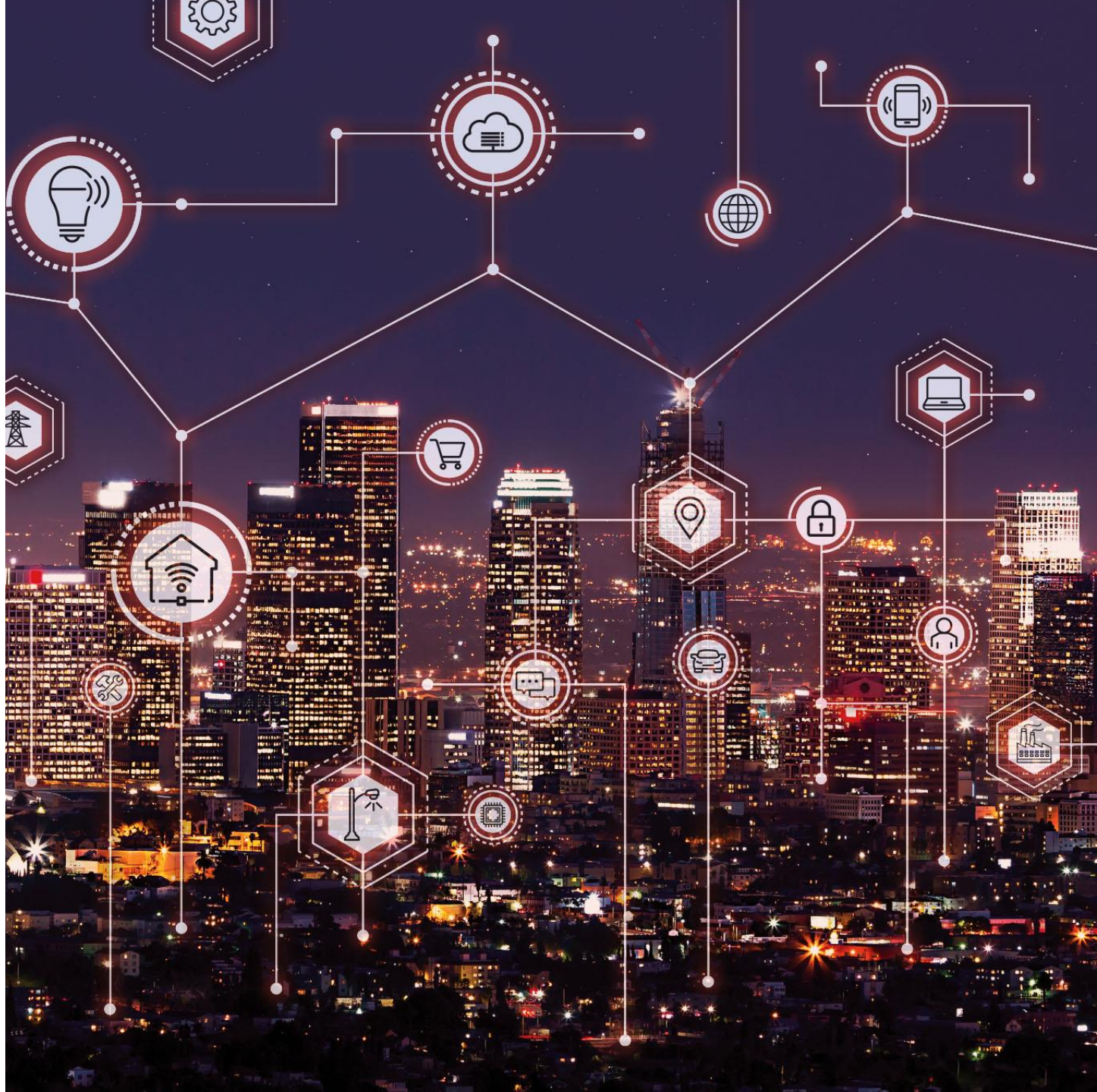
Integrated Lighting Campaign

June 18, 2020

Felipe Leon
Electrical Engineer

U.S. DEPARTMENT OF ENERGY BATTELLE

PNNL is operated by Battelle for the U.S. Department of Energy



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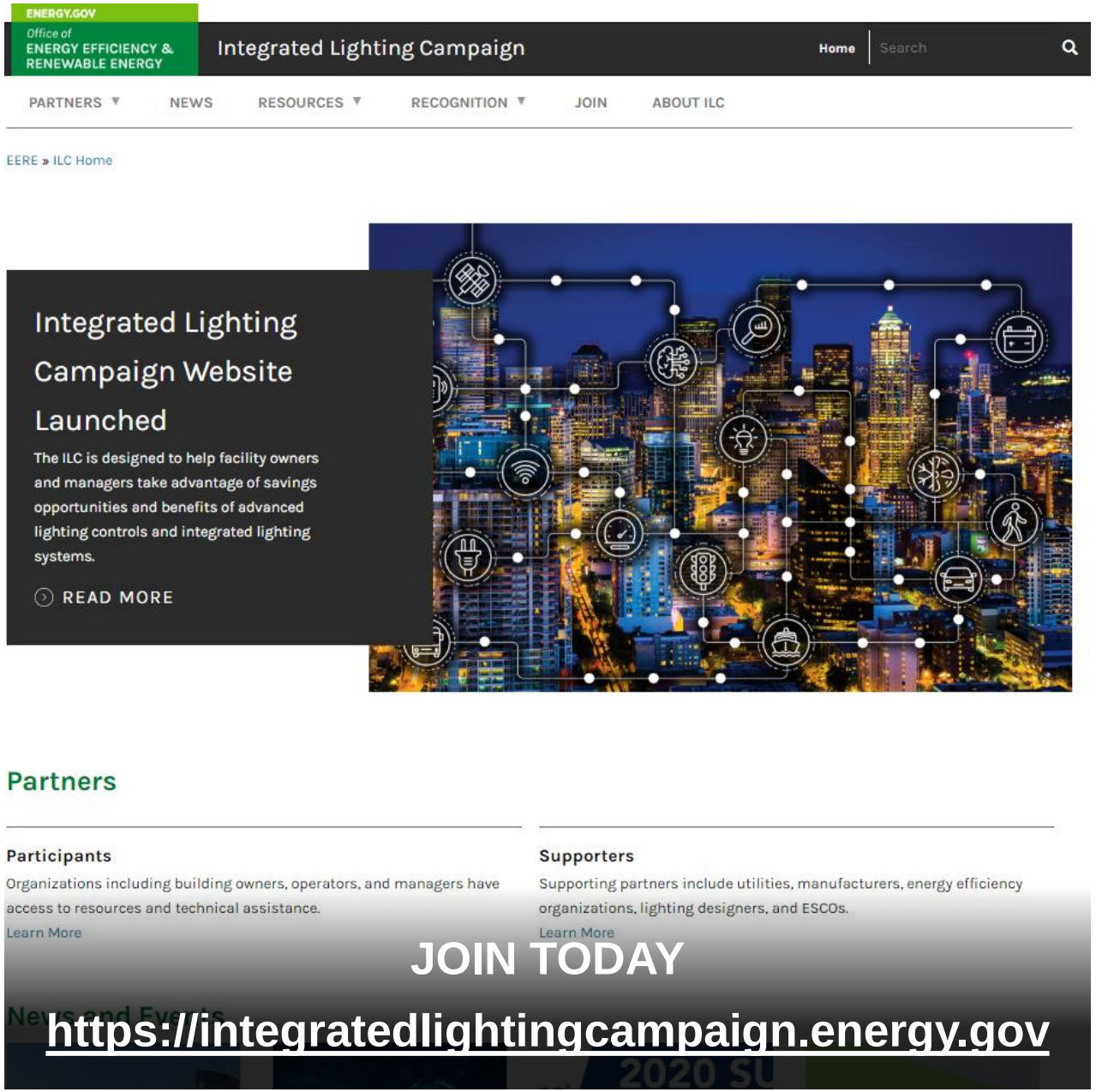
About the ILC

- Promote
  - advanced sensors/devices
  - lighting integration
- Resources
- Document
- Recognition
- Technical Assistance



Why Integration?

- Deeper energy savings
  - HVAC
  - Plug loads
- Value proposition of nonenergy use cases
  - Space – optimization / utilization
  - Labor – productivity / efficiencies
  - Revenues

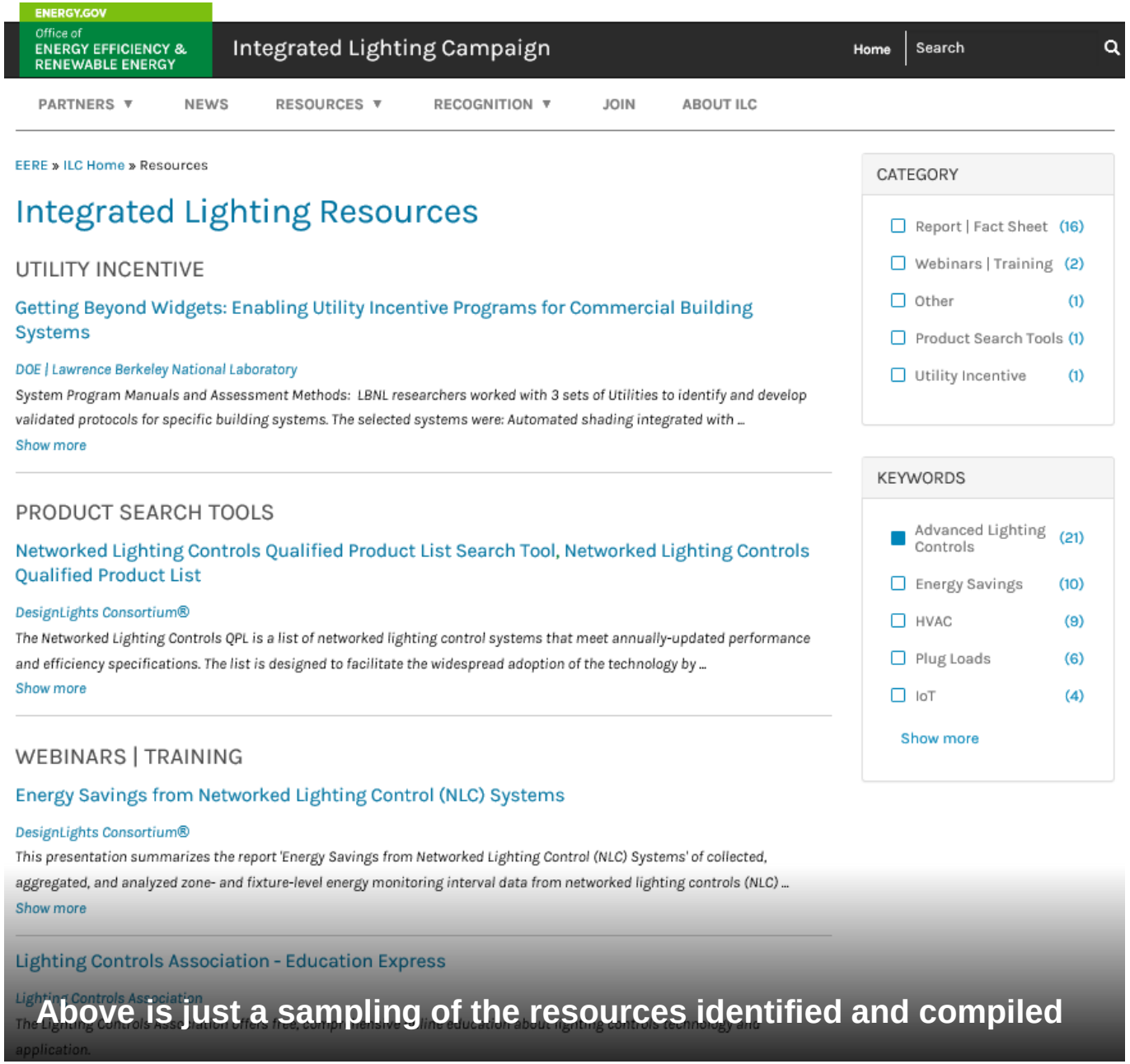
Save Money

Operate your building/business smarter

Pacific Northwest NATIONAL LABORATORY

Resources

- Utility Incentives
- Reports/Fact Sheets
- Webinars/Training
- Product Search Tools
- … and more



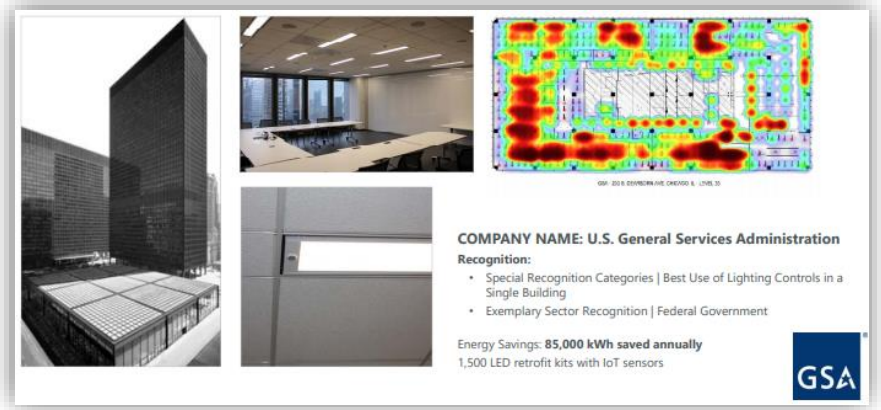
Above is just a sampling of the resources identified and compiled

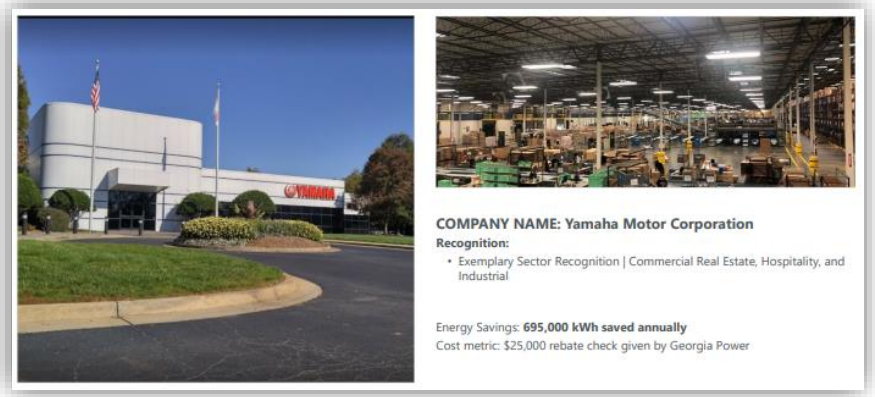
Pacific Northwest NATIONAL LABORATORY

Document

- Adoption of integrated systems
  - Participant joins
  - Entries for recognition
- Create body of knowledge
  - Case studies
  - Project info (recognition)

Previous Campaign Examples





Recognition

- Exemplary Projects
  - Participants
- Impact to integration/ILC
  - Select Supporter categories
- Held Yearly
  - Public forum (e.g., conference)

- Initial focus areas:
  - Advanced use cases in lighting
  - Lighting + HVAC
  - Lighting + Plug Loads
  - More to come…

Getting Connected with the ILC … It's Free

Supporters

Manufacturers, utilities, energy efficiency organizations, design teams, etc.

Anixter International
AZENTIVE
BSA LifeStructures
Cape Light Compact
CEG Solutions
Center for Energy and Environment (CEE)
CLEAResult
Consumers Energy
Cree, Inc.
Dalkia Energy Solutions
Efficiency Vermont
Elementale Enterprises Inc.
EMC
Encentive Energy
Evergreen Consulting Group
Franklin Energy
FSG
Gleason Partners LLC
HXE Partners
Illumination Resources Inc.
International Association of Lighting Designers
Lighting Controls Association
Louvers International
LSI
MC Wholesale
McBride Lighting
National E Solutions
Northeast Energy Efficiency Partnerships, Inc.
Northwest Energy Efficiency Alliance
Orion Energy Systems, Inc.
Puget Sound Energy
Retail Industry Leaders Association (RILA)
Sapient Industries
SEDAC (Smart Energy Design Assistance Center), University of Illinois
Sevan Multi-Site Solutions
Stay-Lite Lighting Inc.
Sustainable Technologies
The Retrofit Companies, Inc.
Trane Technologies
Wisconsin Focus on Energy

Participants

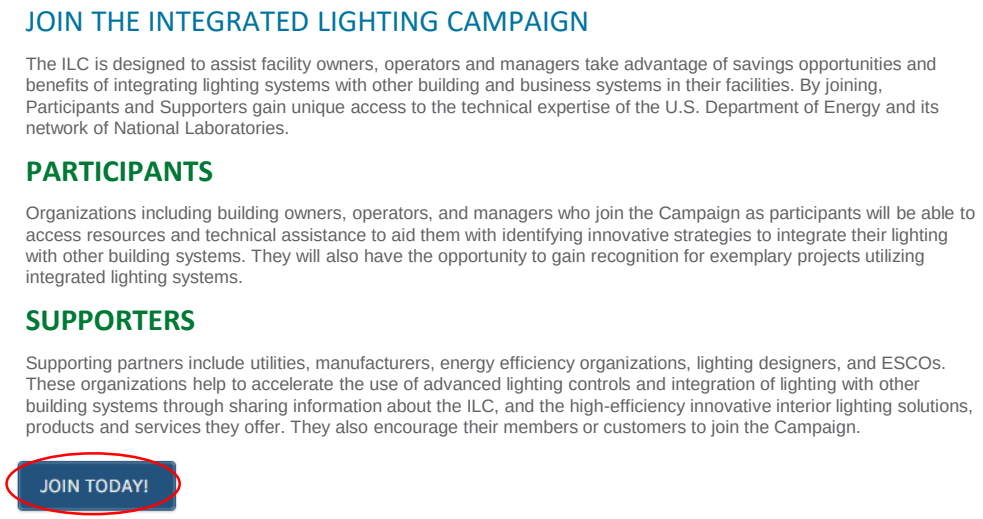
Building owners, facility managers, federal/state/local governments, military

Adams 12 School District
Chicago Housing Authority
City of Milwaukee
Cleveland Clinic
Columbia Association
Community College of Allegheny County
Department of Defense Washington Headquarter Services (WHS)
Four Seasons Family of Companies
Jewish Community Center of San Francisco
Life Time Fitness
MGM Resorts International
Target Corporation
U.S. Air Force-Scott Air Force Base
U.S. Army Reserve- 63d Regional Support Command
U.S. Army Reserve- 81st Regional Support Command
U.S. General Services Administration
University of Wisconsin
Walgreens

Organizers

How to Join the ILC

- It's EASY



- It's FREE
  - Yes, the technical assistance too

- Pledge TODAY

https://integratedlightingcampaign.energy.gov/

Pacific Northwest
NATIONAL LABORATORY

Thank you

Felipe Leon

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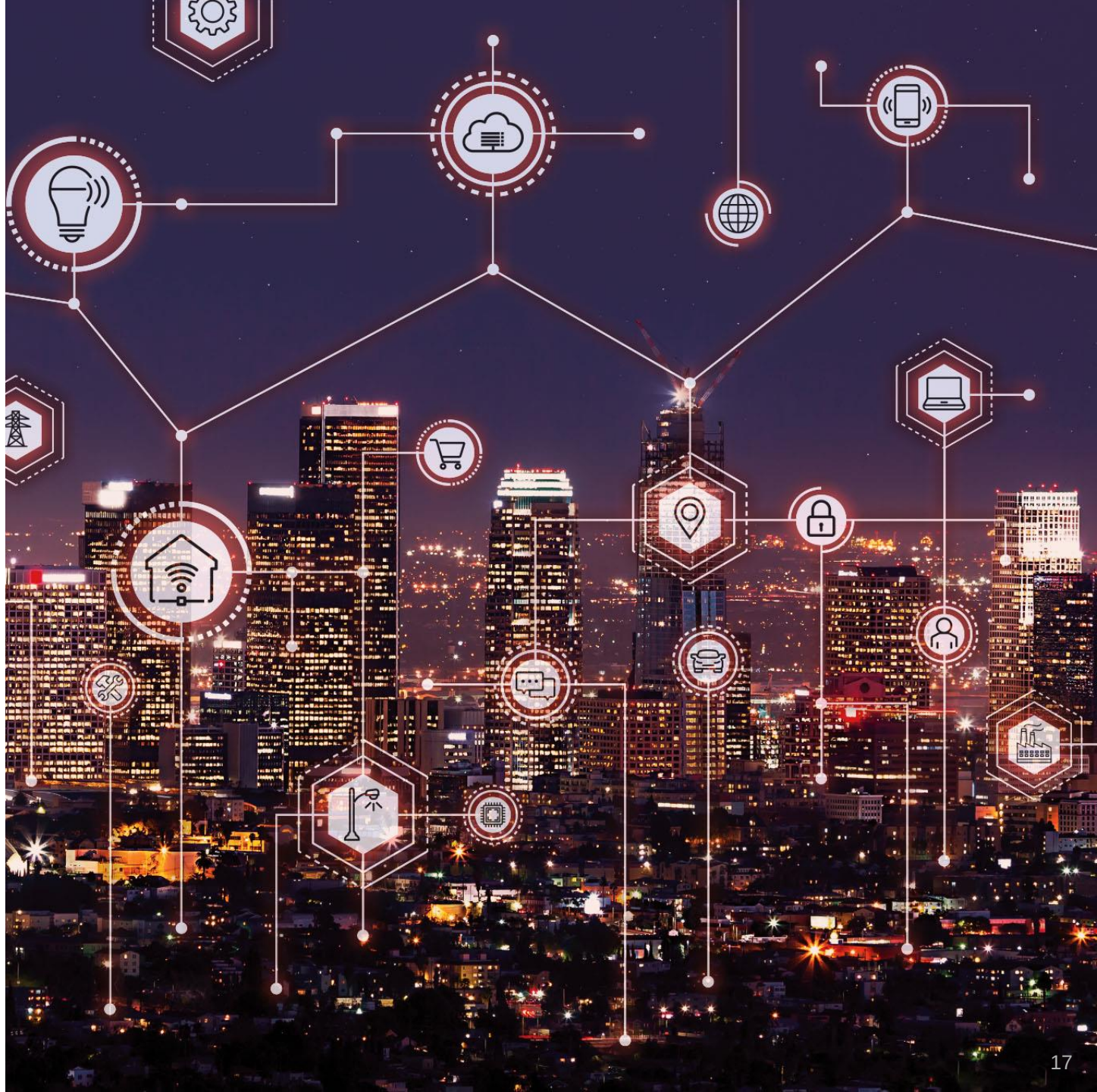


Poll Questions

Submit Poll Responses

www.Slido.com event code **#BBSummit**

Select "***The Next Frontier in Lighting***" **from the dropdown menu**

Guest Speakers

Kenny Seeton
California State University – Dominguez Hills

Kandice Cohen
Trane Technologies

Michael Myer
Pacific Northwest National Laboratory

Kenny Seeton

California State University – Dominguez Hills

Submit Questions
www.Slido.com event code **#BBSummit**

U.S. DEPARTMENT OF ENERGY

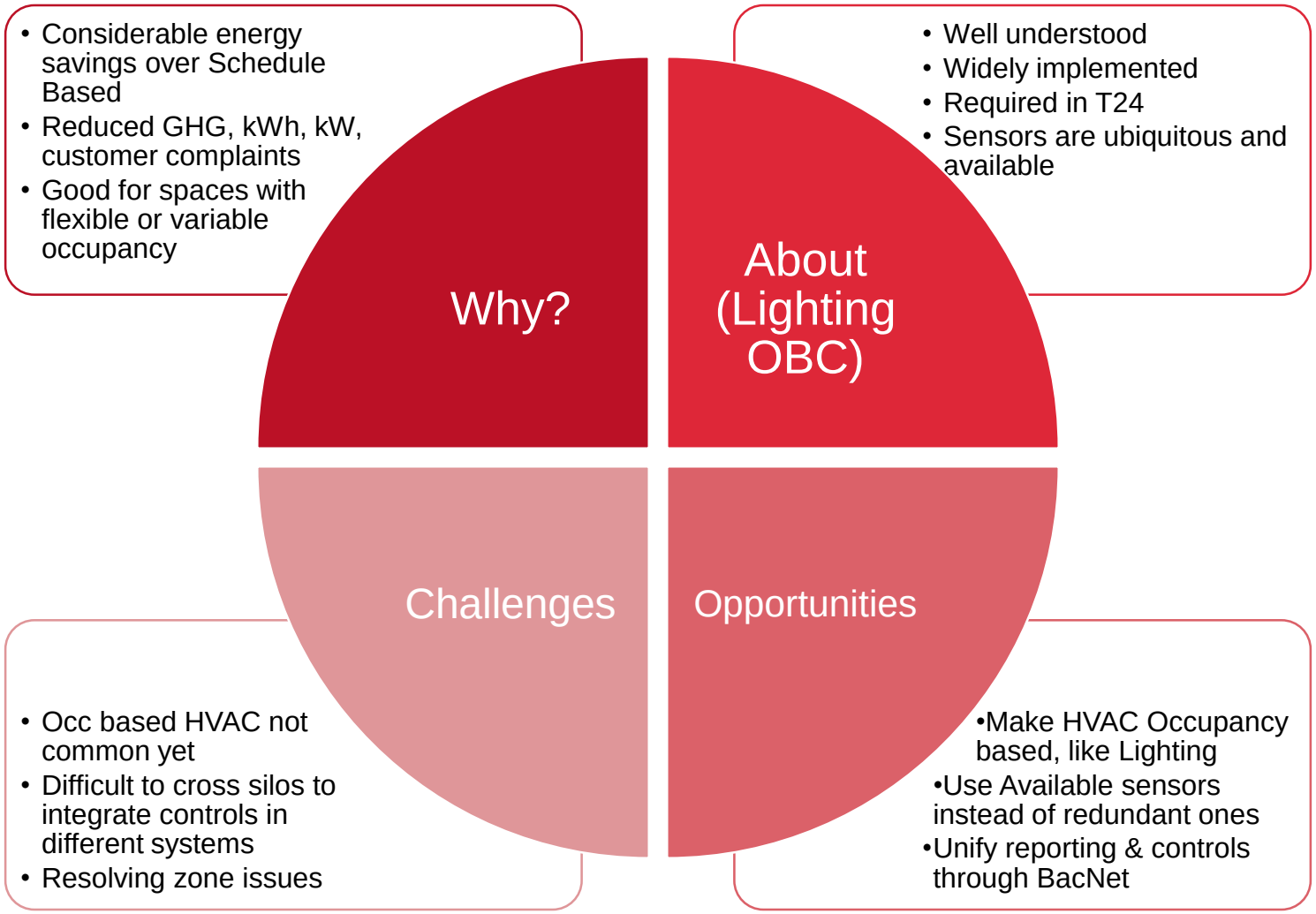
Occupancy Based Unified Controls
at
Cal State Dominguez Hills

Kenny Seeton
CSUDH Energy Manager
Central Plant
www.csudh.edu/sustainability

CALIFORNIA STATE UNIVERSITY, DOMINGUEZ HILLS

CSUDH SUSTAINABILITY

Occupancy Based Controls



CSUDH
SUSTAINABILITY

Welch Hall

Retrofit

179,222 gsf

4 stories, 496 rooms

opened 2002

Police station, I.T., Server Room, President, VPs, Provost

Lecture Hall

Basis of Controls Design

- Lighting to Communicate with HVAC
- Submeters bring data into BAS (through BACnet)
- Control individual light levels & HVAC in every individual office for max comfort & productivity

How We Did It

- Slowly work on creating campus standards
  - This is not done overnight
- Getting Mechanical Design Engineer to buy in to our vision
  - So BOD is built around what you want and not around what they are used to
- Showing possible LEED points through using smarter controls

CSUDH
SUSTAINABILITY

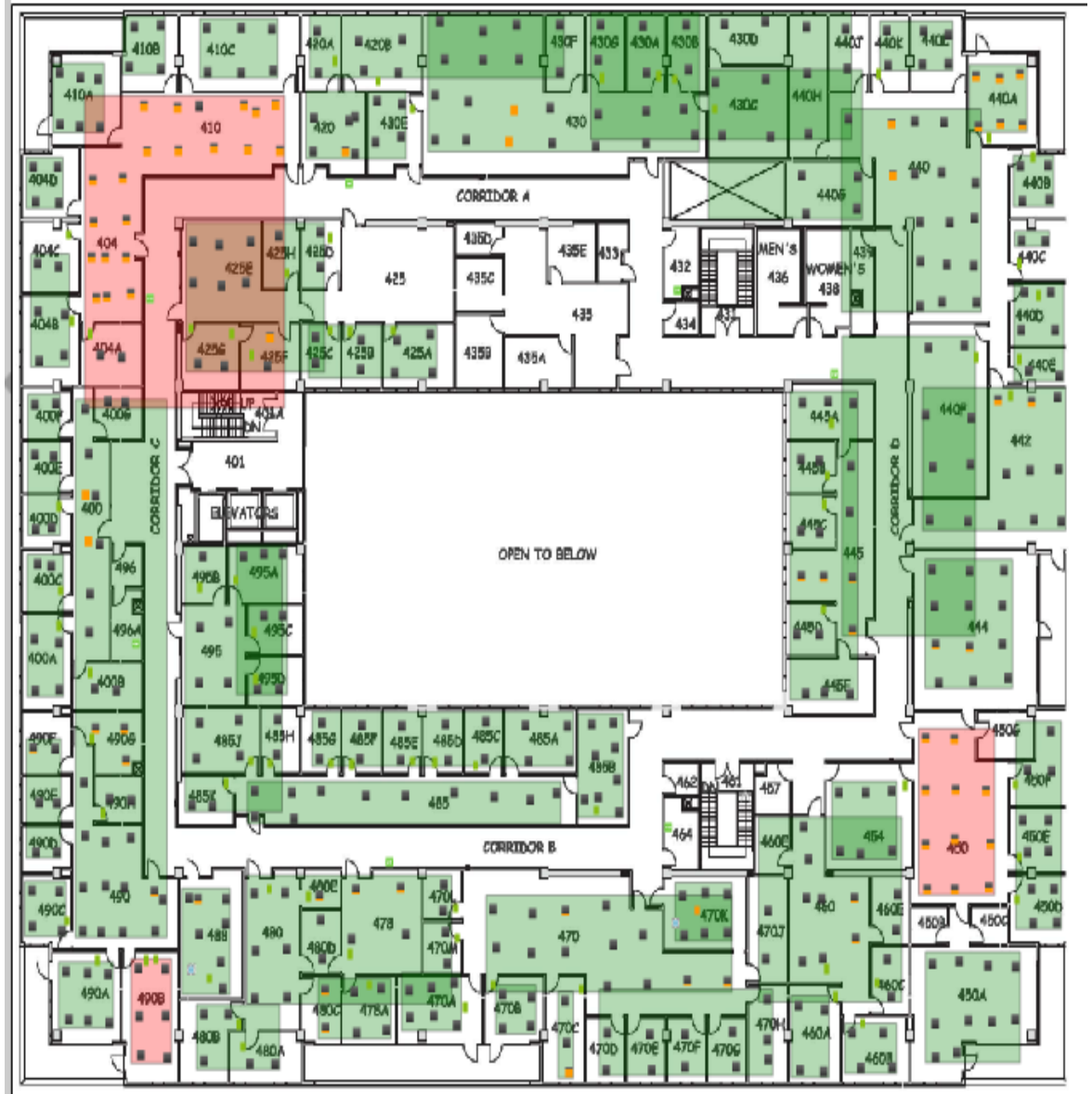
Granular Control of Lights

- CSUDH
  - EE_Extended Education
  - LCH_LaCorte Hall
    - LaCorte Hall
      - 1st Floor
      - 2nd Floor
      - 3rd Floor
  - Library North
  - NCIS
    - NCIS
      - Floor 1
      - Floor 2
      - Floor 3
  - NSM_Natural Science and
  - Parking Lots
  - SAC_CP_Tunnels_PP
  - SBS and EAC
  - WH_Welch Hall
    - Welch Hall
      - WH 1st Floor
      - WH 2nd Floor
      - WH 3rd Floor Hall
      - WH 4th Floor Hall

CSUDH SUSTAINABILITY

Lighting Zones to match VAV Zones

Granular Control of HVAC



Wizard Auto Detect Utility

Status

Stop | Restart | Close

Native Object Name	Identifier
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CSUDH/NCIS/NCIS/Floor 3/ENVAV3.05[117]	Device-2133117
CSUDH/NCIS/NCIS/Floor 3/ENVAV3.04[116]	Device-2133116
CSUDH/NCIS/NCIS/Floor 3/ENVAV3.03[115]	Device-2133115
CSUDH/NCIS/NCIS/Floor 3/ENVAV3.02[114]	Device-2133114
CSUDH/NCIS/NCIS/Floor 3/ENVAV3.01[113]	Device-2133113
E-Mon Meter (89)	Device-89
E-Mon Meter (88)	Device-88
CSUDH/WH_Welch Hall/Welch Hall/WH 4th Floor Hall/WHEN4.15[306]	Device-2101306
CSUDH/WH_Welch Hall/Welch Hall/WH 4th Floor Hall/WHEN4.16[307]	Device-2101307
CSUDH/WH_Welch Hall/Welch Hall/WH 4th Floor Hall/WHEN4.13[305]	Device-2101305
CSUDH/WH_Welch Hall/Welch Hall/WH 4th Floor Hall/WHEN4.5[299]	Device-2101299
CSUDH/WH_Welch Hall/Welch Hall/WH 4th Floor Hall/WHEN4.3[297]	Device-2101297
CSUDH/WH_Welch Hall/Welch Hall/WH 4th Floor Hall/WHEN4.2[296]	Device-2101296
CSUDH/WH_Welch Hall/Welch Hall/WH 4th Floor Hall/WHEN4.12[304]	Device-2101304
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CSUDH/WH_Welch Hall/Welch Hall/WH 4th Floor Hall/WHEN4.4[298]	Device-2101298
CSUDH/SAC_CP_Tunnels_PP/SAC-2/Classrooms/2101 LED[58]	Device-2123058
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CSUDH/WH_Welch Hall/Welch Hall/WH 1st Floor/Office[12]	Device-2107012
CSUDH/WH_Welch Hall/Welch Hall/WH 1st Floor/Hallways[10]	Device-2107010
E-Mon Meter (96)	Device-96
E-Mon Meter (100)	Device-100
E-Mon Meter (97)	Device-97
SWBD MSA SECTION 1PXM 2000	Device-102
PXMP Meter Base - 107	Device-107
SWBD MSA SECTION 2 PXMP	Device-106
SWBD MSA SECTION 1PXM 2000	Device-103
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CSUDH/NCIS/NCIS/Floor 2/ENVVS2.07[158]	Device-2132158	CSUDH/NCIS/NCIS/Floor 2/EN

4th Floor Summary Tech View

Tailored Summary | Summary

Available Tailored Summaries

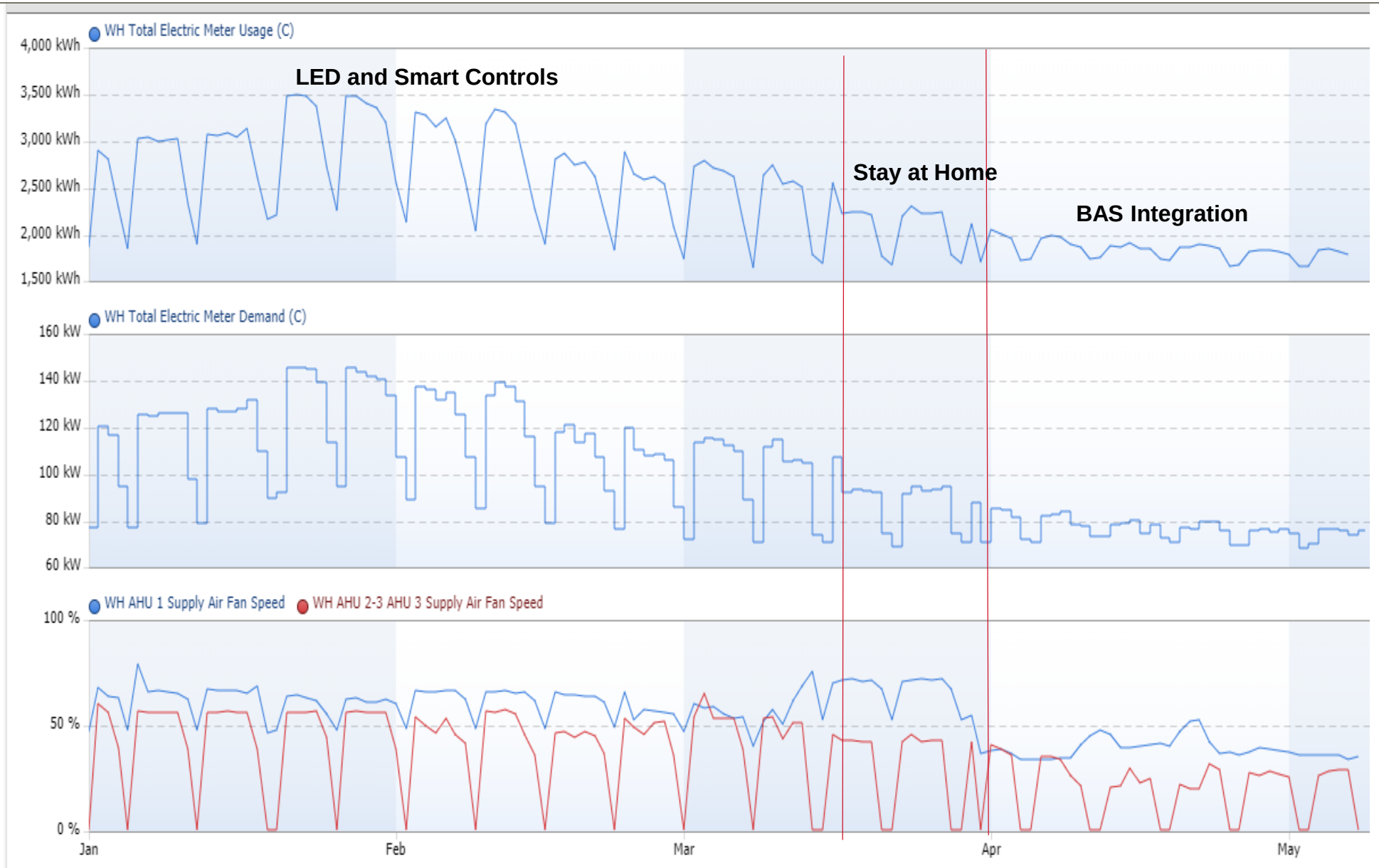
VAV Summary Tech View

VAV summary screen

	Zone Temp	Zone Setpoint	Reheat Valve	Discharge Air Temp	Damper Position	Supply Flow	Supply Flow Setpoint
4-2R	72.9 deg F	72.0	0 %	59.0 deg F	100 %	409.5 cfm	1,425.0 cfm
4-15R	72.7 deg F	72.0	0 %	58.4 deg F	100 %	314.5 cfm	781.5 cfm
4-16R	70.8 deg F	72.0	54 %	59.9 deg F	100 %	384.6 cfm	375.0 cfm
4-24R	74.7 deg F	72.0	0 %	59.7 deg F	100 %	240.0 cfm	900.0 cfm
4-29R	75.1 deg F	72.0	0 %	??? -80.1 deg F	100 %	197.5 cfm	400.0 cfm
4-58R	73.1 deg F	72.0	0 %	59.8 deg F	100 %	671.5 cfm	725.0 cfm
4-13R	74.5 deg F	72.0	1 %	58.5 deg F	100 %	116.0 cfm	1,050.0 cfm
4-6R	71.9 deg F	72.0	0 %	59.2 deg F	59 %	111.8 cfm	108.0 cfm
4-11R	71.5 deg F	72.0	11 %	58.3 deg F	83 %	517.8 cfm	500.0 cfm
4-43R	71.1 deg F	72.0	16 %	60.6 deg F	59 %	490.0 cfm	475.0 cfm
4-31R	72.3 deg F	72.0	1 %	60.1 deg F	52 %	503.1 cfm	498.7 cfm
4-14R	71.5 deg F	72.0	9 %	58.3 deg F	46 %	459.9 cfm	450.0 cfm
4-45R	70.2 deg F	70.0	1 %	61.3 deg F	43 %	304.0 cfm	300.0 cfm
4-60R	72.7 deg F	72.0	0 %	59.7 deg F	40 %	290.6 cfm	282.4 cfm
4-19R	71.3 deg F	72.0	47 %	67.2 deg F	35 %	154.1 cfm	150.0 cfm
4-5R	73.4 deg F	74.0	43 %	63.3 deg F	13 %	12.6 cfm	10.0 cfm
4-1R	72.2 deg F	72.0	0 %	66.9 deg F	0 %	16.5 cfm	0.0 cfm
4-3R	75.1 deg F	72.0	0 %	72.6 deg F	0 %	0.0 cfm	0.0 cfm
4-4R	72.8 deg F	72.0	0 %	72.7 deg F	0 %	20.6 cfm	0.0 cfm
4-7R	74.9 deg F	72.0	0 %	73.9 deg F	0 %	9.5 cfm	0.0 cfm
4-8R	76.7 deg F	72.0	0 %	73.9 deg F	0 %	111.7 cfm	0.0 cfm
4-10R	73.7 deg F	72.0	0 %	59.3 deg F	0 %	0.0 cfm	0.0 cfm
4-12R	75.1 deg F	72.0	0 %	71.4 deg F	0 %	16.1 cfm	0.0 cfm
4-17R	75.0 deg F	72.0	0 %	75.0 deg F	0 %	0.0 cfm	0.0 cfm
4-20R	74.1 deg F	72.0	0 %	61.3 deg F	0 %	0.0 cfm	0.0 cfm
4-21R	76.5 deg F	72.0	0 %	74.2 deg F	0 %	0.0 cfm	0.0 cfm
4-22R	75.2 deg F	72.0	0 %	71.6 deg F	0 %	0.0 cfm	0.0 cfm
4-23R	77.1 deg F	72.0	0 %	76.2 deg F	0 %	2.9 cfm	0.0 cfm

Total Row Count: 56

Welch Hall energy savings: LED smart lighting connected to BAS



Thank you!

Questions? Contact:

Kenny Seeton
CSUDH Energy Manager
Central Plant

kseeton@csudh.edu
(310) 243-2206
www.csudh.edu/sustainability

Kandice Cohen

Trane Technologies

Submit Questions
www.Slido.com event code **#BBSummit**

U.S. DEPARTMENT OF ENERGY

The Next Frontier in Lighting:

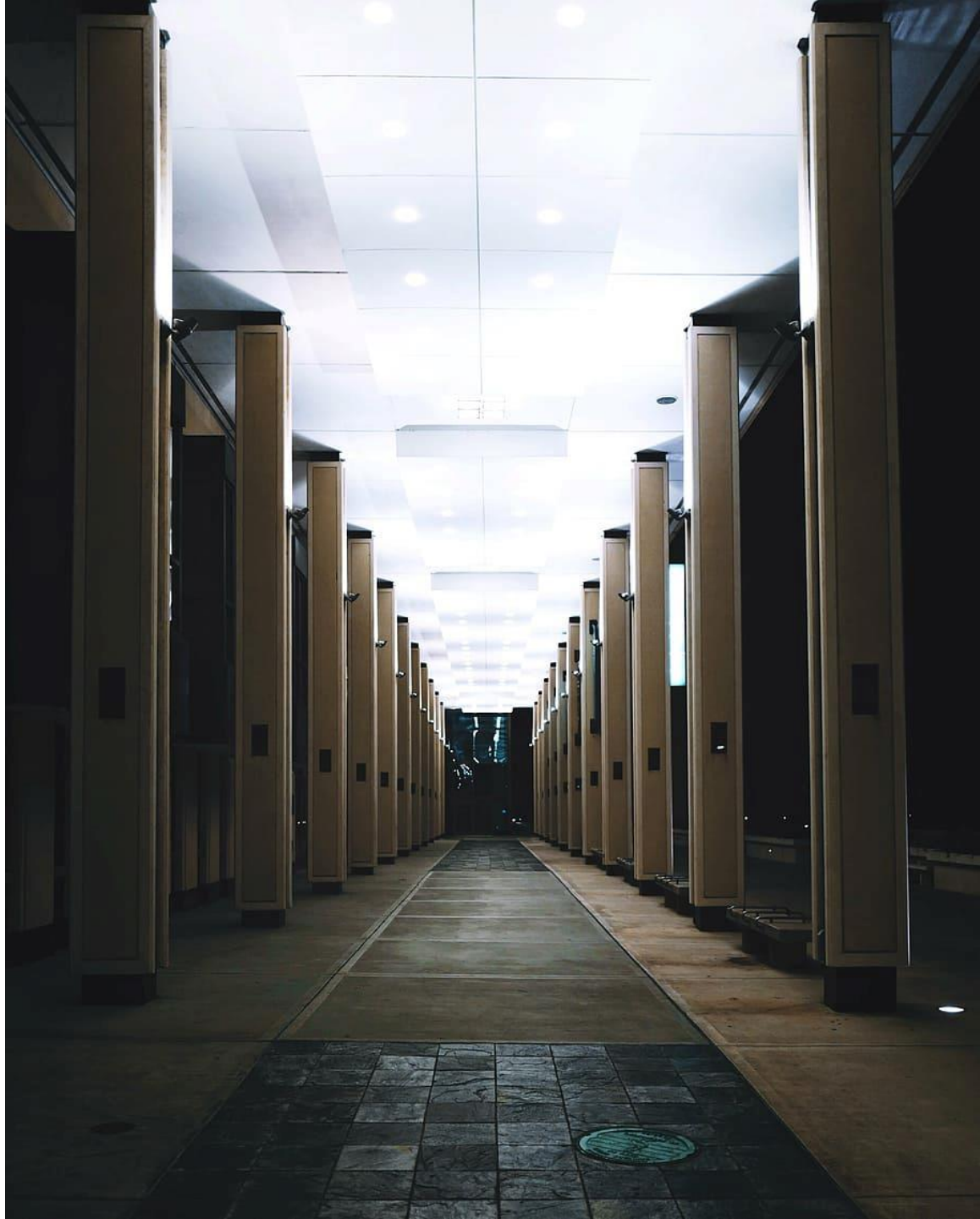
Get Connected with the *Integrated Lighting Campaign*

June 10, 2020

Kandice Cohen, Director of Lighting Strategy

Why Integrate Systems?

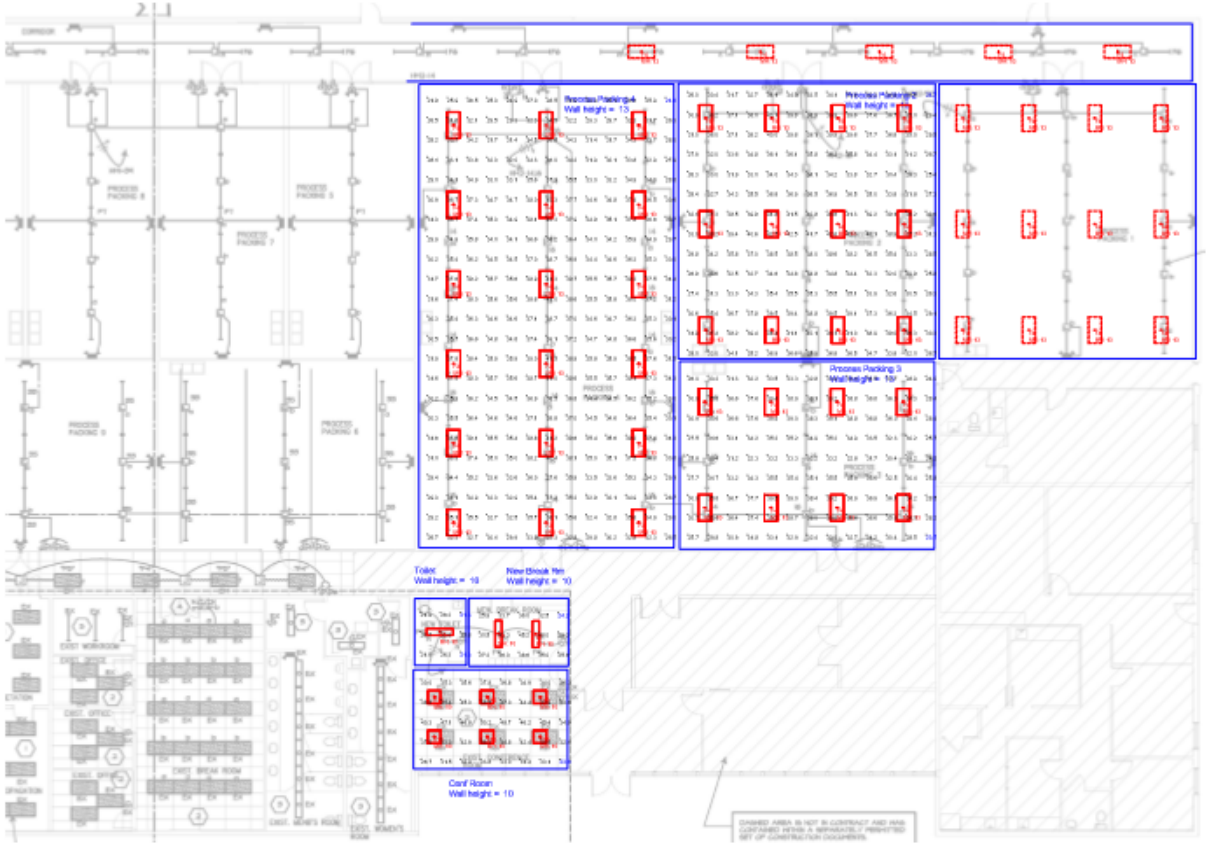
- Lighting and HVAC consume 70% of building energy use
- The meter is on the building – not on each system, so why are these systems designed and controlled in silos?
- Control both HVAC and lighting systems using one platform – more functionality with smoother ease of operations
- Integrating systems brings the most value and the deepest energy savings
- Trane is working with lighting manufacturers to make integration more seamless



Lighting and HVAC Integration

The Benefits:

- Controllable lighting offers increased energy savings, comfort, and flexibility
- Use BAS to control HVAC and lights with shared schedules
- Use occupancy data to control the lighting and HVAC system through the BAS for additional savings
- Aggregate HVAC and lighting energy reporting through BAS for one energy dashboard
- Deploy demand response signals to both HVAC and lighting systems during an event



“Baker’s Dozen”

The Facility

- Two large commercial kitchens available for lease to bake products
- 13 rooms available for lease for product packaging
- 24/7 access by tenants, high operating hours
- Building owner responsible for facility energy bills

Customer Needs

- Manage high energy bills
- Visibility on how the facility is being used
- Visibility on energy usage of multiple tenant spaces
- Cost effective project

“Baker’s Dozen”

Customer opted to install a Connected Lighting Control system integrated into the BAS because it gave customer:

- Control and visibility of both the HVAC and lighting systems – one platform to control 70% of their building energy use!
- Energy dashboard that aggregates the energy use of both HVAC and lighting
- Occupancy reports
- Visibility to how the facility is used and energy is consumed
- Investment payback under 5 years

Michael Myer

Pacific Northwest National Laboratory

Submit Questions
www.Slido.com event code **#BBSummit**

U.S. DEPARTMENT OF ENERGY

Pacific Northwest
NATIONAL LABORATORY

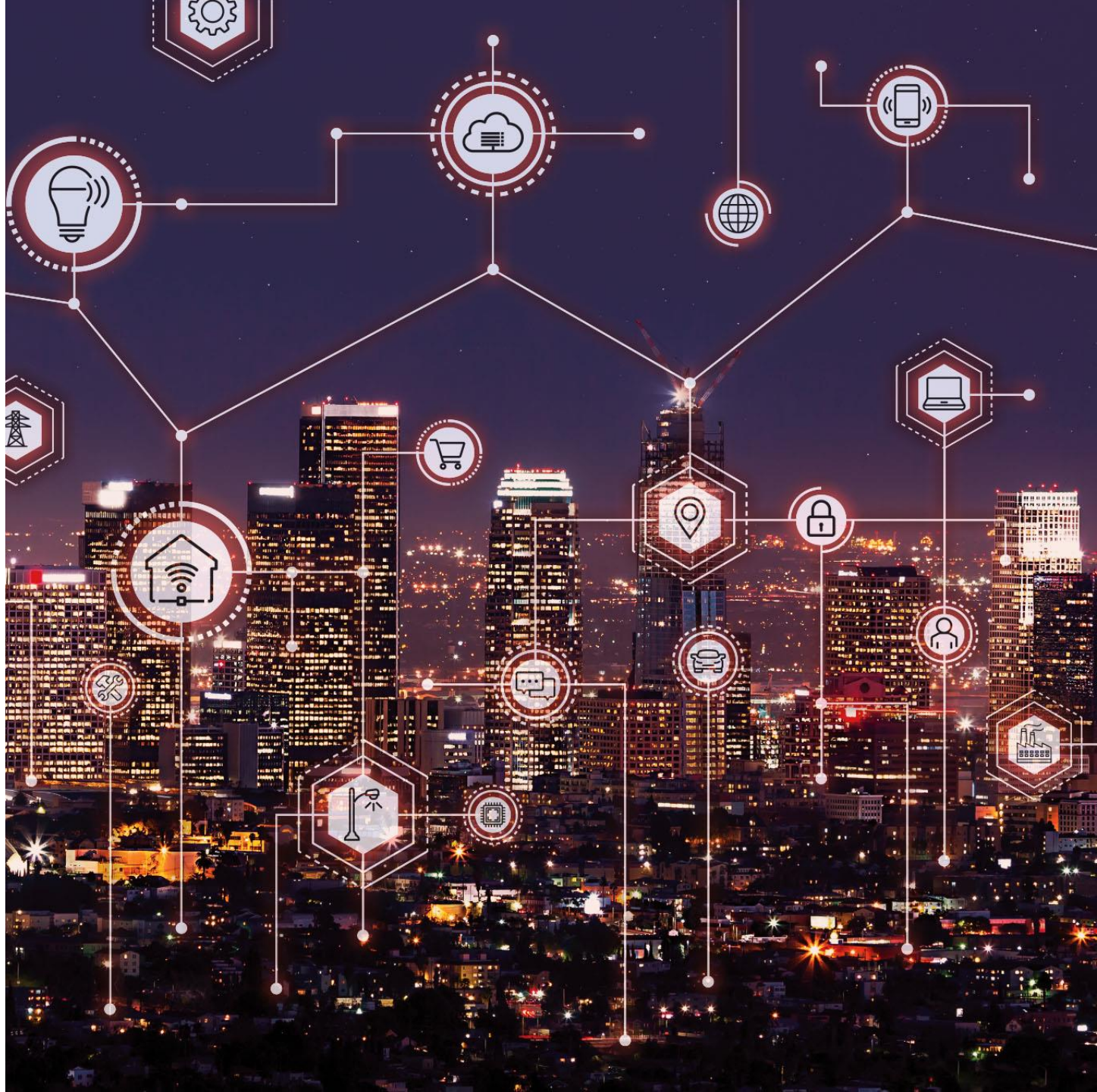
Lighting Integrated with HVAC: Early investigations

June 18, 2020

Michael Myer
Researcher

U.S. DEPARTMENT OF ENERGY BATTELLE

PNNL is operated by Battelle for the U.S. Department of Energy



Energy Savings

Lighting

≈ 50%
Shift to LED

5 – 25%
Controls

Some type of lighting control is required by energy code

Plug Loads

19 – 38%

Automatic receptacle controls required in some spaces

HVAC

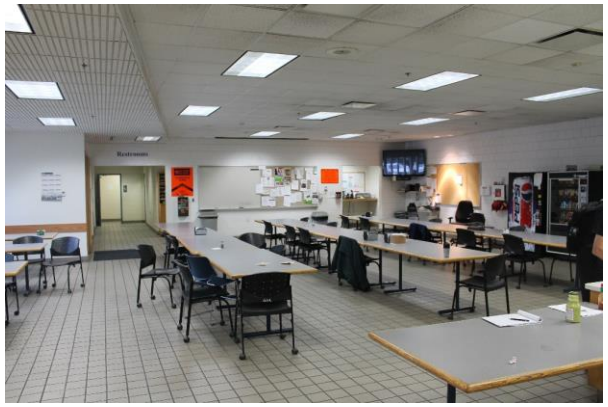
18 – 50%
Modeled & measured

Some integration with HVAC may be required

Field Projects

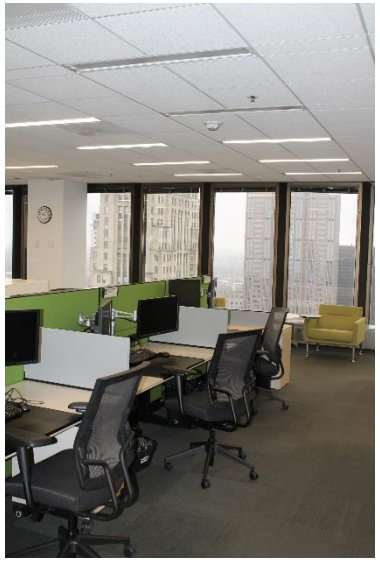
Municipal

University

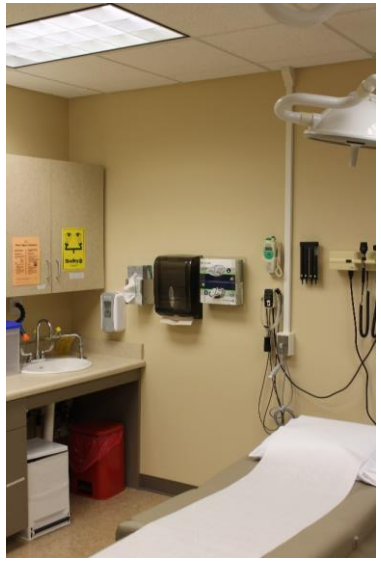


Municipal / Light Industrial

Military



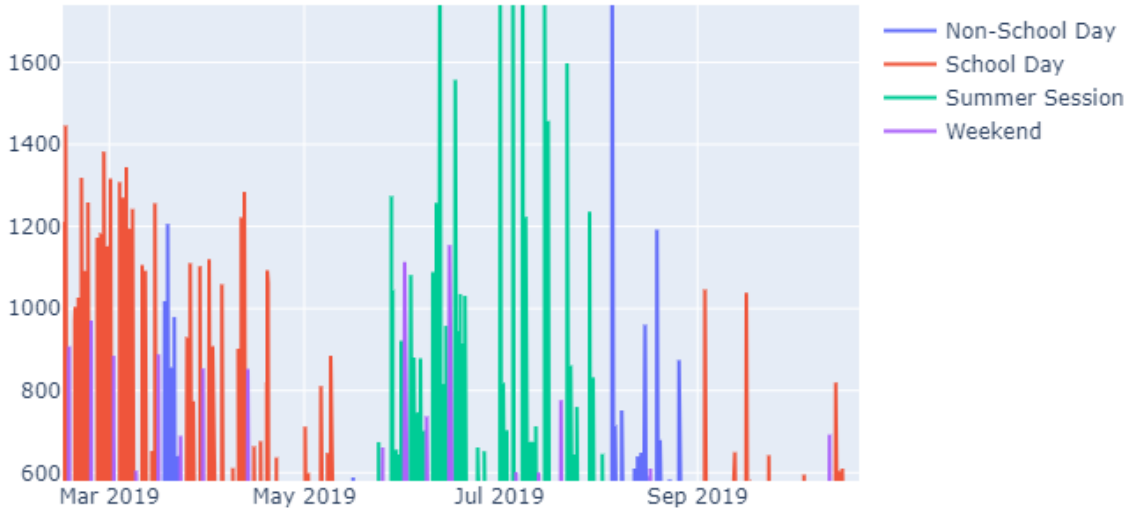
Federal Govt



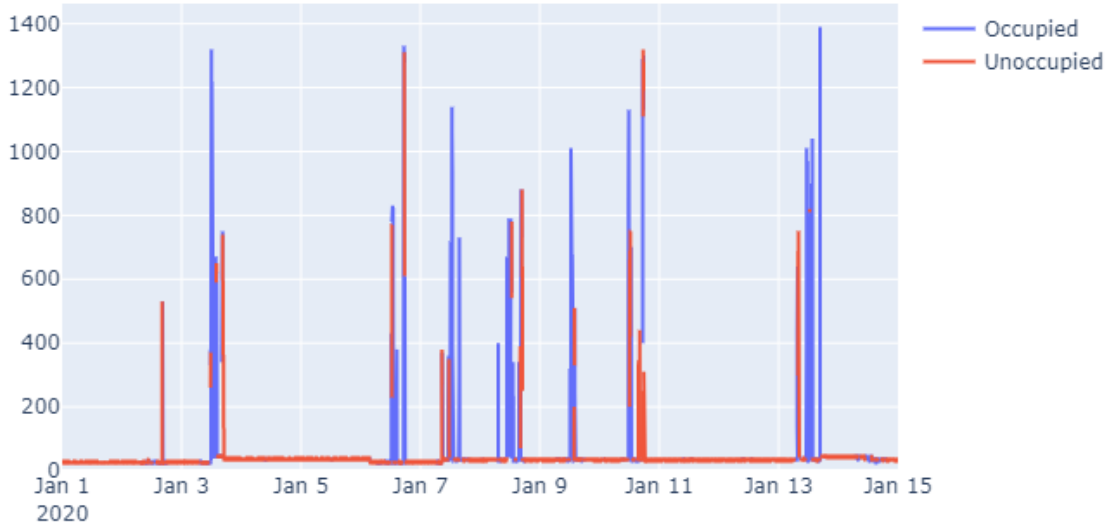
Outpatient Medical

County

Field Projects



University | Fan Data



County | Plug Data

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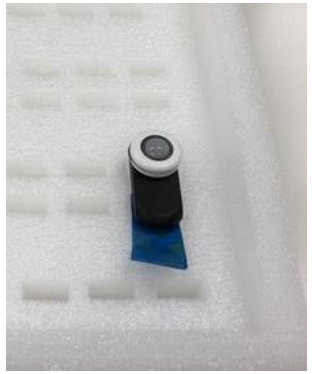
IoT-Upgradeable Lighting Challenge

U.S. DEPARTMENT OF ENERGY BATTELLE

PNNL is operated by Battelle for the U.S. Department of Energy

Why the Challenge?

- Problem: Lost opportunity, currently simple LED fixtures being installed & in future harder to integrate with IoT devices
- IoT applications increasing
  - Asset tracking, space utilization, wayfinding, CO_2 sensors, COVID-related contact tracing, etc.
- Lighting makes sense for IoT
  - Power from fixture, physical platform for sensor, in every room, above most items in room
- Standardized interface reduces installation time



Performance Requirements

- Applicable fixture types:
  - Troffers, linear suspended, low / high bay fixtures, parking garage fixtures, retrofit kits

- Must meet DLC Premium Requirements – high performing equipment
- Cost IoT-Upgradeable: Lower of 10% or $30 adder compared to an equivalent, non-upgradeable IoT fixture or kit
- LED driver must be D4i-certified
  - US products already D4i-certified
  - Similar ANSI-related efforts underway
- Must have a Zhaga Book 20 interface
  - Interface is the “port” or “receptacle”
  - US products testing now

How you can support the Challenge

- Questions?
  - lightingchallenge@pnnl.gov
- End Users and Specifiers: demonstrate support
  - Generic soft letter of support
  - If product that met requirements, these are the products we specify / want to include in our projects
  - Helps manufacturers make product development decisions
- Manufacturers:
  - Review performance targets
  - Provide feedback
  - Build products to meet the Challenge

Poll Questions

Submit Poll Responses

www.Slido.com event code **#BBSummit**

Select "***The Next Frontier in Lighting***" **from the dropdown menu**

Live Q&A Panelists

End-User

Kenny Seeton
California State University – Dominguez Hills

Solution Provider

Kandice Cohen
Trane Technologies

DOE/Research

Michael Myer
Pacific Northwest National Laboratory

Utility/Energy Efficiency

Lauren Morlino
Efficiency Vermont

System Integrator

Ron Bernstein
RBCG Consulting

Q&A / Panel

Today's Topics

Integrated Lighting Campaign

Lighting + HVAC/Plug-Load

IoT-Upgradeable Lighting Challenge

Panel Perspectives

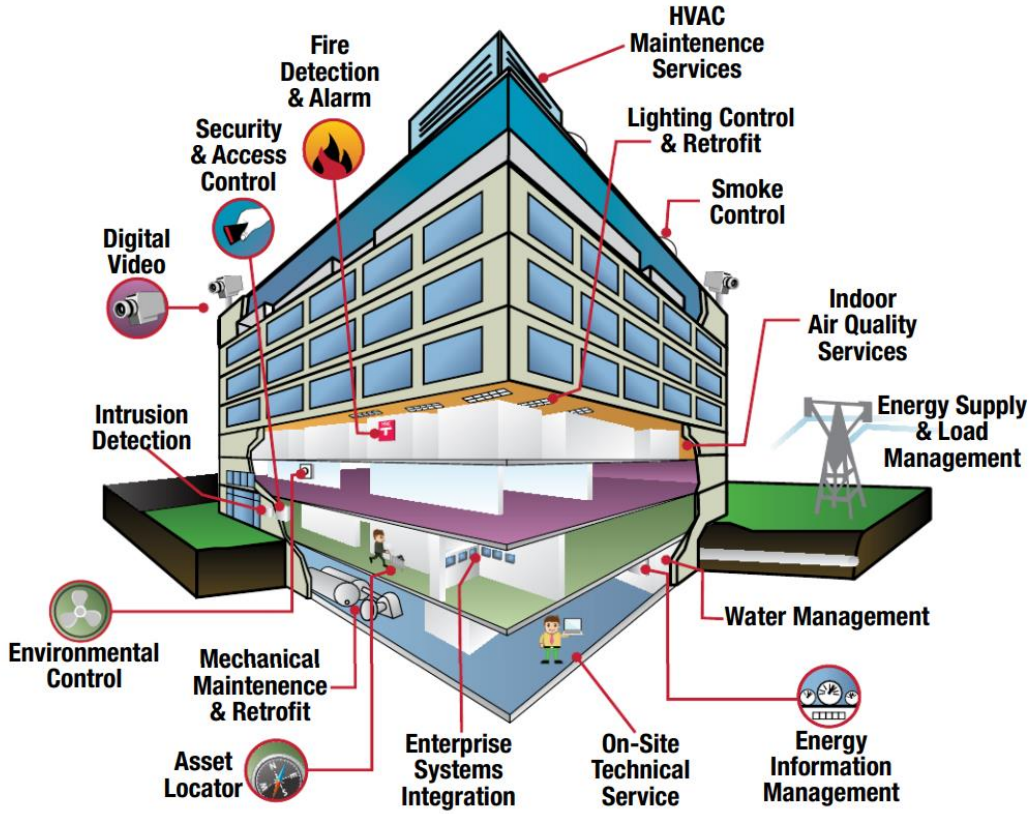
Energy Efficiency/Utility

System Integrator

End-User

Solution Provider

DOE/Research



Source: INTEL/ADLINK Technology

Submit Questions

www.Slido.com event code **#BBSummit**

Additional Resources

Integrated Lighting Campaign

- Solution Center page
  - https://betterbuildingssolutioncenter.energy.gov/alliance/technology-campaigns/integrated-lighting-campaign
- Website
  - https://integratedlightingcampaign.energy.gov/

Other Better Buildings Solution Center Campaigns
https://betterbuildingssolutioncenter.energy.gov/alliance/technology-campaigns

Toolkit: Upgrade Your Interior Lighting to High-Efficiency Solutions
https://betterbuildingssolutioncenter.energy.gov/toolkit-upgrade-your-interior-lighting-high-efficiency-solutions

Toolkit: Energy Efficient Lighting for Parking Facilities
https://betterbuildingssolutioncenter.energy.gov/energy-efficient-lighting-parking-facilities

Better Buildings: Summer Webinar Series

BEHIND THE METER DISTRIBUTED ENERGY RESOURCES:
BEST PRACTICES FOR INTEGRATING DERS INTO COMMERCIAL BUILDINGS

July 8

NEXT-GENERATION BUILDING PERFORMANCE POLICIES:
MAXIMIZING ENERGY SAVINGS AND ENVIRONMENTAL IMPACTS

July 16

EVERYONE HAS A DATA CENTER:
HOW TO BE AN ENERGY CHAMPION FOR YOURS

July 28

PROGRAM DESIGN WITH EVERYONE IN MIND:
LOW-INCOME SOLAR PROGRAM STRATEGIES

July 9

STRATEGIES TO COMBINE ENERGY + HEALTH UPGRADES IN MULTIFAMILY HOUSING

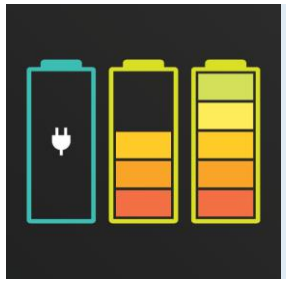
July 21

SUCCEED WITH SUBMETERING:
HOW TO MAKE THE BUSINESS CASE

August 4

THE DYNAMIC DUO:
UNLEASH PUBLIC SECTOR ENERGY SAVINGS WITH FINANCING AND TECHNICAL ASSISTANCE

July 14



CASE IN POINT:
OREGON'S RECENT EFFORTS TO REDUCE PLUG LOAD ENERGY CONSUMPTION

July 22

REGISTER NOW

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Additional Questions?

Please Contact Us

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https://betterbuildingssolutioncenter.energy.gov/

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