



Advanced Lighting Systems

Understanding the benefits and components of good lighting and lighting control

Wesley Whited

Senior Consultant for Advanced Lighting and Controls

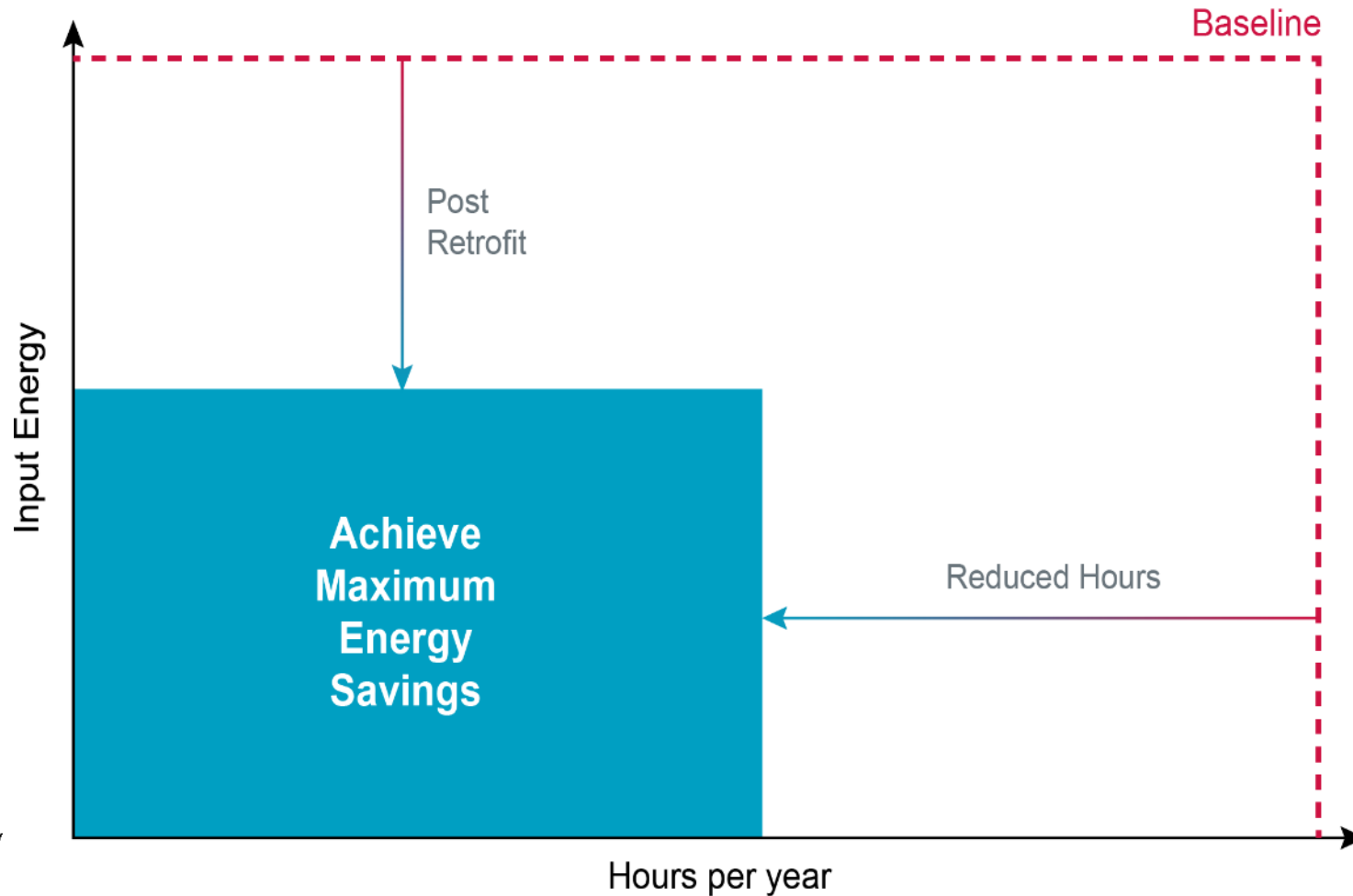
- DNV's national lead for all things lighting!
- DLC technical committee member for Networked Lighting Controls (NLC)
- IES Energy Efficiency Lighting Programs committee member
- ANSI C-137 committee on energy monitoring and cyber security





Lighting System Fundamentals

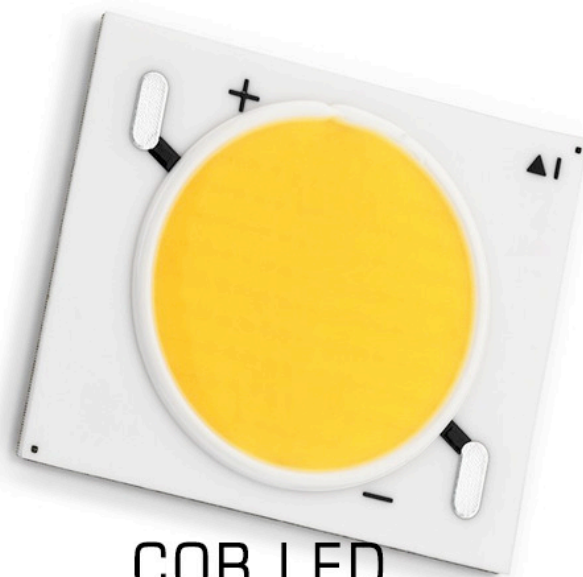
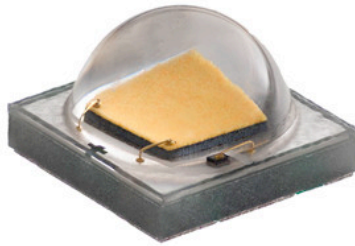
How Do Lighting Systems Save Energy?



- Lighting systems treat the fixture and its control(s) as one unit
- They work together to reduce input energy and operating hours

What is an LED?

- Light Emitting Diode/Solid State Lighting (SSL)

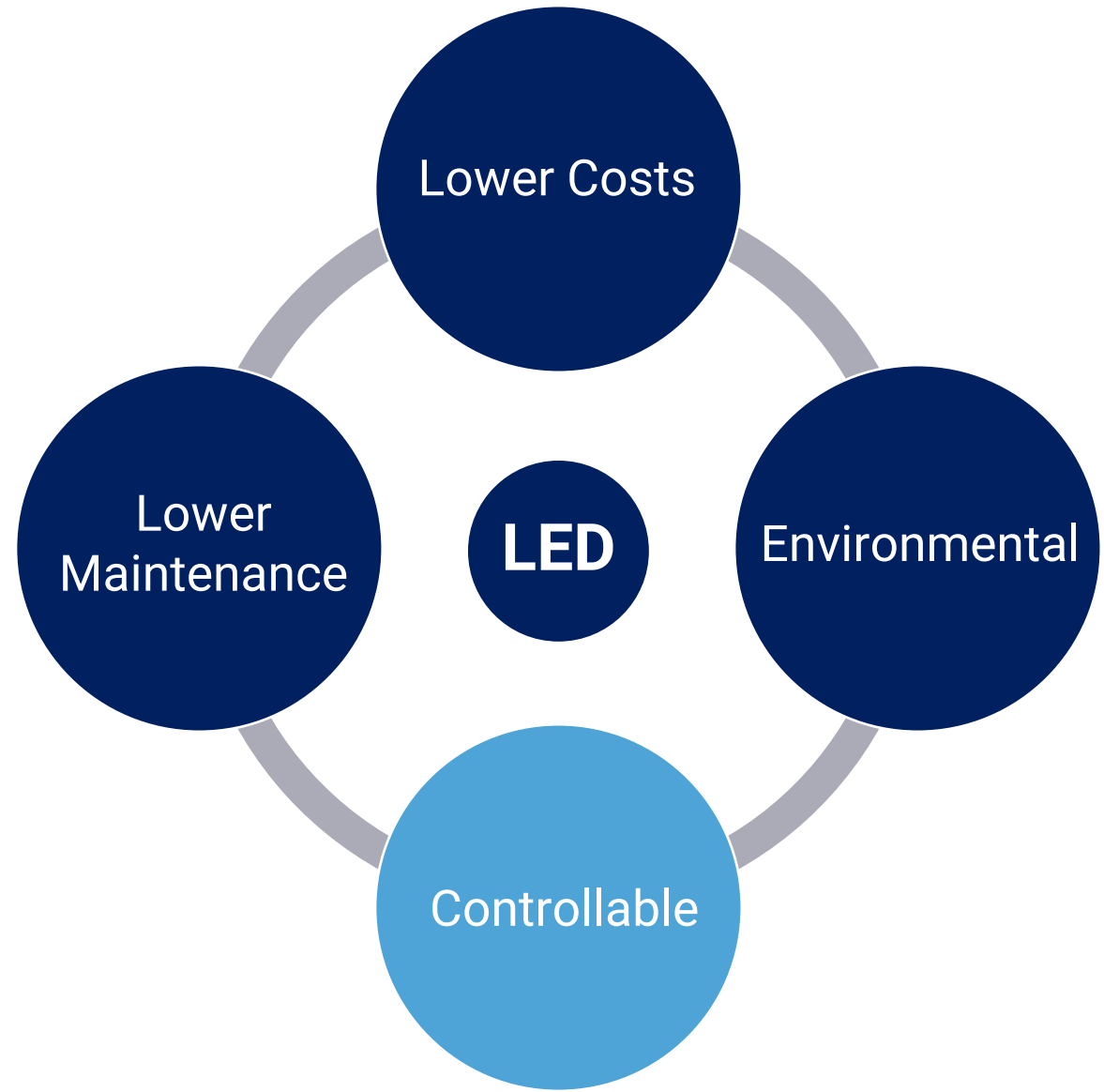


Mid-Power LED

High-Power LED

COB LED

What Makes LEDs Better?



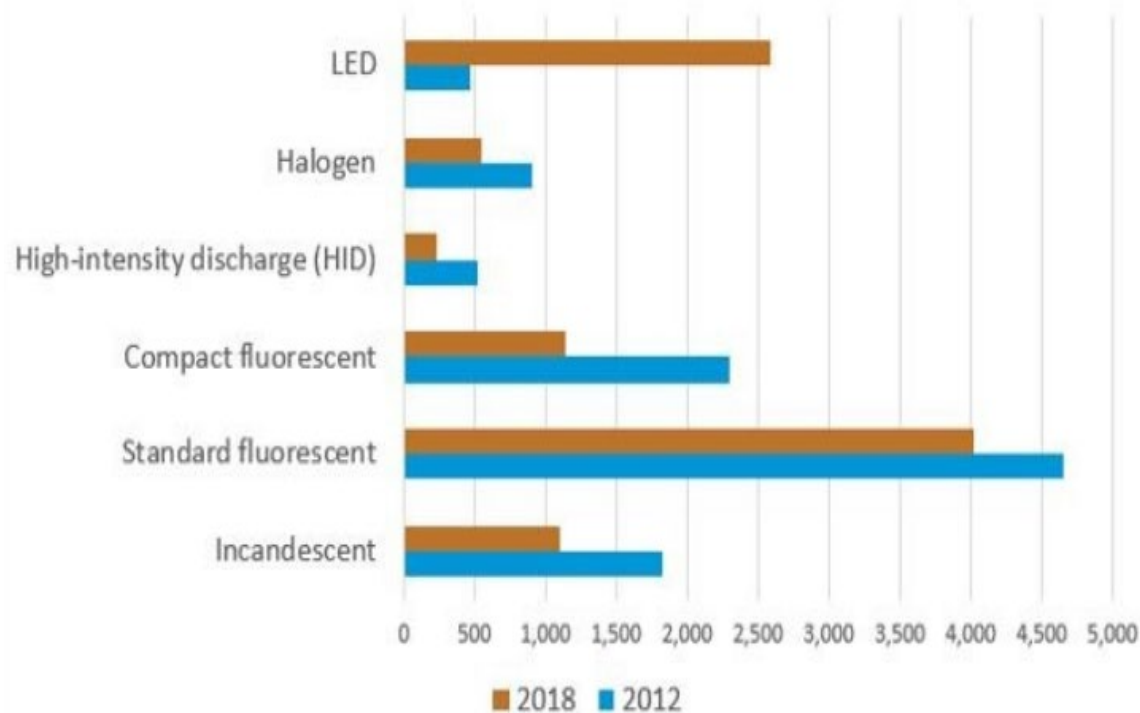
LED Electrical Loads are Controllable

- Dimming out of the box
- Extends life of fixture / lamp
- Saves energy
- More personal control over private spaces
- Automation of shared spaces when paired with sensor

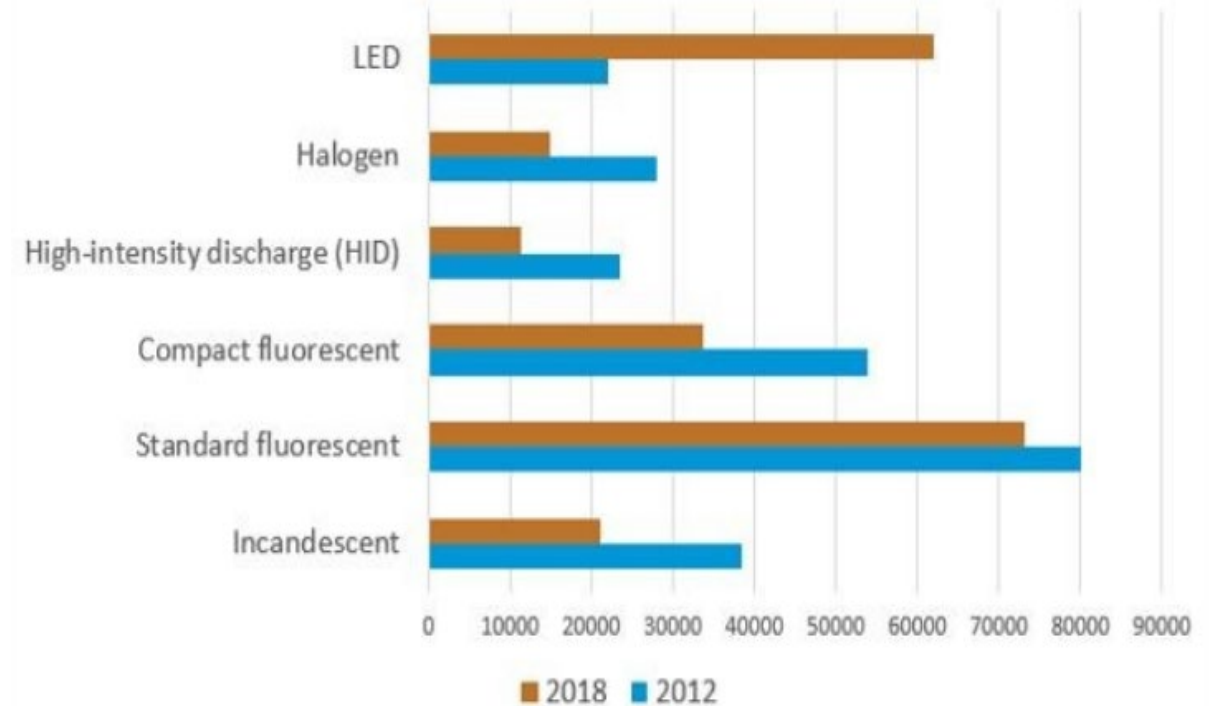


LED Adoption Increased 5x Between 2012-18

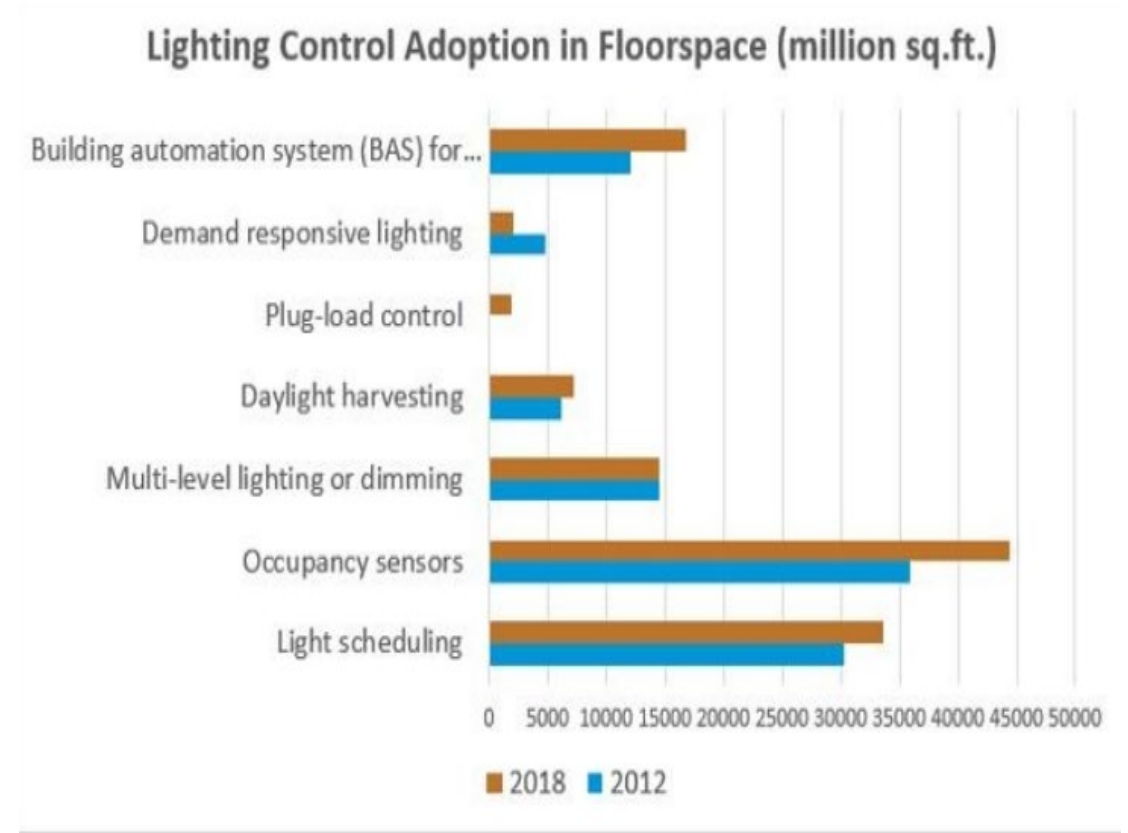
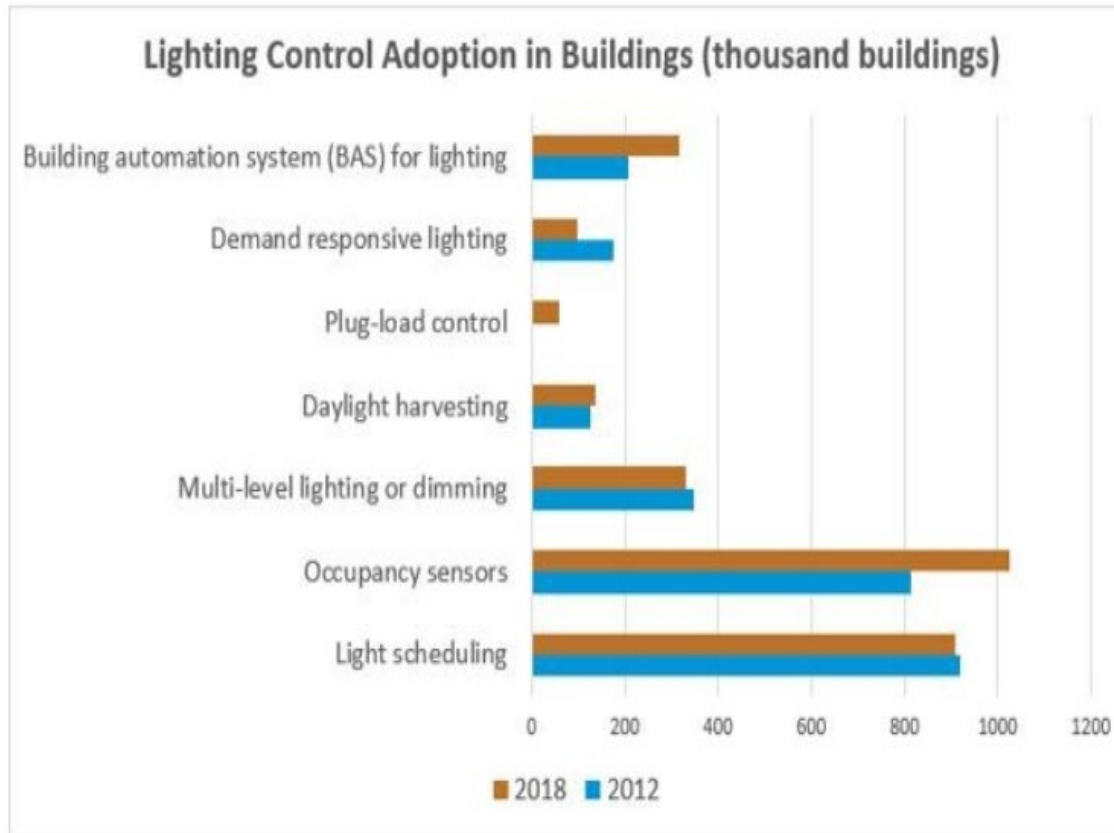
Light Sources Installed in Buildings (thousand buildings)



Light Sources Installed by Floorspace (million sq.ft.)



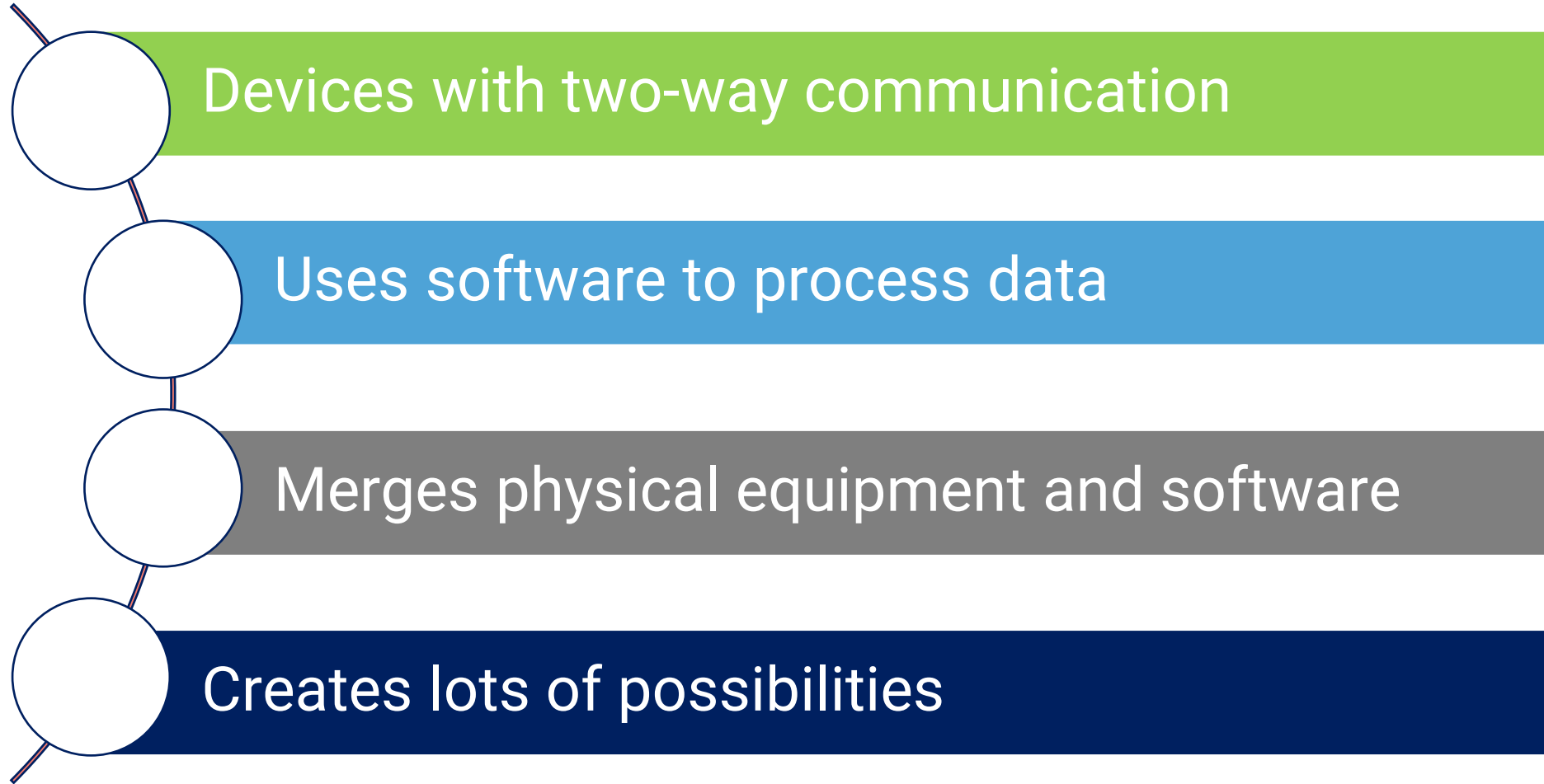
Majority of Buildings Untapped for Lighting Automation



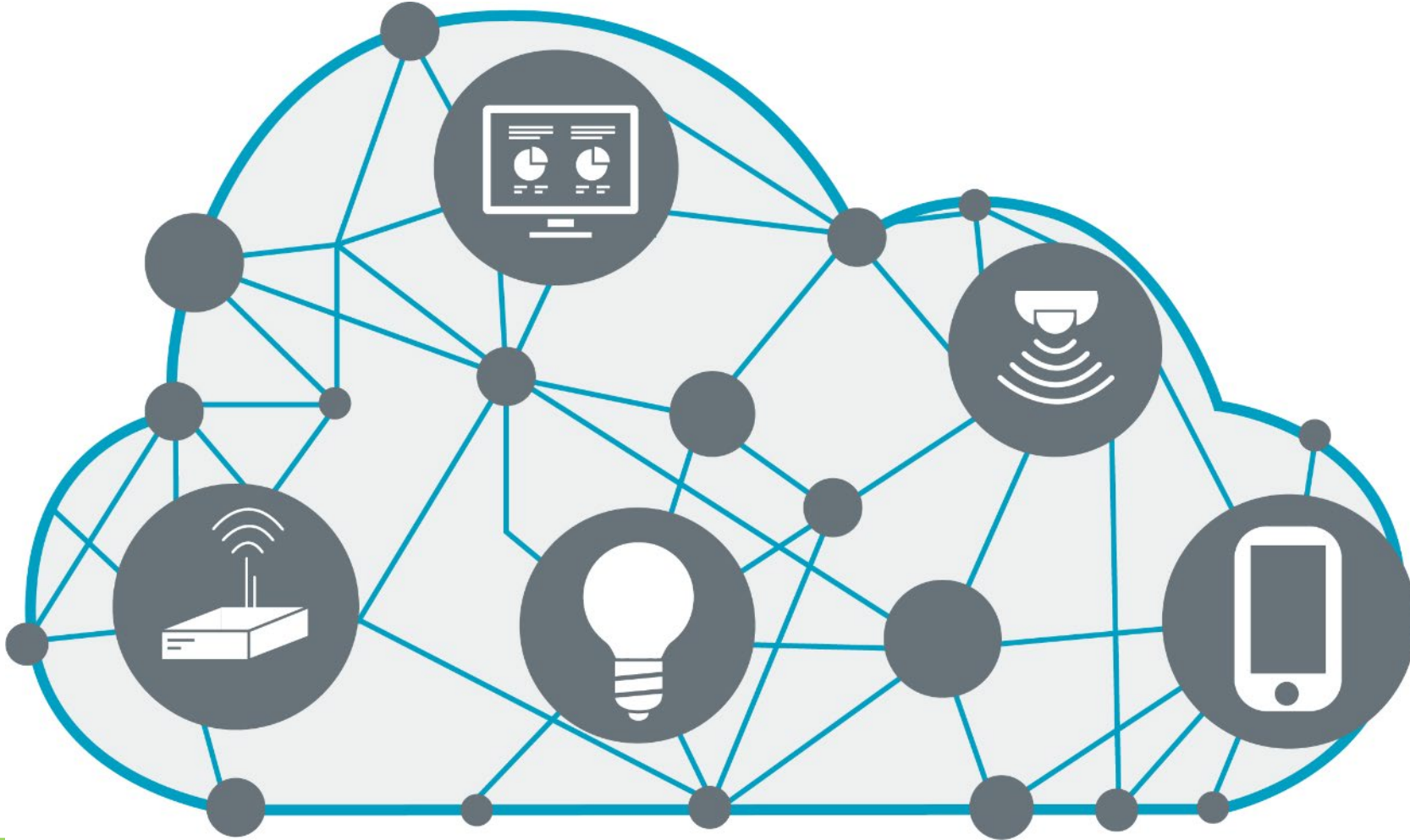


What Makes a Lighting System “Smart”

What is Networked Lighting?



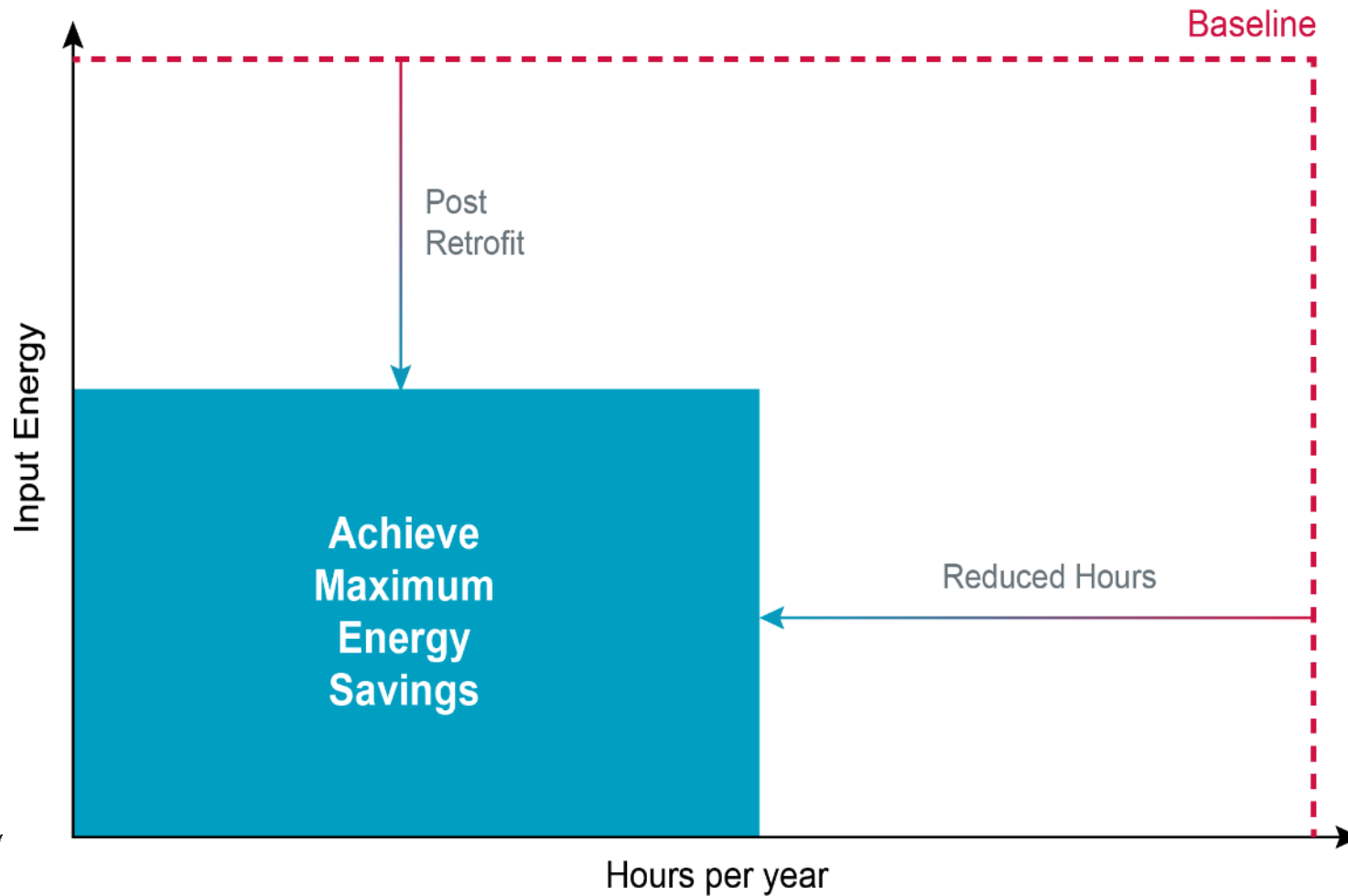
Software is the Key to Staying Connected





How do NLCs Save Energy?

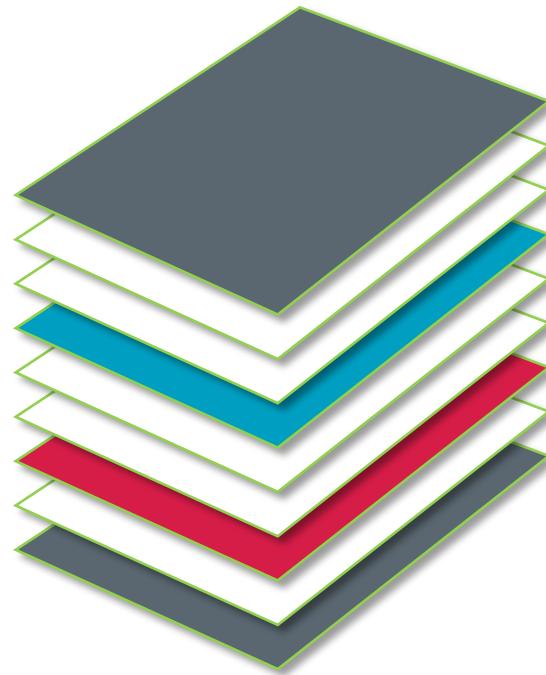
How Do Lighting Systems Save Energy?



- Lighting systems treat the fixture and its control(s) as one unit
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Layering Control Strategies

- Dimming
- High end trimming
- Luminaire/sensor integration
- Individual IP addressability
- Dynamic scheduling
- Personal control



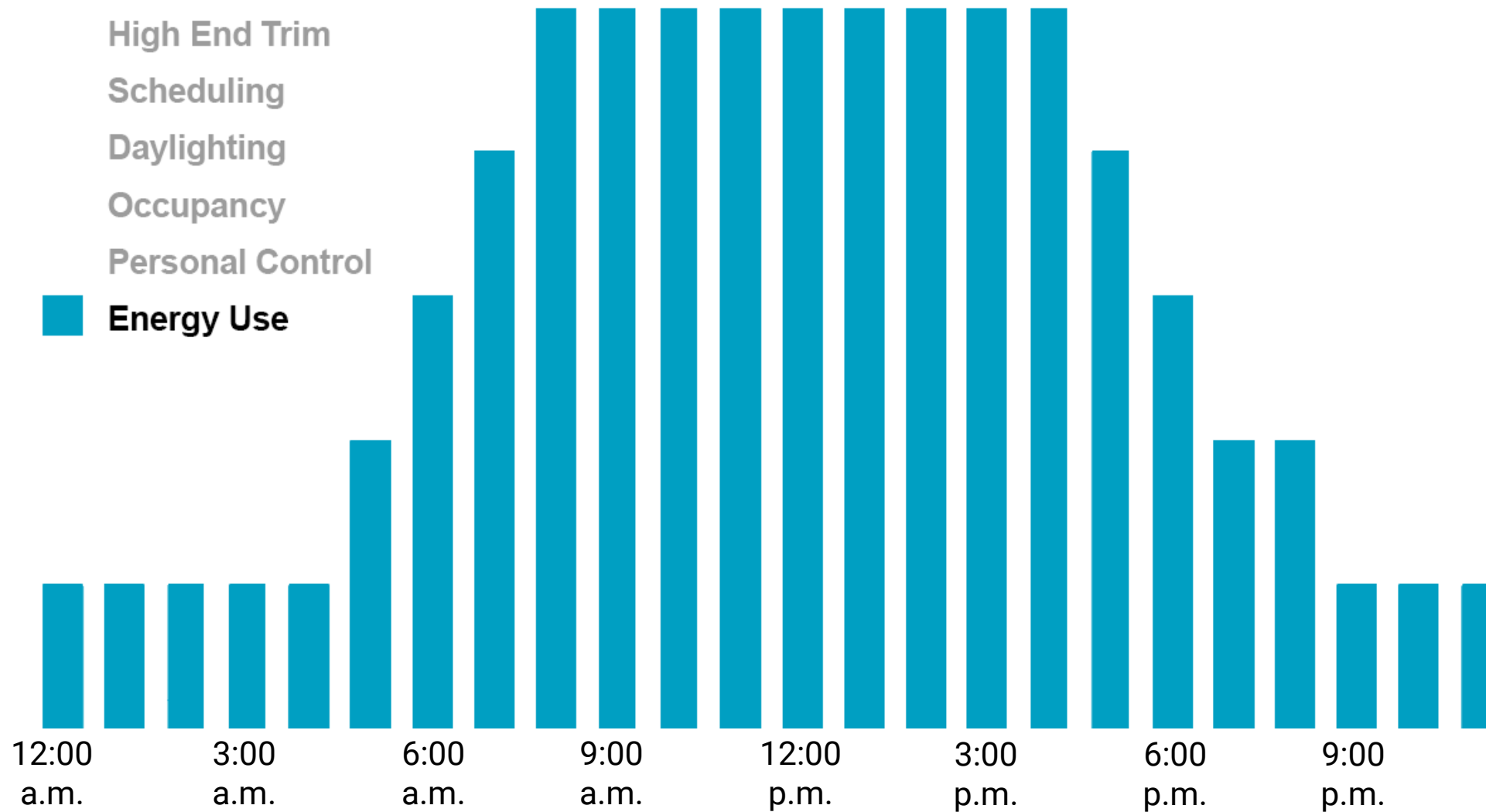
Layer 1

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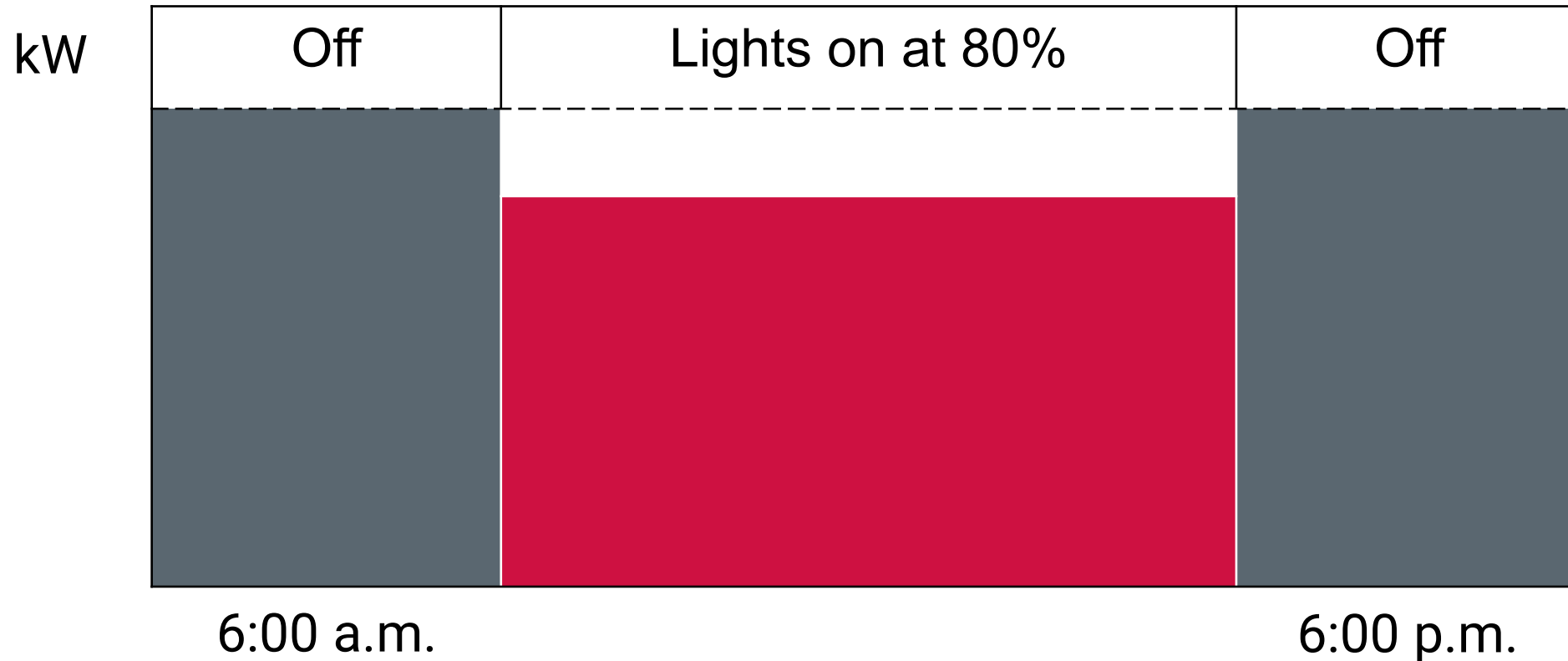
- Load shedding
- Plug load control
- BMS integration
- Energy monitoring
- Daylight harvesting
- Occupancy sensors

Layer 16

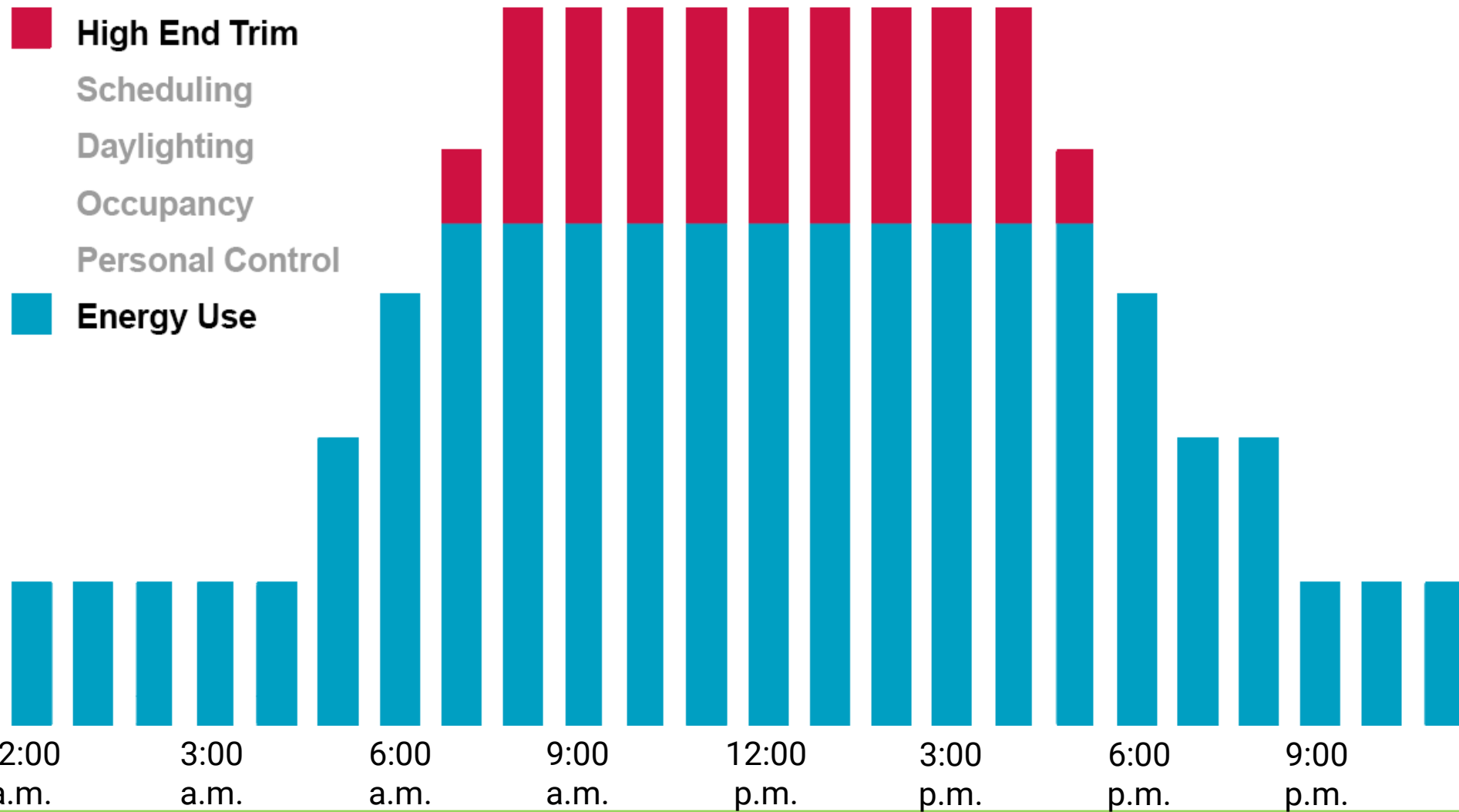
Layering in Action!



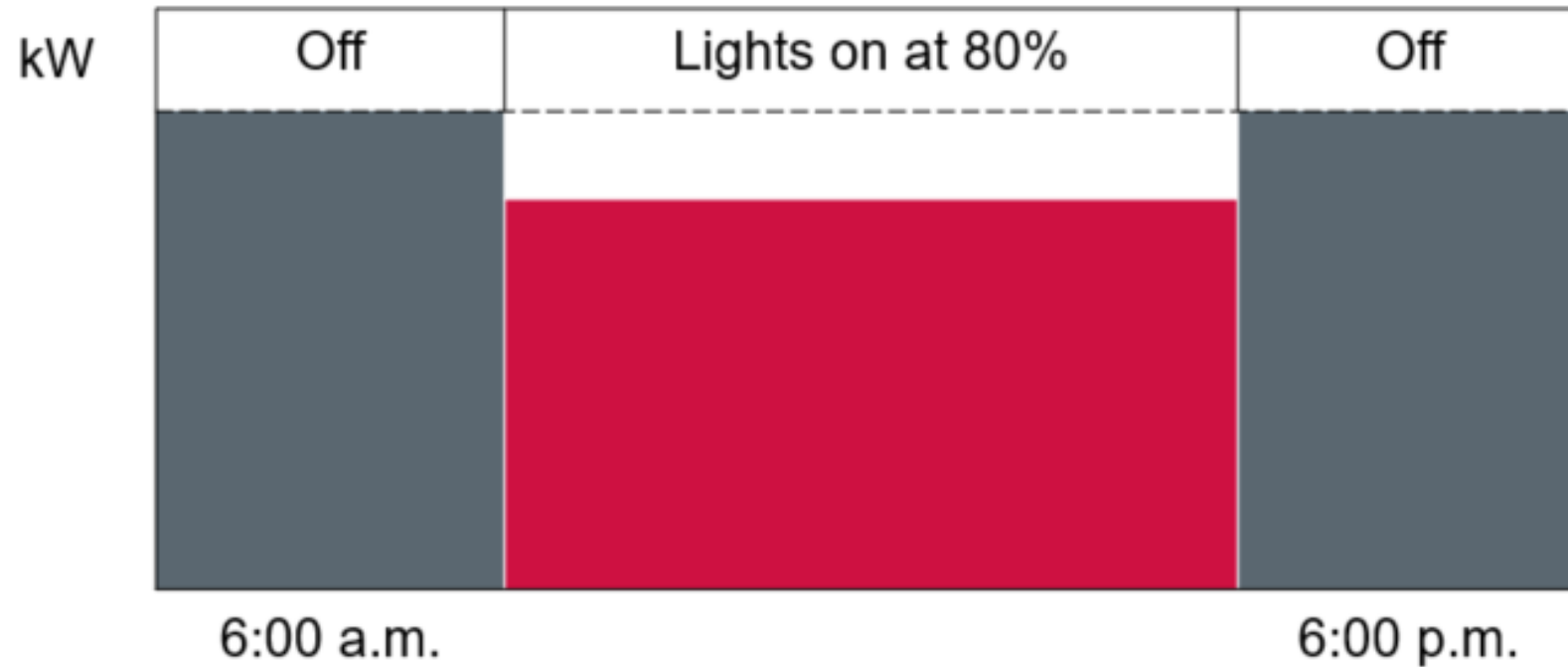
Lighting Control Fundamentals – High End Trim



Dimming Can Cut Energy Consumption By 20%

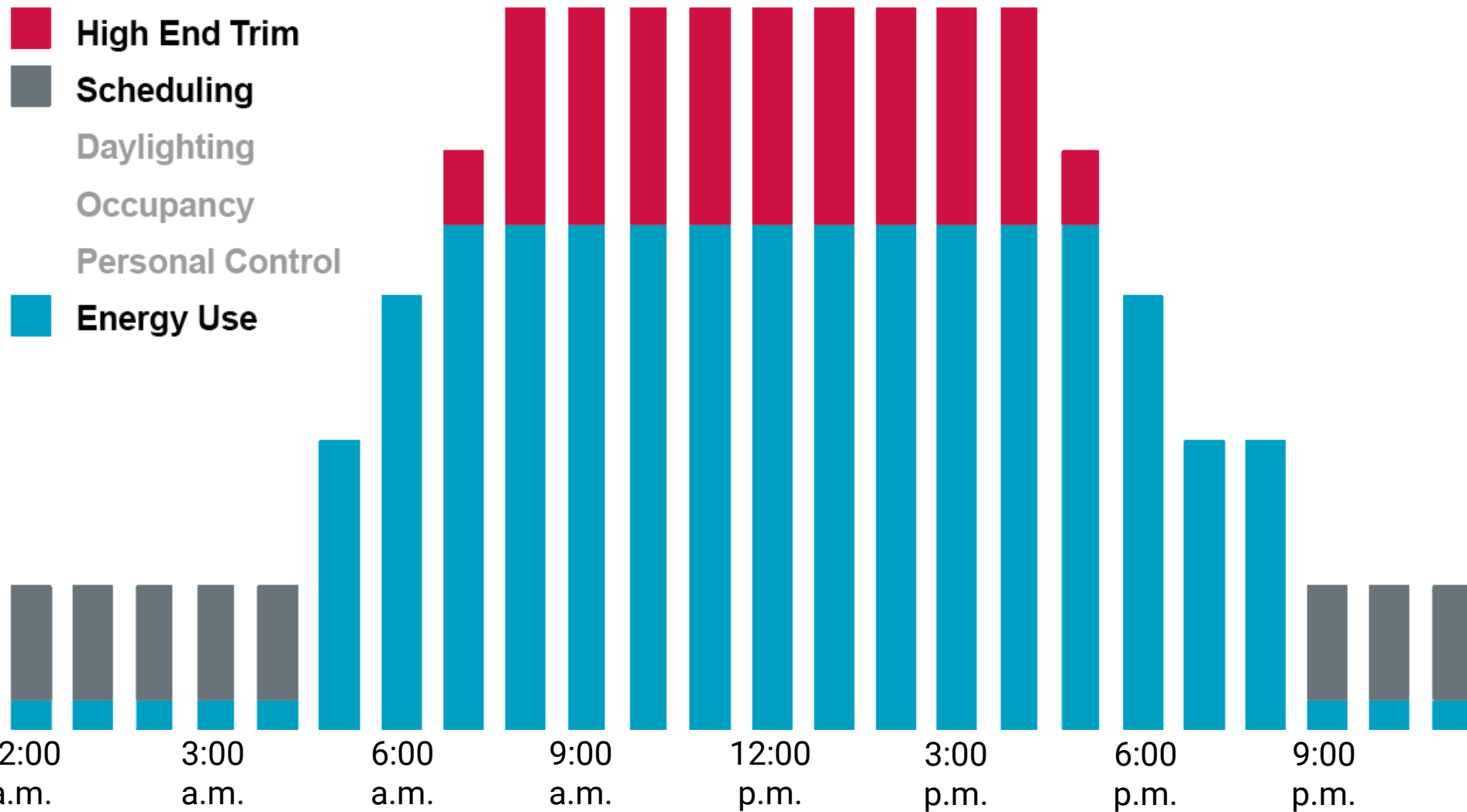


Lighting Control Fundamentals – Time Scheduling

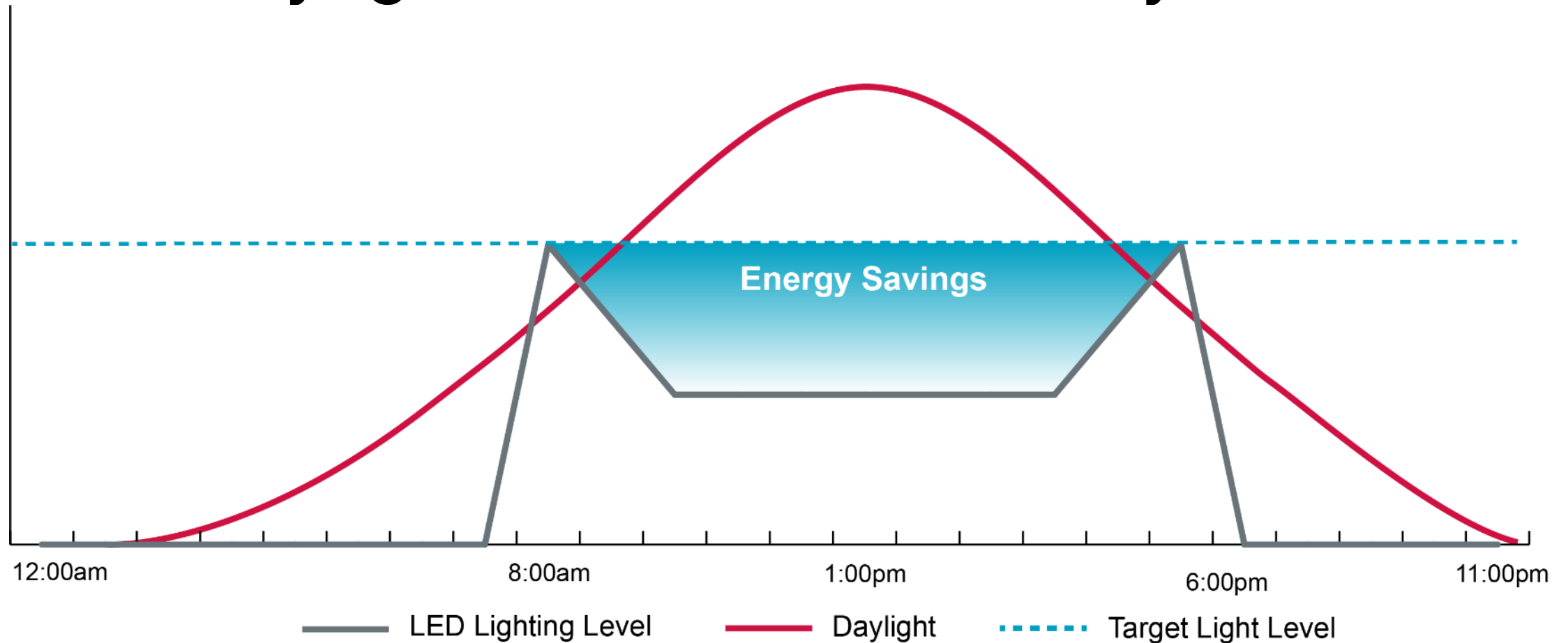


- Works by creating “events” that last for a predetermined amount of time
- The event determines the behavior of the light fixture, sensor inputs and switches
- 24% average energy savings

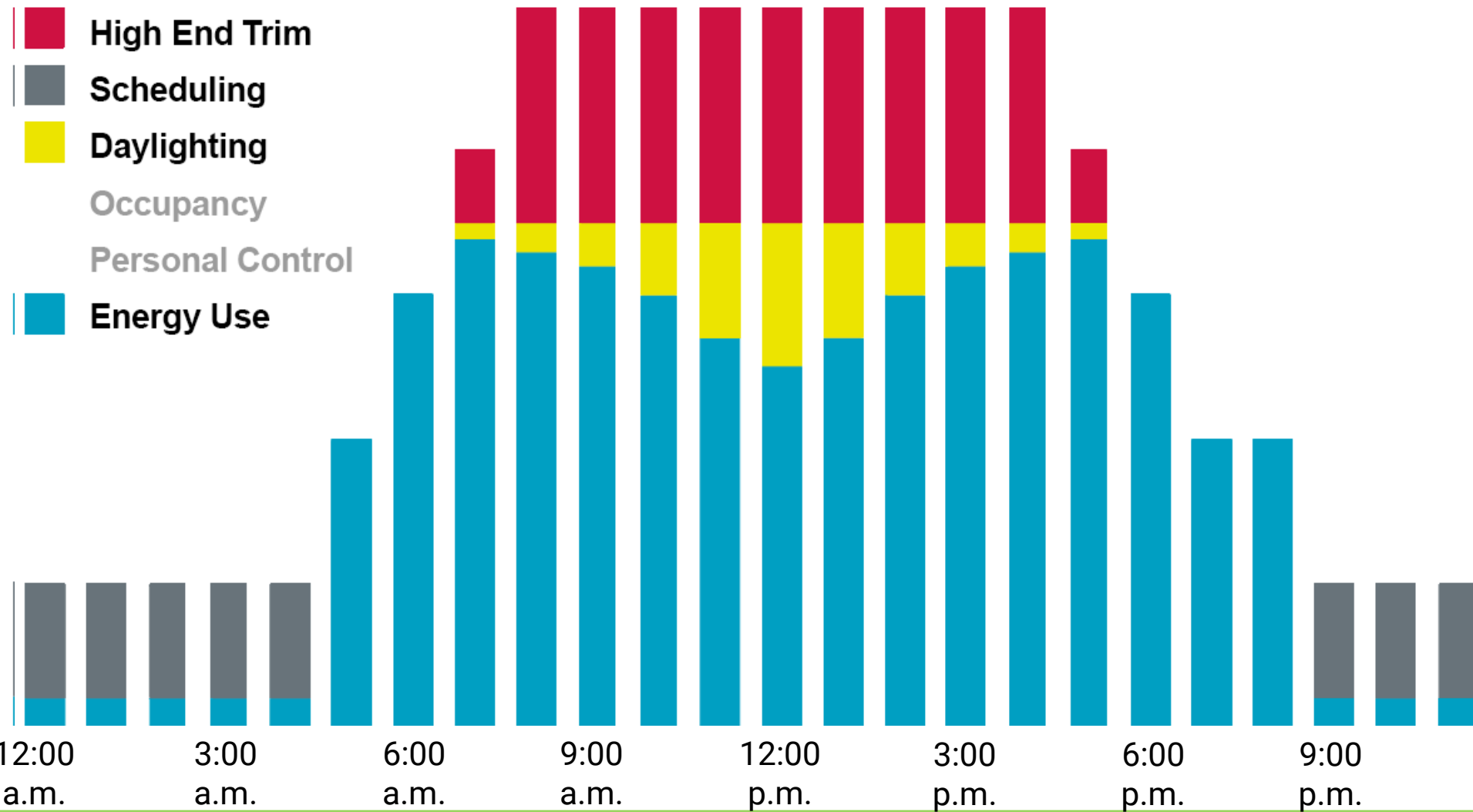
It's Easy To Update Scheduling As Needs Change



More Daylight Sensors Are Always Better



The Largest Energy Savings Is Mid-Day



Vacancy and Occupancy Sensors

Vacancy

Manual ON / Auto OFF

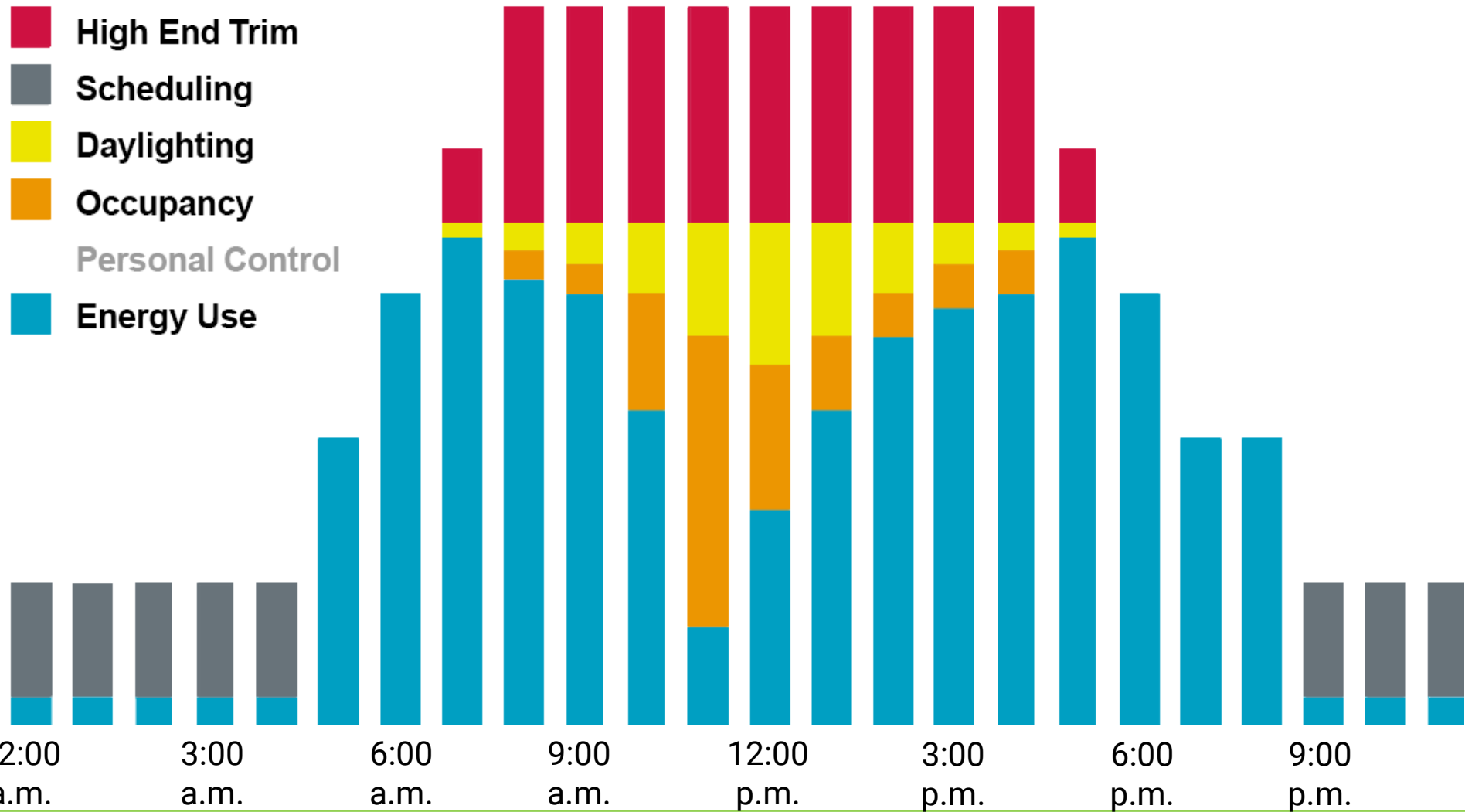


Occupancy

Auto ON / Auto OFF



Occupancy Patterns Will Determine Energy Savings



Lighting Control Fundamentals – Personal Control

Dashboard Map Configuration Calendar Manual Control Analysis Reporting Administration

Manual Control

Profile
Select a Profile

Expiration
Permanent (until canceled)

Edit Clone Create New Reset Save and Push

Name
[Text Field]

Description
[Text Area]

This short summary will be displayed in the Calendar and Dashboard.

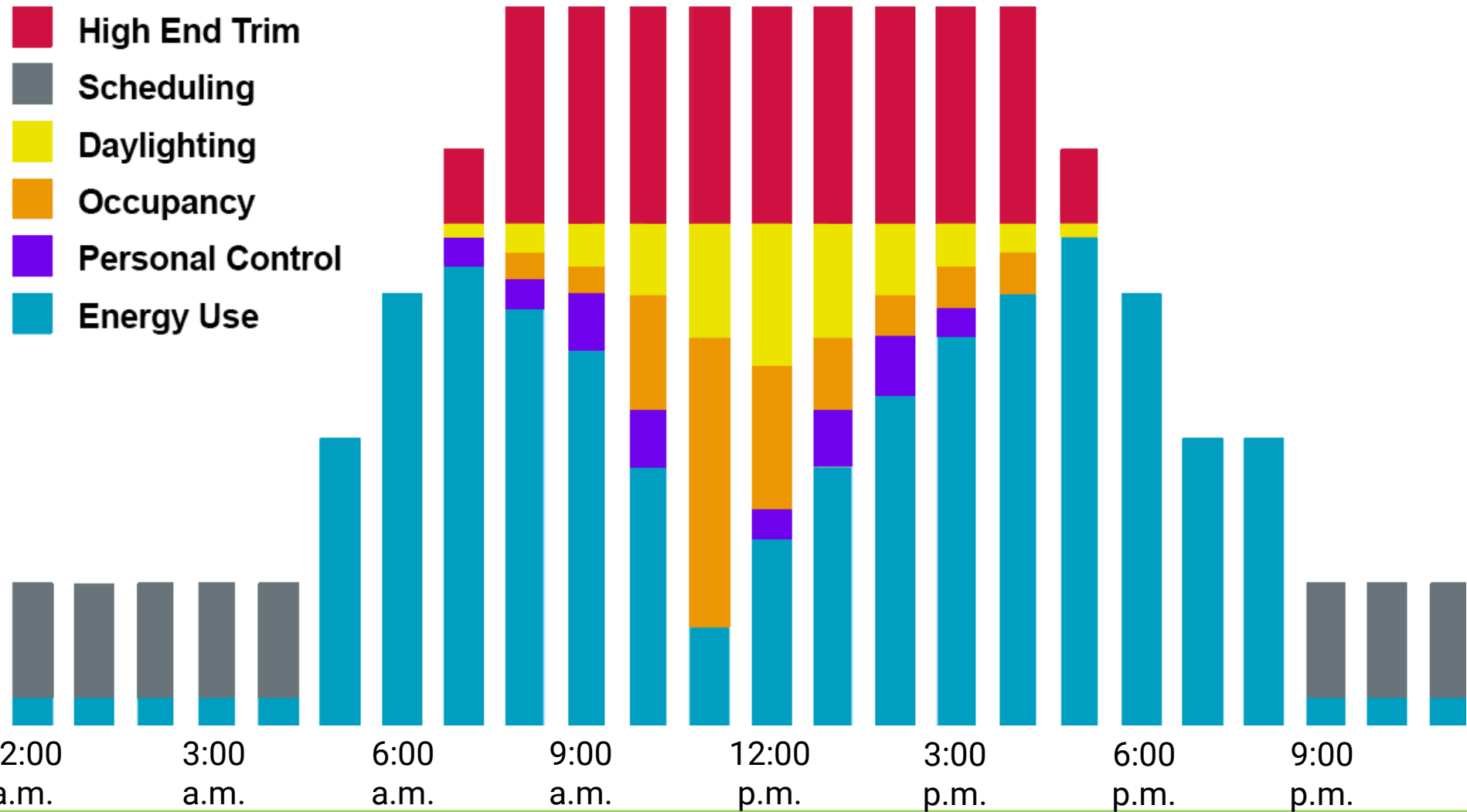
Select zones for override

Zone	Gang	Inactive	Active	Delay (sec)	Disable CC / DH
Office 0017	<input type="checkbox"/>	20	71	600	<input type="checkbox"/>

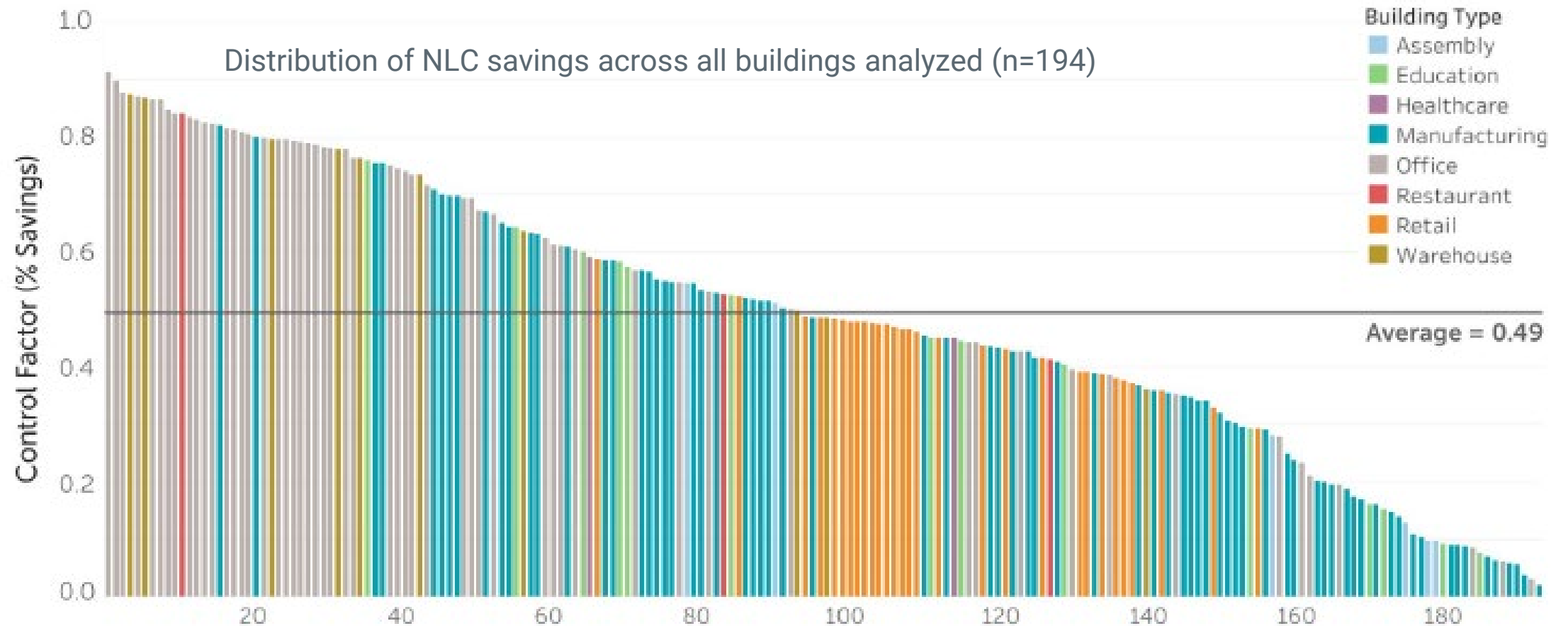
Add Rule Save



Personal Control Offers Occupant Empowerment



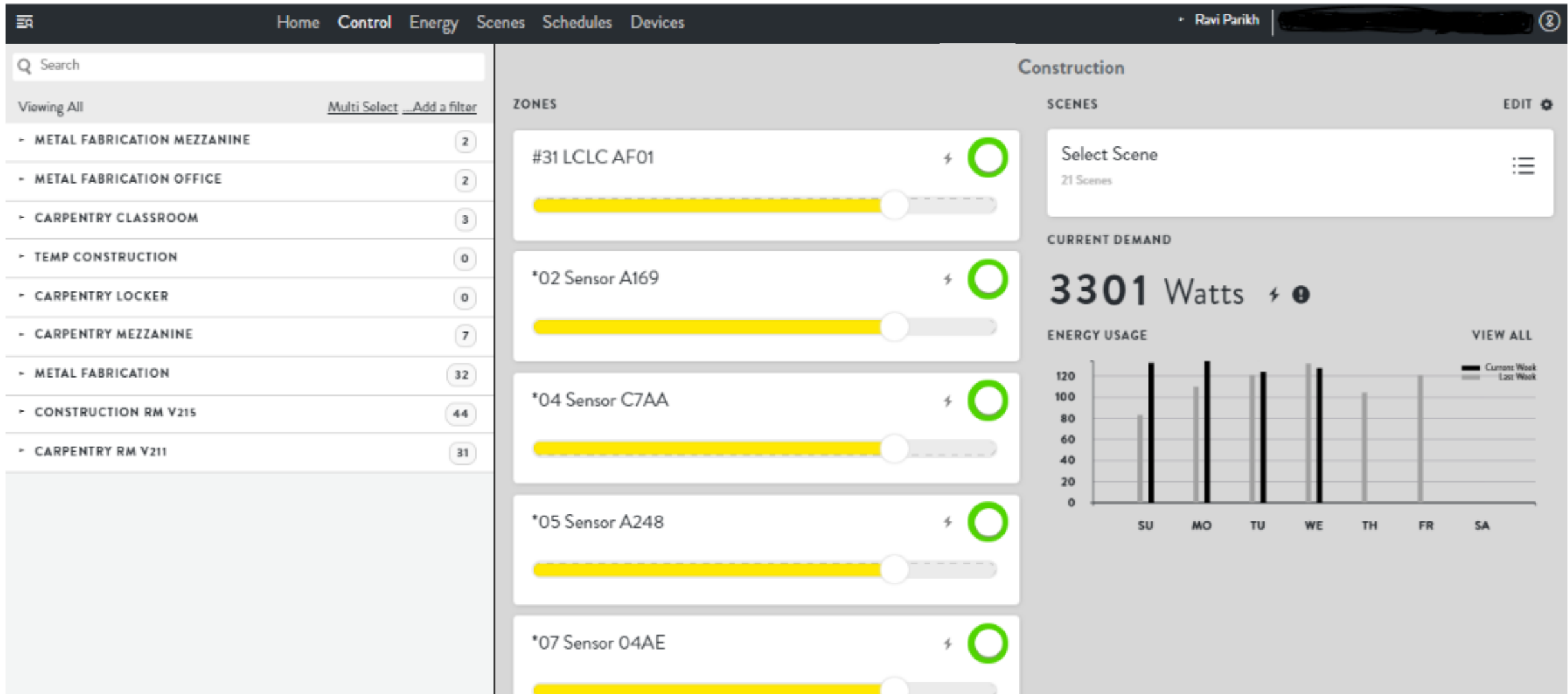
Energy Savings Varies By Building Type





Documenting Energy Savings

Energy Monitoring

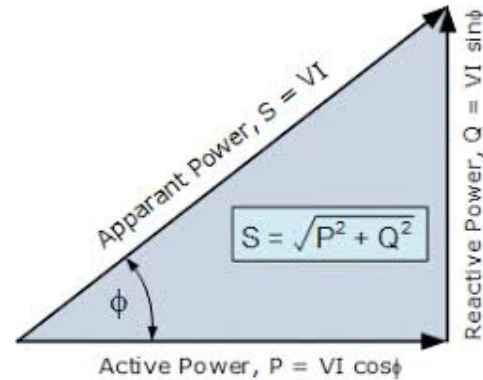


How We Achieve Energy Monitoring



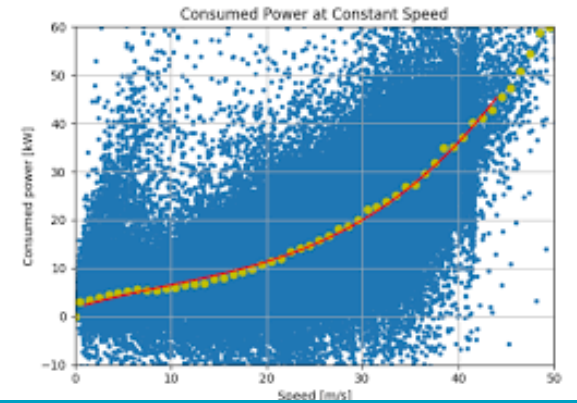
True Power Monitoring

- Simultaneous voltage and current readings
- Standard for revenue-grade metering
- Expensive



Apparent Power

- Current to the device is measured and the voltage is assumed
- Does not account for phase angle
- Not revenue-grade metering
- Best results when the light source has a PF near 1



Correlated Power

- The 0-10v LED driver signal is recorded over time
- The signal is correlated to the power curve of the fixture
- Does not measure voltage or current, and estimates intended energy
- Not used for revenue-grade metering

Benefits of Energy Monitoring

- Lower energy cost
- Predictive maintenance
- Lower insurance
- Improved safety





What Types of Systems are in the Market?

Lighting Systems Overview

Older systems

- Stand-alone controls
- Low-voltage relay panel

Newer systems

- Luminaire level lighting controls
- Centralized networked systems



Simplified Wireless Systems Overview

Best use cases:

- Suites or floors in a larger building
- Facilities with a single location
- Operations without complex reliability or data privacy concerns
- Larger projects focused on value-engineered lighting controls
- Best for small-to-medium facilities



Simplified Systems Architecture



- Hub is both the gateway and “server”
- Coverage radius of 71’ and control of up to 700 devices
- Individual dashboard for each hub’s control area
 - Cannot integrate multiple hubs to a single dashboard for whole building control

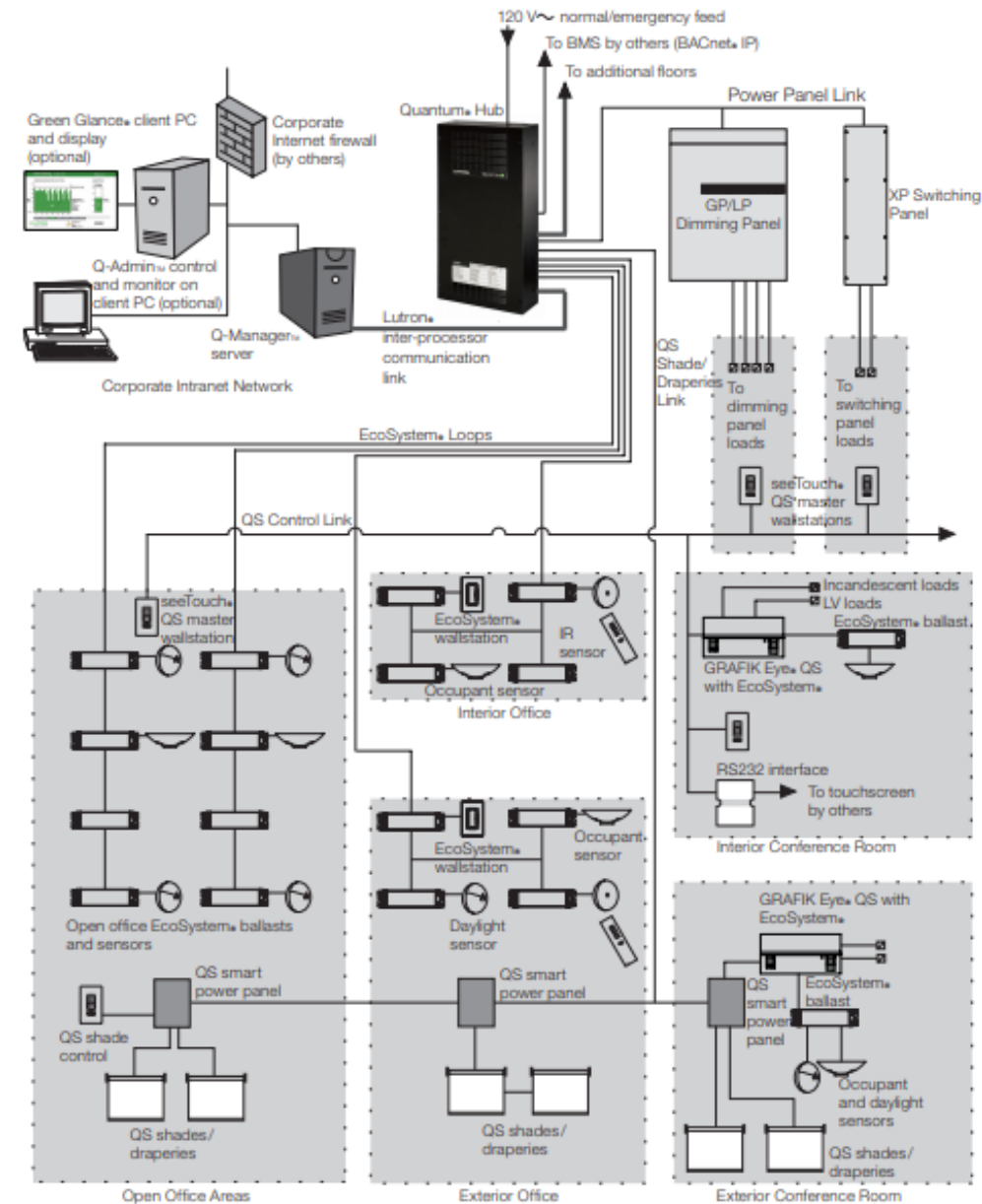
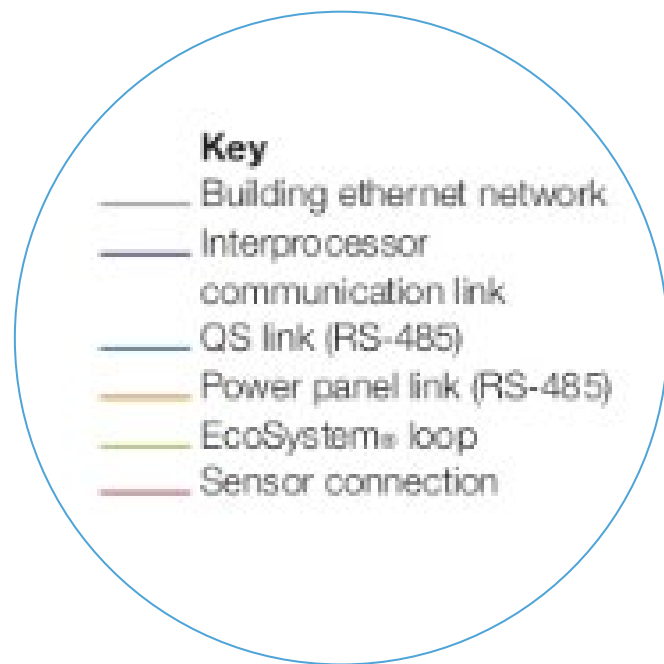
Advanced Wireless Systems Overview

Best use cases:

- Whole buildings or multiple floors
- Facilities with multiple locations
- Operations with complex reliability or data privacy concerns
- Larger projects
- Operations requiring verifiable energy data for sustainability or other goals
- Best for multi-site and complex organizations



Advanced Systems Wired Architecture



Systems Recap

Simplified Systems

- Likely to be wireless
- Commissioned by local rep or contractor
- Single suite/floor or smaller building
- Simplified training
- Basic control strategies

Advanced Systems

- Likely hard-wired/wireless or hybrid system
- Commissioned by manufacturer's rep
- Whole building or multiple facilities
- Intensive training
- Basic and advanced control strategies
- Integration with other building systems



Selecting a System

Networked Lighting System Checklist

- ✓ Check the DLC listing
- ✓ Installation requirements
- ✓ Warranty
- ✓ Functionality
- ✓ Ease of use
- ✓ Fees
- ✓ Security

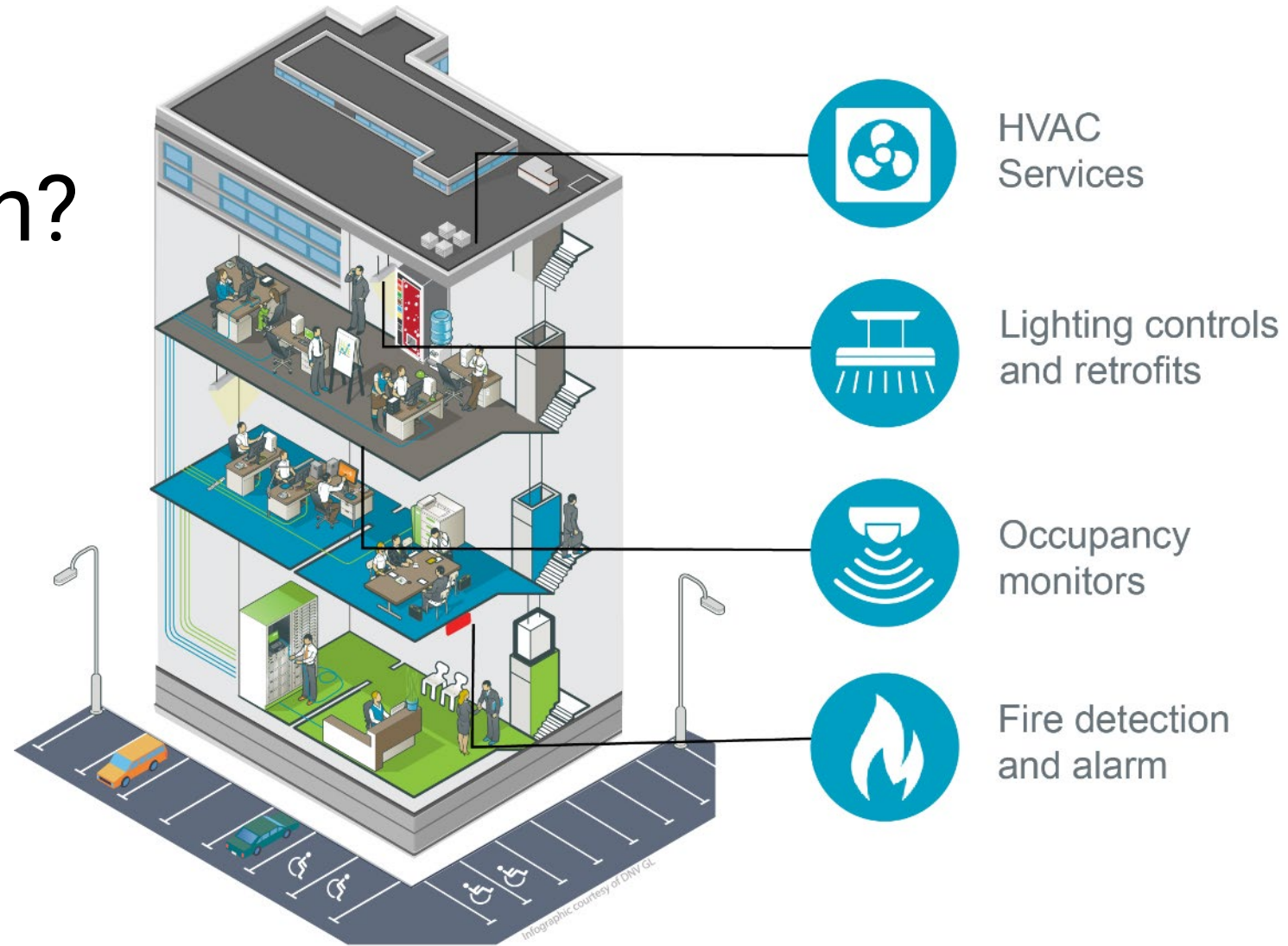




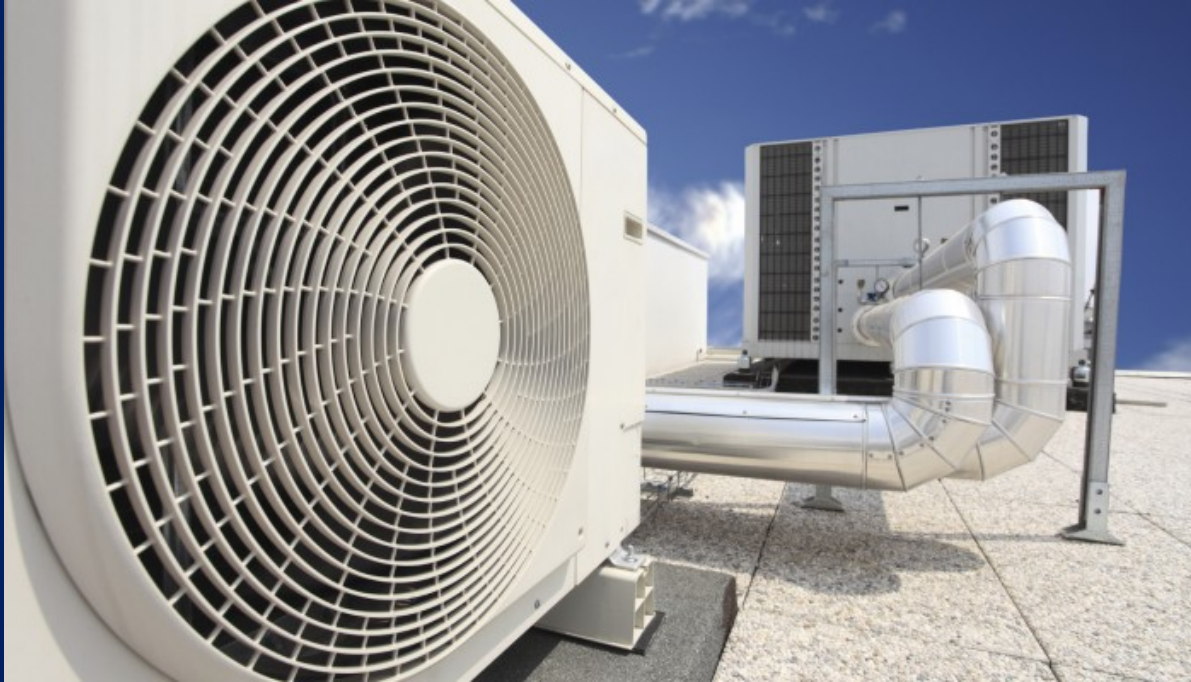
Integrating NLCs Into Other Building Systems

What is Building System Integration?

- Organizing the data streams of various building systems – lighting, HVAC and plug loads – into a single control application to save energy and improve performance



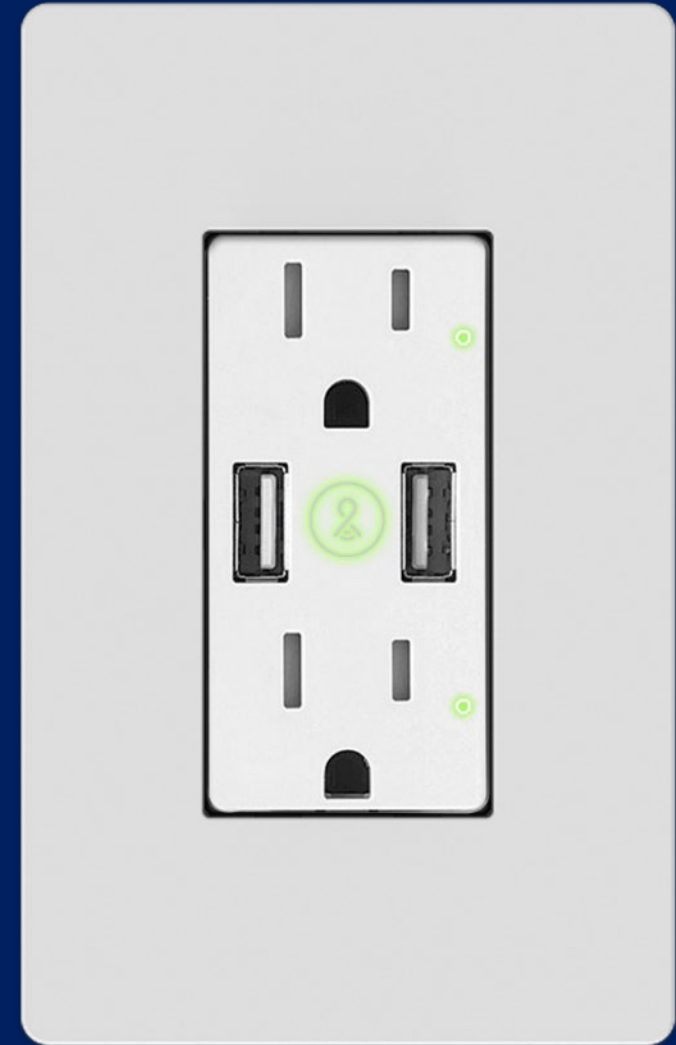
HVAC Integration



- Integrate with a BMS system for unified controls and automations
- Puts all the data into a “single pane of glass”
- Can incorporate all the NLC savings strategies plus additional HVAC savings from
 - Thermostat set-backs
 - VAV box turndown
 - Pressure / temperature reset
 - Ventilation reset
 - Demand controlled ventilation

Plug Load Control

- Control the power delivered to receptacles through occupancy sensing or scheduling
 - Workstation plug load control
 - Common area control
 - Office equipment control
- Plug load control is becoming an energy code standard
- Hard-wired and wireless options for sharing sensor data between light source and controlled receptacle

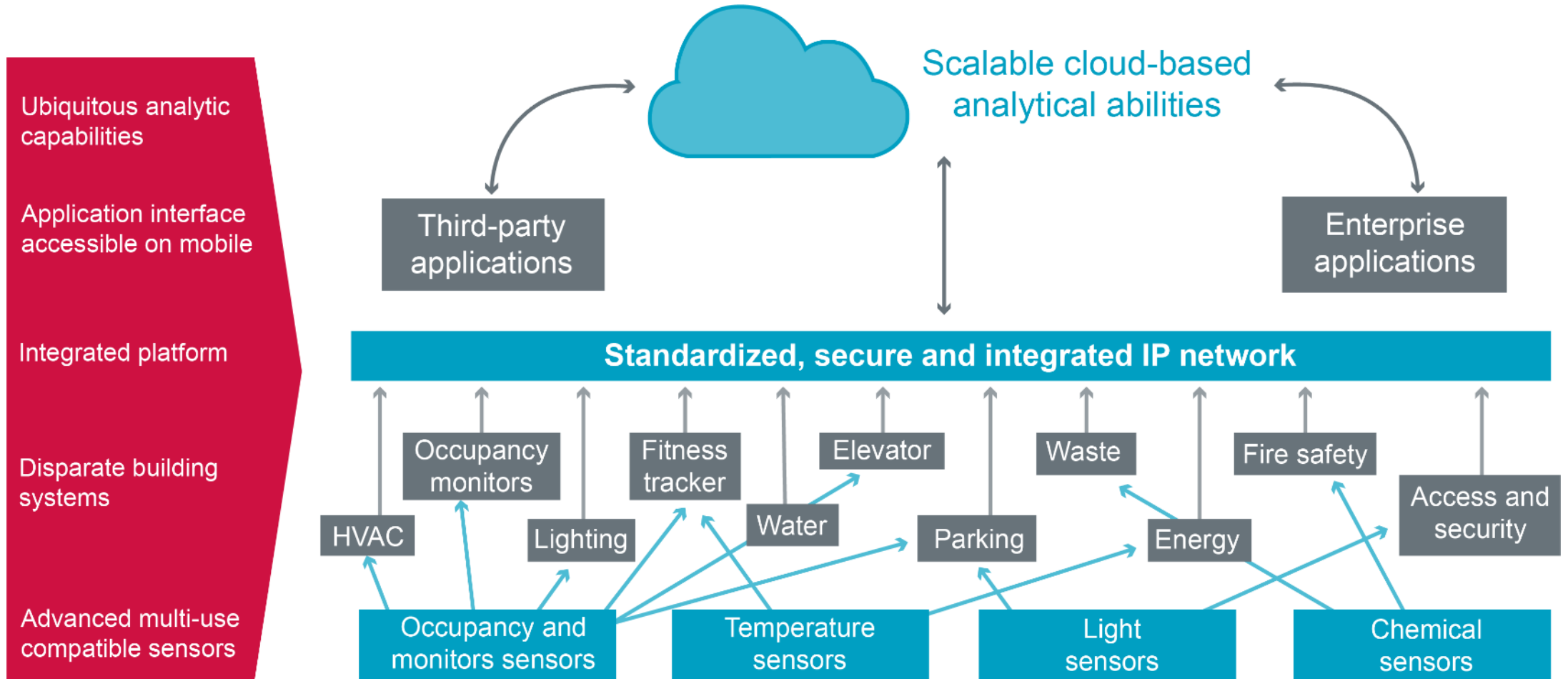


What is BACnet?



- Most common communication protocol for building automation and controls
- Open protocol developed by ASHRAE, and widely used for controlling HVAC systems
- When integrating an NLC system, the facility's BMS becomes the “server” and the NLC system becomes the “client”; i.e., the BMS manages the NLC systems data flow
- Updates to the BACnet standard make it easier to integrate with NLC systems through using a REST architecture and a common data format such as JSON
- To fully integrate the two systems, one needs to write a separate S00 to define where and how data is shared between the systems and if the BMS will poll the data or if the NLC system will provide real-time feedback

The Future of Building Integration



Thanks! Lets Talk

Wesley.Whited@DNV.com

www.linkedin.com/in/wesley-whited





Upcoming Training

Attend the webinar to learn more about Business Energy Services

New Construction and Major Renovation

Tuesday, April 26th

10:00 AM – 11:30 AM



Business Energy Services Incentives

Business Energy Services

What We Offer

- **Application Support**
- **Technical Services**
- Free Classroom Education & Training
- Non-Profit Agency Grants
- Small Business Project Incentives
- Instant Discounts
- Retrofit Project Incentives
- New Construction Incentives

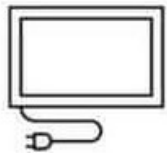
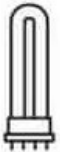


Customer Benefits

- **Reduced Energy Expenses**
- Reduced Carbon Footprint
- Annual Cash Savings
- Improved Comfort

Instant Discounts

No application Needed



Eligible Products

Lighting	Incentive/unit
T8 4' Linear LED*	\$4
T8 2' U-Bend LED*	\$4
1'x4' LED Illuminated Panel & Troffers Containing LED Strip Lights	\$10
2'x2' LED Illuminated Panel & Troffers Containing LED Strip Lights	\$10
2'x4' LED Illuminated Panel & Troffers Containing LED Strip Lights	\$10

Kitchen	Incentive/unit
High Efficiency (HE) Fryer	\$200
Large Vat Fryer	\$200
HE Griddle	\$300
Convection Oven	\$350
Combination Oven	\$1,000
Steam Cooker	\$750
HE Holding Cabinets, Full Size	\$300
HE Holding Cabinets, 3/4 Size	\$250
HE Holding Cabinets, 1/2 Size	\$200

ES = Energy Star, CEE = Consortium for Energy Efficiency, SD = Solid Door, GD = Glass Door, cf = Cubic Feet

Refrigeration	Incentive/unit
Ice Machine ES/CEE I <300	\$50
Ice Machine ES/CEE I 300-500	\$75
Ice Machine ES/CEE I 500-1000	\$125
Ice Machine ES/CEE I 1000-1500	\$200
Ice Machine ES/CEE I >1500	\$250
Ice Machine ES/CEE II <300	\$100
Ice Machine ES/CEE II 300-500	\$150
Ice Machine ES/CEE II 500-1000	\$250
Ice Machine ES/CEE II 1000-1500	\$400
Ice Machine ES/CEE II >1500	\$500
Refrigerator SD ES < 15 cf	\$50
Refrigerator SD ES ≤ 15 cf V < 30 cf	\$75
Refrigerator SD ES ≤ 30 cf V < 50 cf	\$90
Refrigerator SD ES ≥ 50 cf	\$125
Freezer SD ES < 15 cf	\$60
Freezer SD ES ≤ 15 cf V < 30 cf	\$75
Freezer SD ES ≤ 30 cf V < 50 cf	\$80
Freezer SD ES ≥ 50 cf	\$200

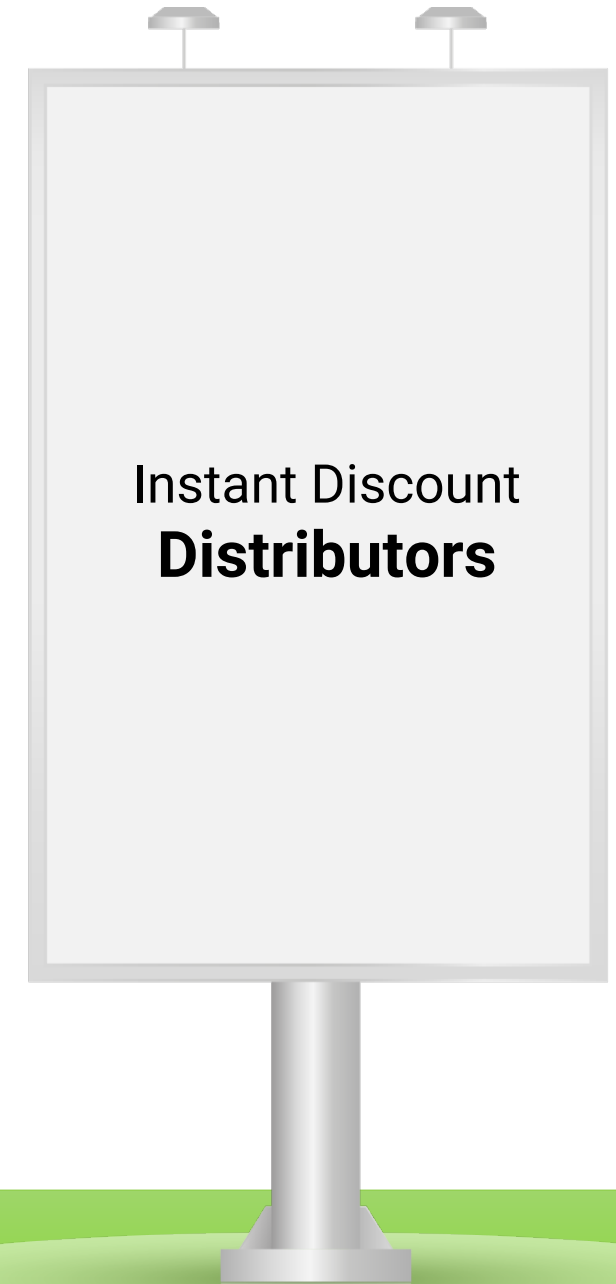
Refrigeration	Incentive/unit
Refrigerator GD ES < 15 cf	\$50
Refrigerator GD ES ≤ 15 cf V < 30 cf	\$75
Refrigerator GD ES ≤ 30 cf V < 50 cf	\$90
Refrigerator GD ES ≥ 50 cf	\$125
Freezer GD ES < 15 cf	\$60
Freezer GD ES ≤ 15 cf V < 30 cf	\$75
Freezer GD ES ≤ 30 cf V < 50 cf	\$80
Freezer GD ES ≥ 50 cf	\$200

Lighting

- Bulb and Driver
- City Electric Supply
- Facility Solutions Group
- Main Electric Supply Company
- Grainger
- Wedco
- Crescent Electric Supply Company
- Bulbman, Inc.
- Regency Lighting
- Vegas Electric Supply
- MCOR Lighting
- Key Power Solutions
- Green Planet Corporation
- Platt Electric Supply
- Have Lights Will Travel
- Discount Lighting
- Gexpro
- GoGreenLighting.com, Inc.
- Nedco Supply
- Sierra Nevada Lighting, LLC
- Codale Electric Supply
- HD Supply Facilities Maintenance
- mySupplier
- USA LED
- Bulbtronics
- Commercial Lighting Specialties
- Las Vegas Lighting
- Capitol Light

Commercial Kitchen & Refrigeration

- Open to apply for all commercial kitchen & refrigeration distributors



Instant Discount Website

BUSINESS ENERGY SERVICES INSTANT DISCOUNT

No applications. No waiting. Big savings.

Our Business Energy Services offers a PowerShift **instant discount** to NV Energy eligible business customer accounts and contractors on the purchase of qualifying lighting and commercial kitchen equipment.

Visit a participating distributor to make your purchase and receive your PowerShift instant discount. Your discount is automatically deducted from the purchase price, so there's no paperwork for you to complete. It's that easy.

Get details on all the incentives and participating distributors below.



nvenergy.com/BES > Incentives & No Cost Offers > Instant Discounts



Instant Discount Website

Website includes:

- Eligible product types
- Participating distributor listing
- FAQs
- Operations Manual

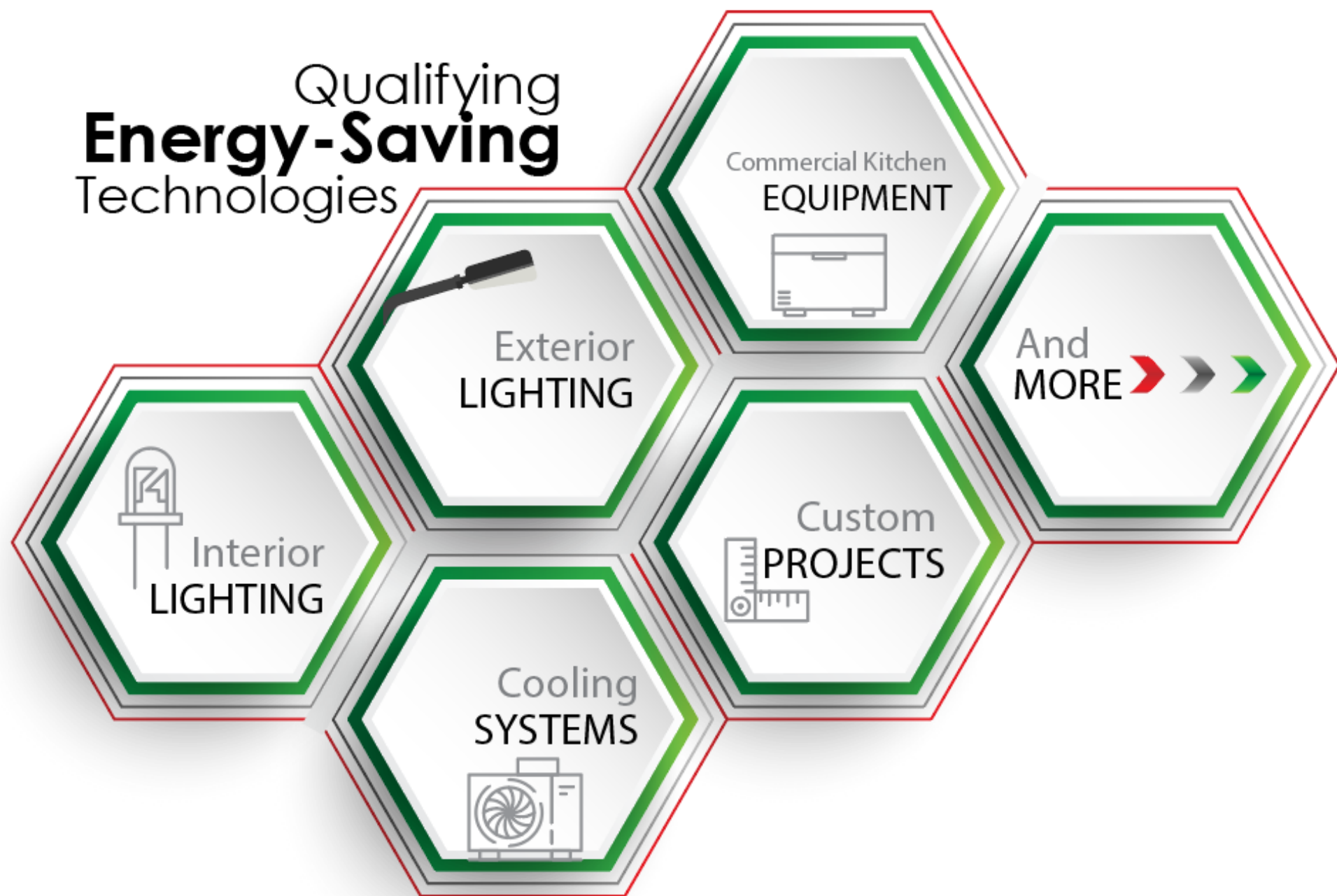
+ Participating Distributors

+ Frequently Asked Questions

FULL PROGRAM DETAILS



Qualifying **Energy-Saving** Technologies



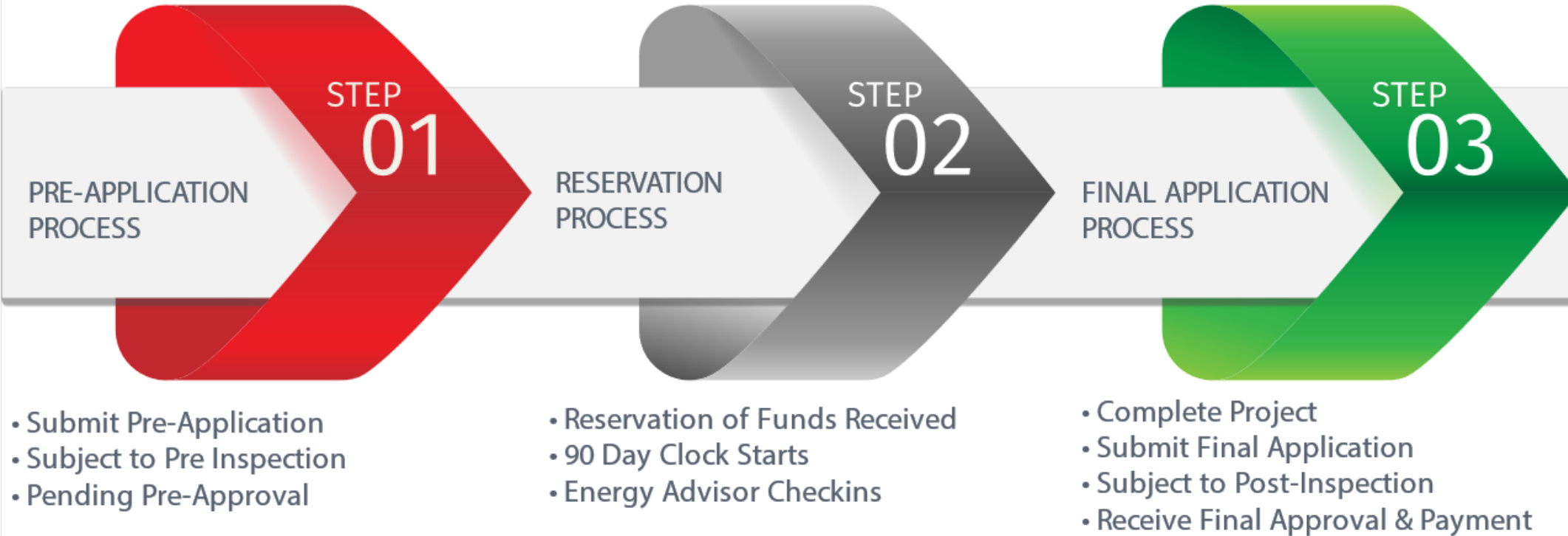


Applying for Incentives

Retrofit and New Construction

Talk with a Business Energy Advisor 1-800-342-6335

Three Easy Steps to Saving



Save
Energy & Money,
Year After Year



► THE APPLICATION PROCESS

More Ways to Save

Business Energy Services 2022 Southern Retrofit Incentive Summary

Retrofit - Interior Lighting			
Measure	Size/Type	Unit	Incentive
Interior Lighting Lamp/Fixture	Interior	Watt Reduced	\$0.25
Interior LED Lamp, Hotel Guestroom	Interior	Watt Reduced	\$0.10
Delamping T8 Lamps	4-foot lamp	Lamp	\$3.00
Standard T8 to RW T8	4-foot lamp	Lamp	\$1.00
LED Exit Sign		Sign	\$15.00
LED Refrigerated Case Lighting		Lamp	\$25.00
LED Channel Sign	≤ 2 Feet	Letter	\$10.00
LED Channel Sign	> 2 Feet	Letter	\$25.00
Occ. Sensor on Refrigerated Case	Enclosed	Door	\$12.00
Occ. Sensor on Refrigerated Case	Open	LF of Case	\$4.00
Occupancy Sensors	Wall Box	Sensor	\$12.00
Occupancy Sensors	Ceiling Mount	Sensor	\$30.00
Occupancy Sensors	HB T5/T8 Sensor	Sensor	\$20.00
Occupancy Sensors	HB LED Sensor	Sensor	\$14.00
Daylighting Controls		Watt Controlled	\$0.10
Bi-Level Stairwell/Hall/Garage LED Fixtures with Sensors		Watt Controlled	\$0.40
Retrofit-Exterior and Garage Lighting			
Garage LED Replacing HID 24/7	24/7 Operation	Watt Reduced	\$0.25
Exterior Replacing HID 12 Hr	12 Hour Operation	Watt Reduced	\$0.20
Garage High Wattage Screw-In CFL	24/7 Operation	Watt Reduced	\$0.20
Exterior High Wattage Screw-In CFL	12 Hour Operation	Watt Reduced	\$0.15
LED Channel Sign	≤ 2 Feet	Letter	\$10.00
LED Channel Sign	> 2 Feet	Letter	\$25.00
Garage Hard-Wired CFL < 29W		Fixture	\$25.00
Garage Hard-Wired CFL > 30W		Fixture	\$40.00
Exterior Hard-Wired CFL < 29W		Fixture	\$15.00
Exterior Hard-Wired CFL > 30W		Fixture	\$30.00

Please refer to 2022 Business Energy Services Retrofit Specifications document for complete specifications

¹ Incentive varies by transformer size, see application.

² Incentive varies by UPS size and input dependency characteristics, see application.

Retrofit - Commercial Kitchen		
Measure	Unit	Incentive
Ventilation Control - Retrofit	HP	\$350.00
Ventilation Control - New Hood	HP	\$300.00
Anti-Sweat Heater Controls	Door	\$40.00
EC Motors: Walk-in Boxes	Motor	\$40.00
EC Motors: Refrigerated Cases	Motor	\$30.00
Evaporator Fan Controller	Controller	\$35.00
ENERGY STAR® Tier II Vending Machine Refurbishment Kit	Kit	\$75.00
Vending Machine Controls	Controller	\$90.00
Snack Machine Controls	Controller	\$15.00
Floating Head Pressure Controls	HP	\$35.00
Reach-in Cooler Controls	Controller	\$30.00

Please note that 4' T8 LED and 1'x4', 2'x2' & 2'x4' LED TROFFERS Illuminated Panels and some kitchen equipment are no longer eligible for incentives though this program. Please see Business Energy Services Instant Discount Program at www.nvenergy.com/bes for details.

Retrofit – Transformer and UPS		
Measure	Unit	Incentive
Single & Three Phase High Eff. Transformer	Per Unit	Varies ¹
Single & Three Phase High Eff. Transformer - incremental	Per 0.01% Above Qual.	Varies ¹
High Eff. UPS - Single & Multi-Normal	Output kW	Varies ²
Retrofit - Miscellaneous		
Escalator Motor Controllers (EMC)	HP	\$20.00
VSD Pool Pump & Scheduling Control	HP	\$150.00
VSD Air Compressor Replacement < 50hp	HP	\$45.00
Compressed Air Engineered Nozzles	Nozzle	\$10.00
High Efficiency Battery Chargers	Charger	\$225.00
Demand Control Ventilation – Parking Garage	HP	\$90.00
Demand Control Ventilation – Interior Spaces	Per 1,000 sq ft	\$50 per 1,000 sq ft
Irrigation Nozzles	Nozzle	\$3.00
Irrigation Sprinklers	Sprinkler	\$2.50
Irrigation Regulators	Regulator	\$3.50
Irrigation Gaskets	Gasket	\$2.00
Retrofit - Cooling		
Air-Cooled Units:		
(<65 kBtuh), Qual SEER	Ton	\$12.00
(<65 kBtuh), 1 Additional SEER	Ton	\$8.00
(≥65 & <135 kBtuh), Qual EER	Ton	\$12.00
(≥65 & <135 kBtuh), 1 Additional EER	Ton	\$10.00
(≥135 & <240 kBtuh), Qual EER	Ton	\$18.00
(≥135 & <240 kBtuh), 1 Additional EER	Ton	\$10.00
(≥240 kBtuh) Qual IEER	Ton	\$18.00
(≥240 kBtuh) 1 Additional IEER	Ton	\$10.00
Water-Cooled Units, Qual EER	Ton	\$25.00
Water-Cooled Units, 1 Additional EER	Ton	\$10.00
PTAC/PTHP, Qual EER	Ton	\$50.00
PTAC/PTHP, 1 Additional EER	Ton	\$20.00
Programmable Thermostat	Each	\$25.00
Window Film	Sq. Foot	\$0.70
VSD on HVAC Fans and Pumps	HP	\$50.00
Air Side Economizers	Ton	\$25.00
Retrofit – Custom		
	Annual Energy Savings (kWh)	
Custom Incentive	\$0.05 /kWh	
Retro-Commissioning	\$0.05 /kWh	

LEARN MORE

CALL | 800.342.6335
EMAIL | bes@nvenergy.com
WEB | www.nvenergy.com/bes



AB54 Impacts on Retrofit Incentives

Interior Guest Room LED Lamp/Fixture (Can be used for guest room incandescent, CFL, fluorescent T5, LED lamps or fixture retrofits)								
INCENTIVE: \$0.10/Watt Reduced								
Pre	Post		Pre		Post			
Pre Fixture Description Example: 13W CFL	Post Fixture Description Example: 5W LED Lamp	Location Example: Bathroom, floor lamp or entry	# of Lamps or Fixtures	Watts / Lamp or Fixture	# of Lamps or Fixtures	Watts / Lamp or Fixture	Total Watts Reduced	Calculated Incentive
Due to AB54, the retrofit of A-19, general service, screw-in incandescent lamps are available only for this measure AND the baseline for all such lamps is as follows: <u>40W Inc = 10W</u> <u>60W Inc = 18W</u> <u>75W Inc = 24W</u> <u>100W Inc = 36W</u>								

- A-19 incandescent lamp baselines are only eligible under guest room measures on the retrofit application.
- In guestroom measure group, adjusted baselines are to be used for A-19 lighting.

More Ways to Save

Business Energy Services 2022 Southern New Construction Incentive Summary

New Construction - Lighting Power Density		
Measure	Unit	Incentive
Interior Lighting Power Density, 10% Better Than IECC 2009	kW	\$350.00
Interior Lighting Power Density, 5% Better Than IECC 2012	kW	\$250.00
Interior Lighting Power Density, 5% Better Than IECC 2018	kW	\$250.00

New Construction - Performance Based / Whole Building	
Approach	Annual Energy Savings (kWh)
Performance Based - 10% Better Than IECC 2009	\$0.05 per kWh
Whole Building - 10% Better Than IECC 2009	\$0.05 per kWh
Performance Based - 5% Better Than IECC 2012	\$0.05 per kWh
Whole Building - 5% Better Than IECC 2012	\$0.05 per kWh
Performance Based - 5% Better Than IECC 2018	\$0.05 per kWh
Whole Building - 5% Better Than IECC 2018	\$0.05 per kWh

Please refer to 2022 Business Energy Services
New Construction Specifications document for complete
specifications

New Construction - Cooling / Misc.			
Measure	Unit	IECC 2009, 2012 & 2018 Incentive	IECC 2012 & 2018 - C406 Incentive
Air-Cooled Units			
(<65 kBtuh), Qual SEER	Ton	\$12.00	\$14.00
(<65 kBtuh), 1 Additional SEER	Ton	\$8.00	\$10.00
(≥65 & <135 kBtuh), Qual EER	Ton	\$12.00	\$14.00
(≥65 & <135 kBtuh), 1 Additional EER	Ton	\$10.00	\$12.00
(≥135 & <240 kBtuh), Qual EER	Ton	\$18.00	\$22.00
(≥135 & <240 kBtuh), 1 Additional EER	Ton	\$10.00	\$12.00
(≥240 kBtuh) Qual IEER	Ton	\$18.00	\$22.00
(≥240 kBtuh) 1 Additional IEER	Ton	\$10.00	\$12.00
Water-Cooled Units, Qual EER	Ton	\$25.00	\$30.00
Water-Cooled Units, 1 Additional EER	Ton	\$10.00	\$12.00
PTAC/PTHP, Qual EER	Ton	\$60.00	\$60.00
PTAC/PTHP, 1 Additional EER	Ton	\$24.00	\$24.00
Flat Plate Heat Exchanger ²	HX Tons	\$15.00	N/A
Variable Speed Drive	per HP	\$60.00	N/A

¹Incentives for projects subject to Section C406 of IECC 2012 & IECC 2018.

²Flat Plate Heat Exchangers are required by IECC 2012 & IECC 2018 and thus not eligible for incentive.

New Construction - Commercial Kitchen		
Measure	Unit	Incentive
HE Fryer	Vat	\$200.00
Large Vat Fryer	Vat	\$200.00
HE Griddle	Griddle	\$300.00
Convection Oven	Oven	\$350.00
Combination Oven	Oven	\$1,000.00
Steam Cooker	Steamer	\$750.00
HE Holding Cabinets, Full Size	Cabinet	\$300.00
HE Holding Cabinets, 3/4 Size	Cabinet	\$250.00
HE Holding Cabinets, 1/2 Size	Cabinet	\$200.00
Ventilation Control - New Hood	HP	\$300.00
Evaporator Fan Controller	Controller	\$35.00
Ice Machine ES/CEE I <300	Machine	\$50.00
Ice Machine ES/CEE I 300-500	Machine	\$75.00
Ice Machine ES/CEE I 500-1000	Machine	\$125.00
Ice Machine ES/CEE I 1000-1500	Machine	\$200.00
Ice Machine ES/CEE I >1500	Machine	\$250.00
Ice Machine CEE II <300	Machine	\$100.00
Ice Machine CEE II 300-500	Machine	\$150.00
Ice Machine CEE II 500-1000	Machine	\$250.00
Ice Machine CEE II 1000-1500	Machine	\$400.00
Ice Machine CEE II >1500	Machine	\$500.00
Refrigerator SD ES < 15 cf	Refrigerator	\$50.00
Refrigerator SD ES 15 ≤ V < 30 cf	Refrigerator	\$75.00
Refrigerator SD 30 ≤ V < 50 cf	Refrigerator	\$90.00
Refrigerator SD ES ≥ 50 cf	Refrigerator	\$125.00
Freezer SD ES < 15 cf	Freezer	\$60.00
Freezer SD ES 15 ≤ V < 30 cf	Freezer	\$75.00
Freezer SD ES 30 ≤ V < 50 cf	Freezer	\$80.00
Freezer SD ES ≥ 50 cf	Freezer	\$200.00
Refrigerator GD ES <15 cf	Refrigerator	\$50.00
Refrigerator GD ES 15 ≤ V < 30 cf	Refrigerator	\$75.00
Refrigerator GD 30 ≤ V < 50 cf	Refrigerator	\$90.00
Refrigerator GD ≥ 50 cf	Refrigerator	\$125.00
Freezer GD ES < 15 cf	Freezer	\$60.00
Freezer GD ES 15 ≤ V < 30 cf	Freezer	\$75.00
Freezer GD ES 30 ≤ V < 50 cf	Freezer	\$80.00
Freezer GD ES ≥ 50 cf	Freezer	\$200.00

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Bonus is first come, first served, applied to retrofit projects submitted for NV Energy business customers.

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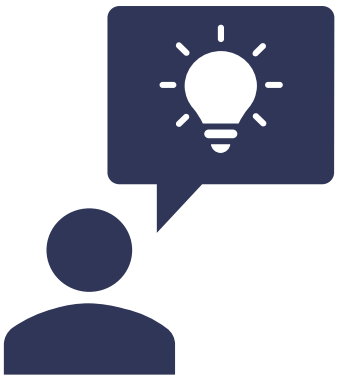
Location: Services:

Contractor	Location	Services
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BIDENERGY INC Philadelphia Tim Mayo 215-732-4480 tim.mayo@bidenergy.com www.bidenergy.com	Northern Southern	HVAC Consulting Lighting Consulting Refrigeration Consulting
ECOGREEN SOLUTIONS, INC. Laguna Niguel Corey Brophy (949) 364-6800 Corey.B@EcoGreen-Solutions.Net www.ecogreen-solutions.net	Northern Southern	Equipment Vendor HVAC Consulting HVAC Installation Lighting Consulting Lighting Installation Pump Services Refrigeration Consulting

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