



Bringing Efficiency to LightSM

Energy Savings Potential of DLC Commercial Lighting and Networked Lighting Controls

September 12, 2018

Webinar Logistics

- Recorded webinar will be posted to www.designlights.org following presentation
- All attendees are on mute; Please use GoToWebinar Interface (Question pane) to submit questions during today's webinar
- We'll pause to answer questions received between topics; and at the end of the webinar
- If you experience any technical issues, use Chat feature to let us know

Speakers



**Christina
Halfpenny**
*DesignLights
Consortium*



**Dan
Mellinger**
*Energy
Futures Group*

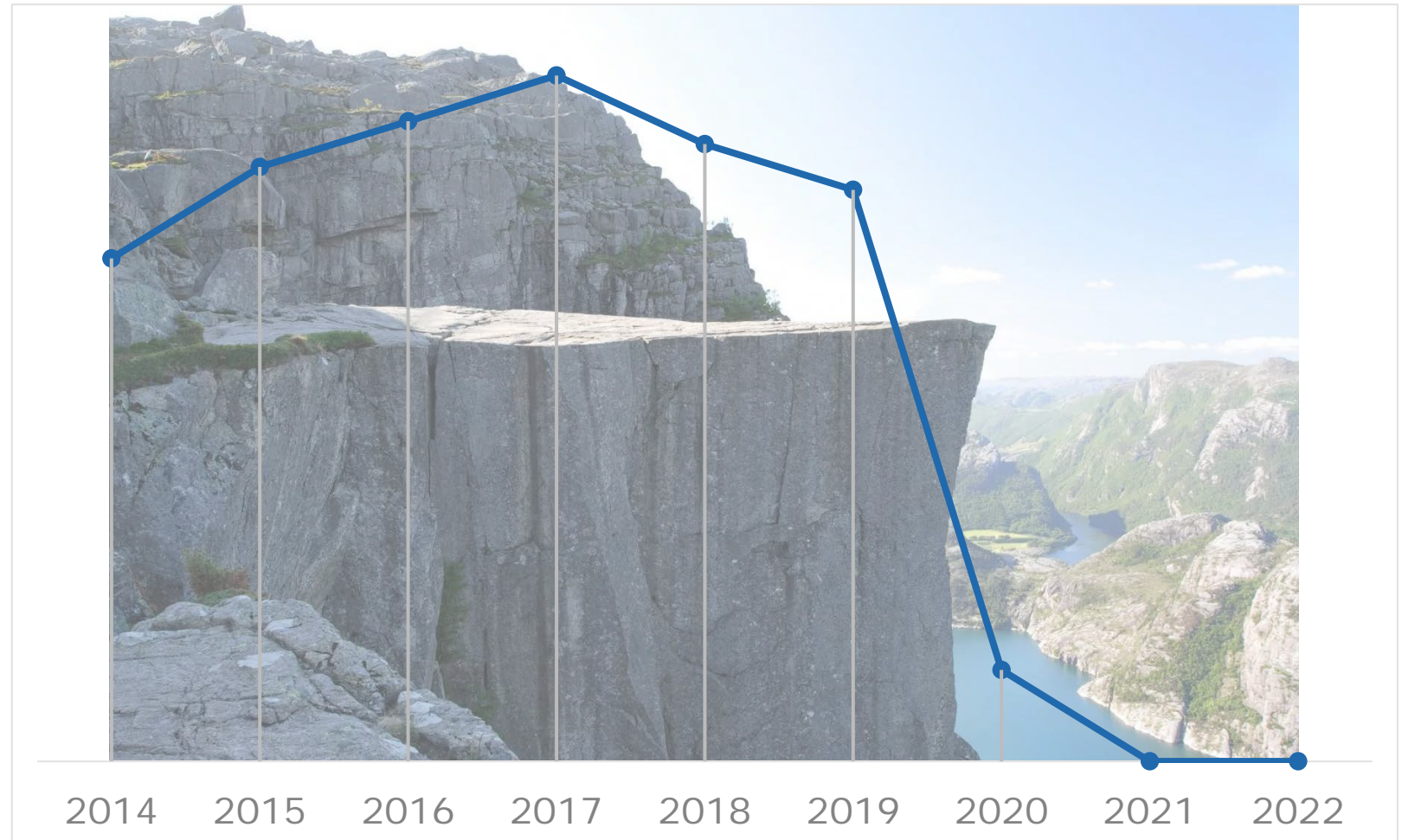
Agenda

- Research Background
- National Commercial & Industrial (C&I) Lighting Forecast
- Regional C&I Lighting Forecast
- Networked Lighting Control (NLC) Program Design Strategies
- Q&A

Research Background

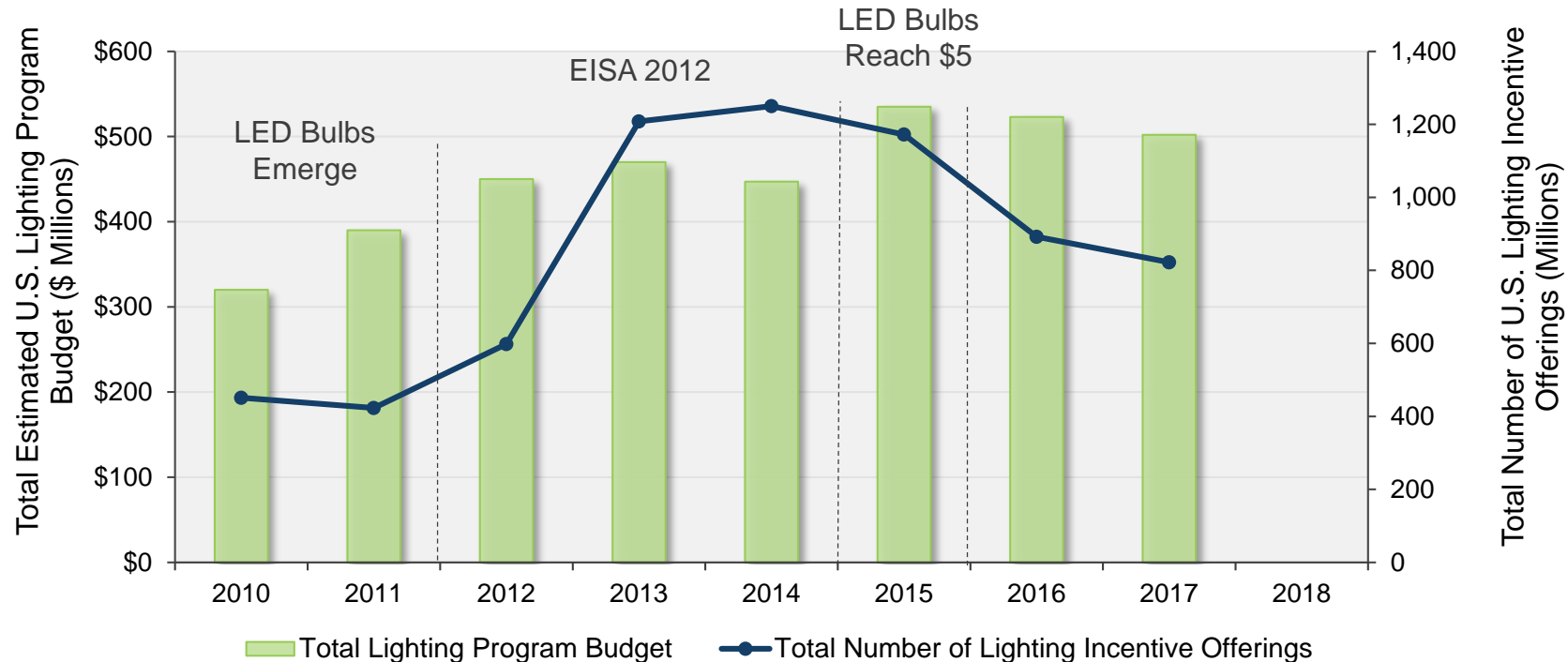
Residential Lighting Energy Savings

- Residential utility lighting pressures:
 - Saturation
 - Free ridership
 - EISA 2020
- Results shown are for illustration purposes only



Residential Lighting Programs are in Decline

Total Estimated U.S. Residential Lighting Program Budget and Incentive Offerings

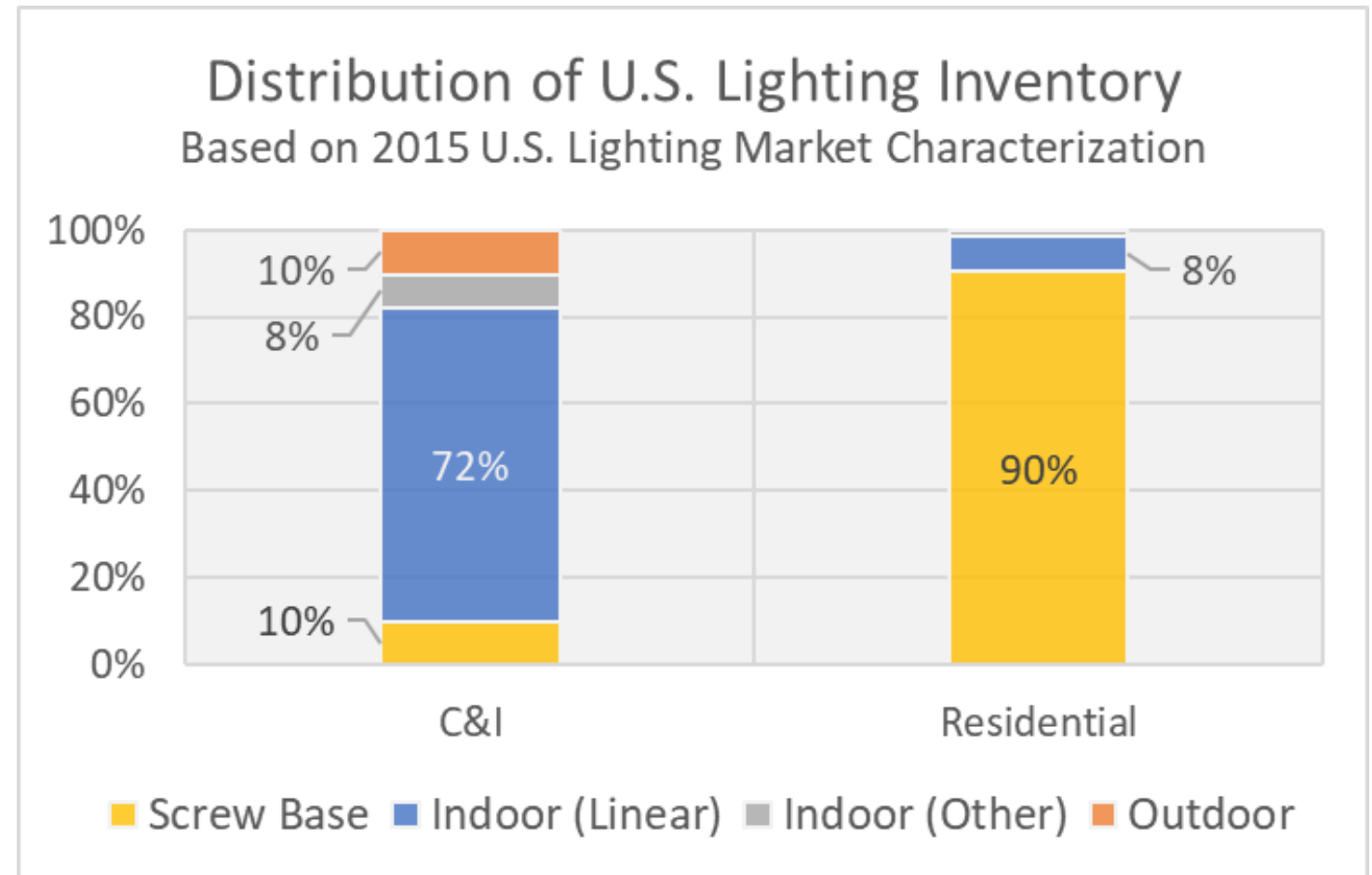


Based on Navigant analysis of U.S. utility energy efficiency budgets allocated to lighting initiatives between 2010 and 2017. Sources include (ENERGY STAR 2010-2016) and (ENERGY STAR 2017). Source: "Lighting Isn't Finished: Pivoting beyond the LED Bulb", ACEEE Summer Study 2018



Residential ≠ C&I

- EISA impact to C&I sector will be far less pronounced
- The vast majority of C&I installed inventory consists of linear lamps & fixtures
- C&I product categories generally have low LED market penetration and higher savings potential



C&I Lighting Misconceptions

It's game over by 2020 due to EISA (Energy Independence and Security Act)

There's nothing left for LED – the low hanging fruit is already picked

LEDs don't save much beyond existing T8/HPT8

Networked lighting controls don't save much since LEDs are already so efficient

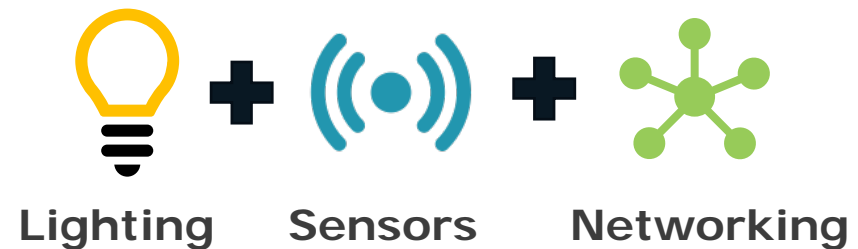
Commercial & Industrial (C&I) Lighting Energy Savings Research Project

Completed for DLC in 2018 with the intent to:

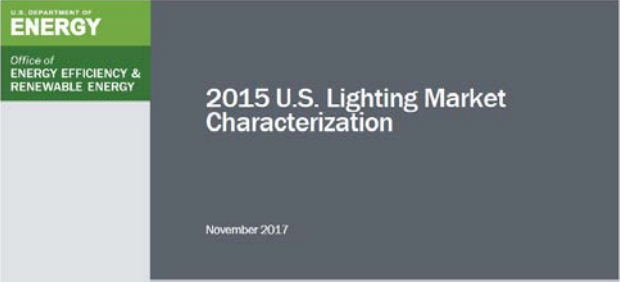
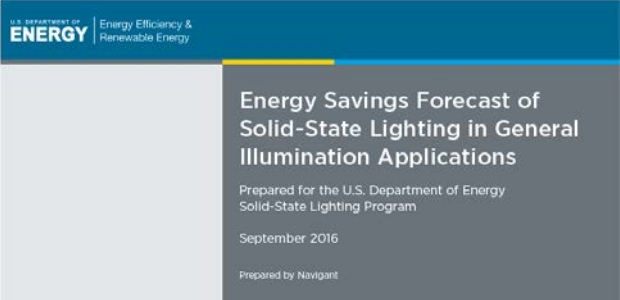

- Evaluate the long-term potential of C&I lighting savings
- Quantify the potential savings from Networked Lighting Controls
- Estimate the timeframe C&I lighting portfolios can be sustained
- Understand regional differences in adoption and savings

What are Networked Lighting Controls?

- Networked Lighting Controls (NLCs) are technologies that combine multiple control strategies into a single system with the ability to communicate among devices. A DLC-qualified NLC system is required to have:
 - Networking of lighting luminaires and control devices
 - Occupancy sensing
 - Daylight harvesting
 - High-end trim
 - Zoning
 - Luminaire and device addressability
 - Continuous dimming
- NLC systems achieve greater levels of energy savings (on average 47%) and improved operational performance
- Also referred to as Connected Lighting Systems or Advanced Lighting Controls

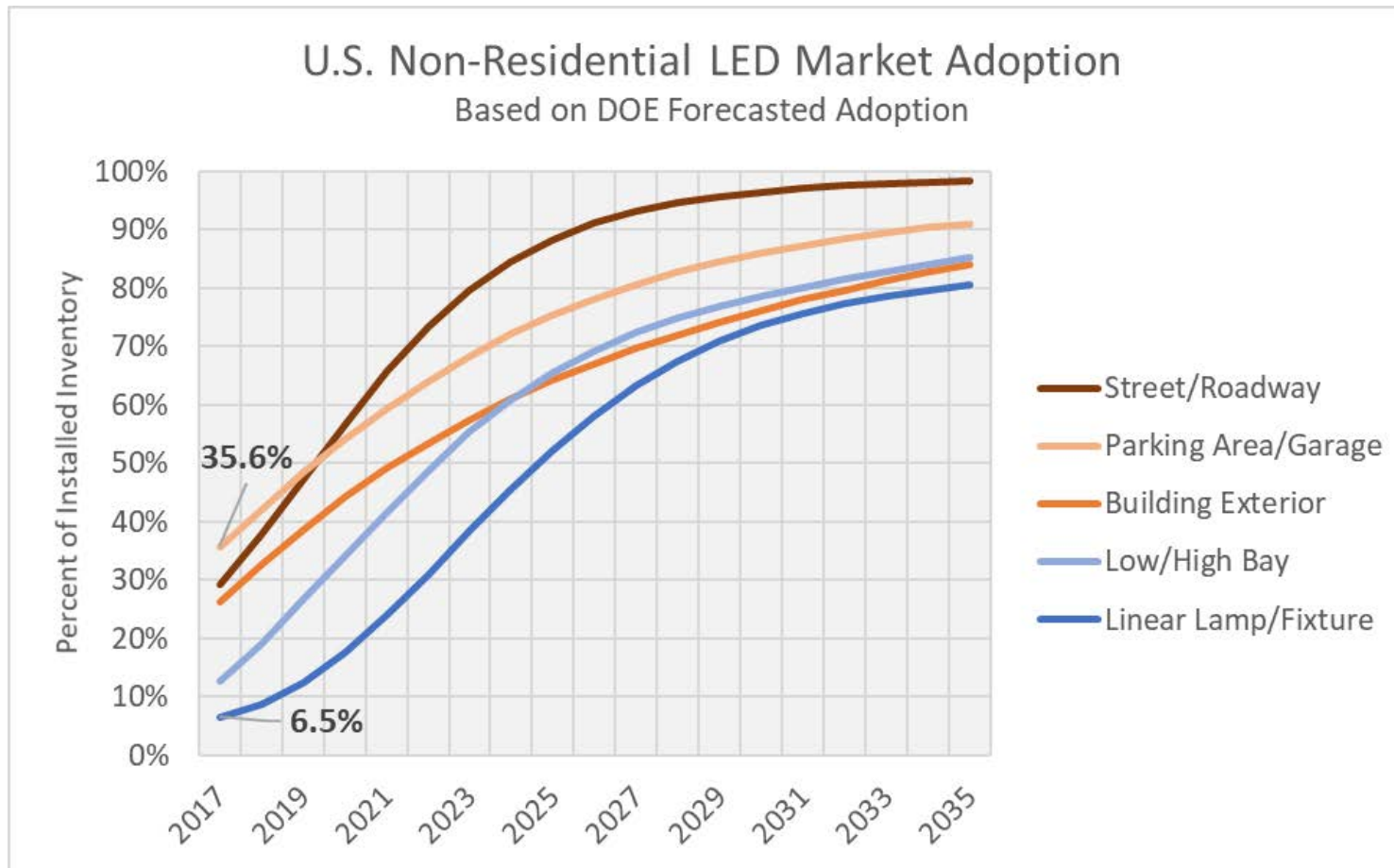


National C&I Lighting Forecast

	<p>2015 U.S. Lighting Market Characterization (U.S. DOE, 2017)</p>	<ul style="list-style-type: none"> • C&I lighting inventories • C&I LED market penetration • Baseline technology characteristics
	<p>Energy Savings Forecast of Solid-State Lighting in General Illumination Applications (U.S. DOE, 2016)</p>	<ul style="list-style-type: none"> • LED adoption rates • LED efficacy forecast • NLC adoption rates • NLC savings estimate (2035)
	<p>Energy Savings from Networked Lighting Control Systems (DLC, 2017)</p>	<ul style="list-style-type: none"> • NLC savings estimate (2017)

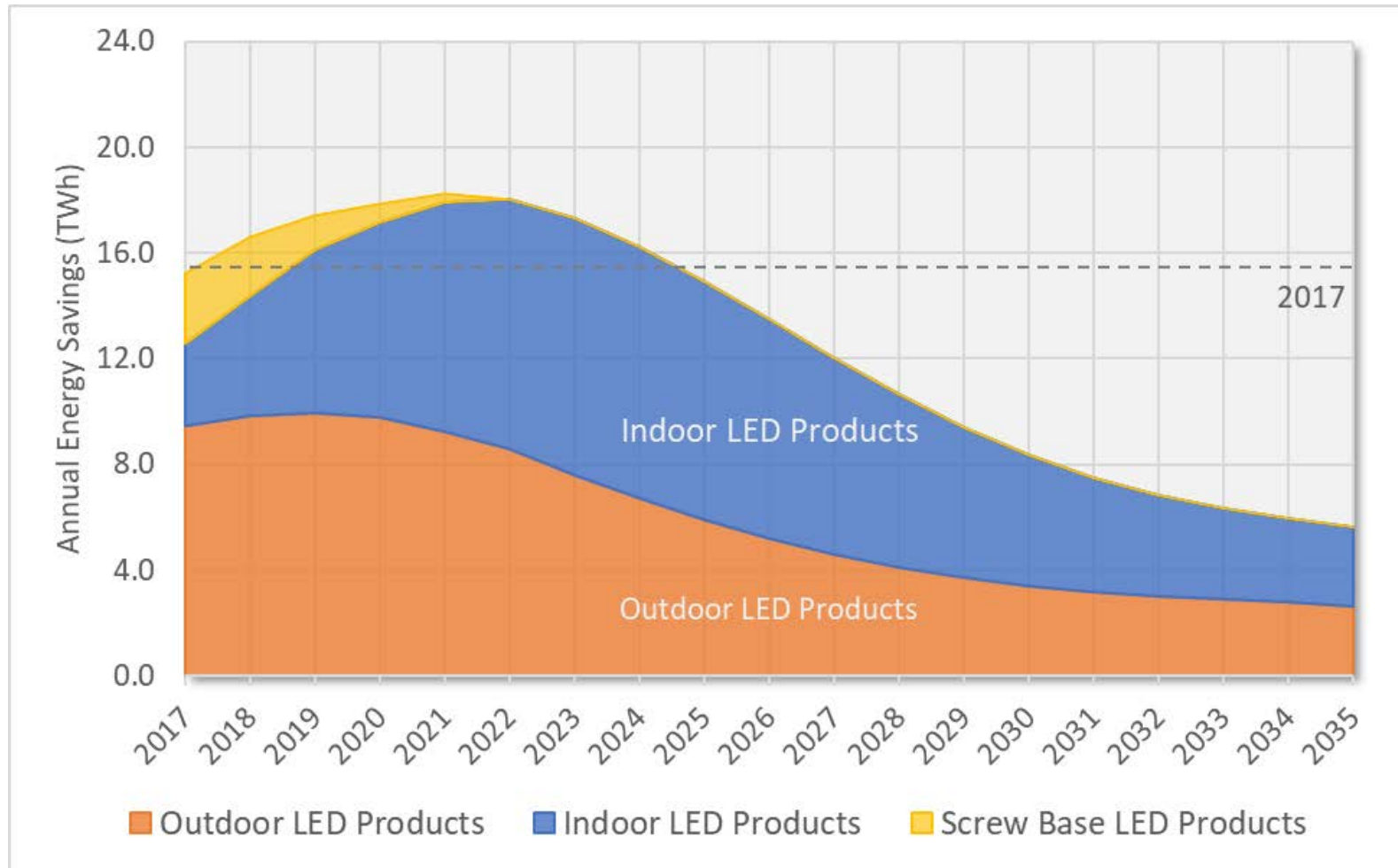
National C&I Lighting Forecast

C&I LED Adoption is Still Accelerating



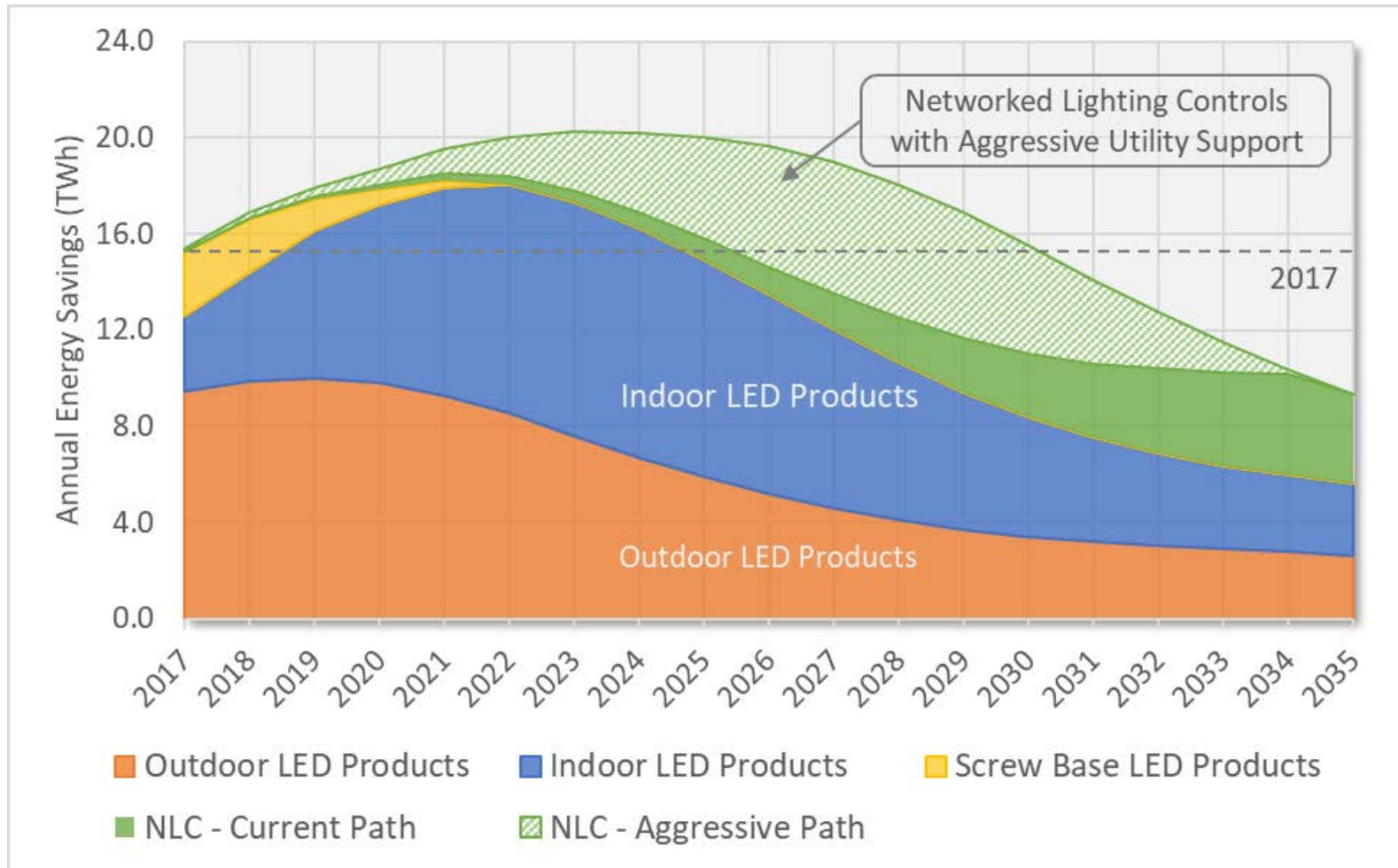
- Outdoor products have achieved higher levels due to earlier market introductions and greater savings potential
- Linear products have achieved only 6.5% LED adoption as of 2017
- All product categories are accelerating; none have surpassed 50%

C&I Lighting Savings Haven't Yet Peaked



- Outdoor products start to decline as early as 2020
- Indoor product categories experiencing significant growth and will more than offset outdoor
- Screw base product savings becoming insignificant

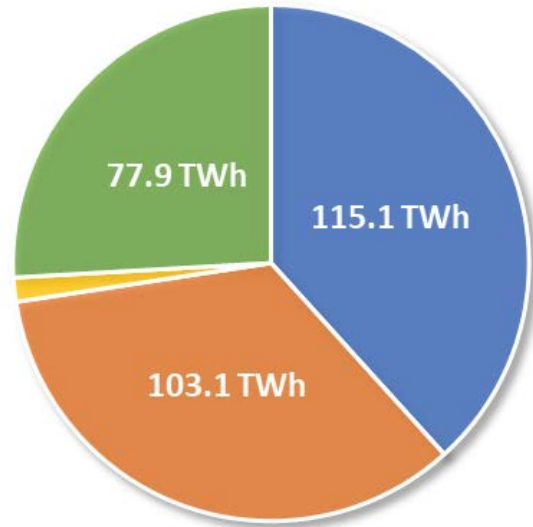
NLCs Can Sustain C&I Lighting Programs



- With limited promotion (current path), NLC savings will be modest throughout the 2020s
- With aggressive promotion, NLC savings double and occur earlier
- 2017 savings levels can be maintained until 2030

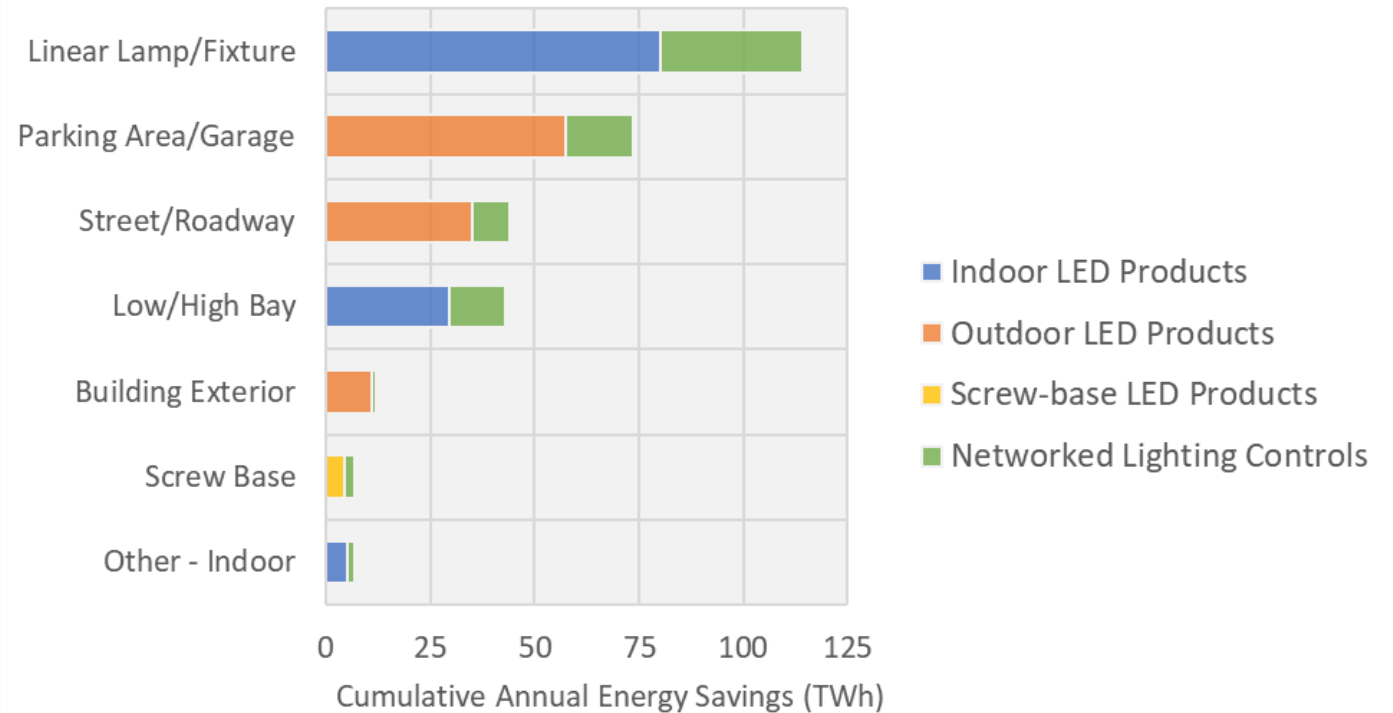
C&I Lighting Cumulative Savings Potential

U.S. Non-Residential Cumulative Savings (2018-2035)



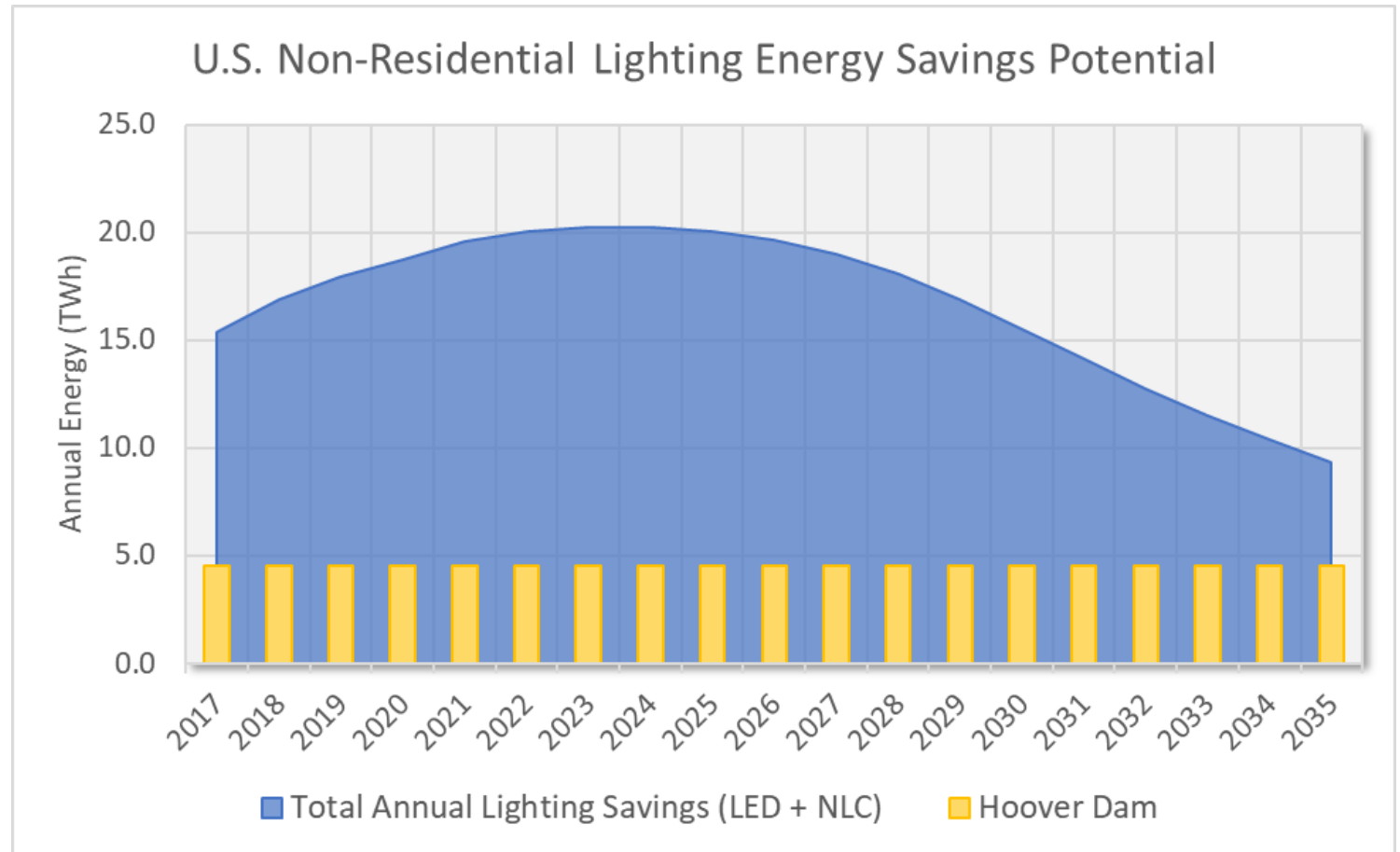
- LED Indoor Products
- LED Outdoor Products
- Screw-base LED Products
- Networked Lighting Controls

U.S. Non-Residential Cumulative Savings (2018-2035)



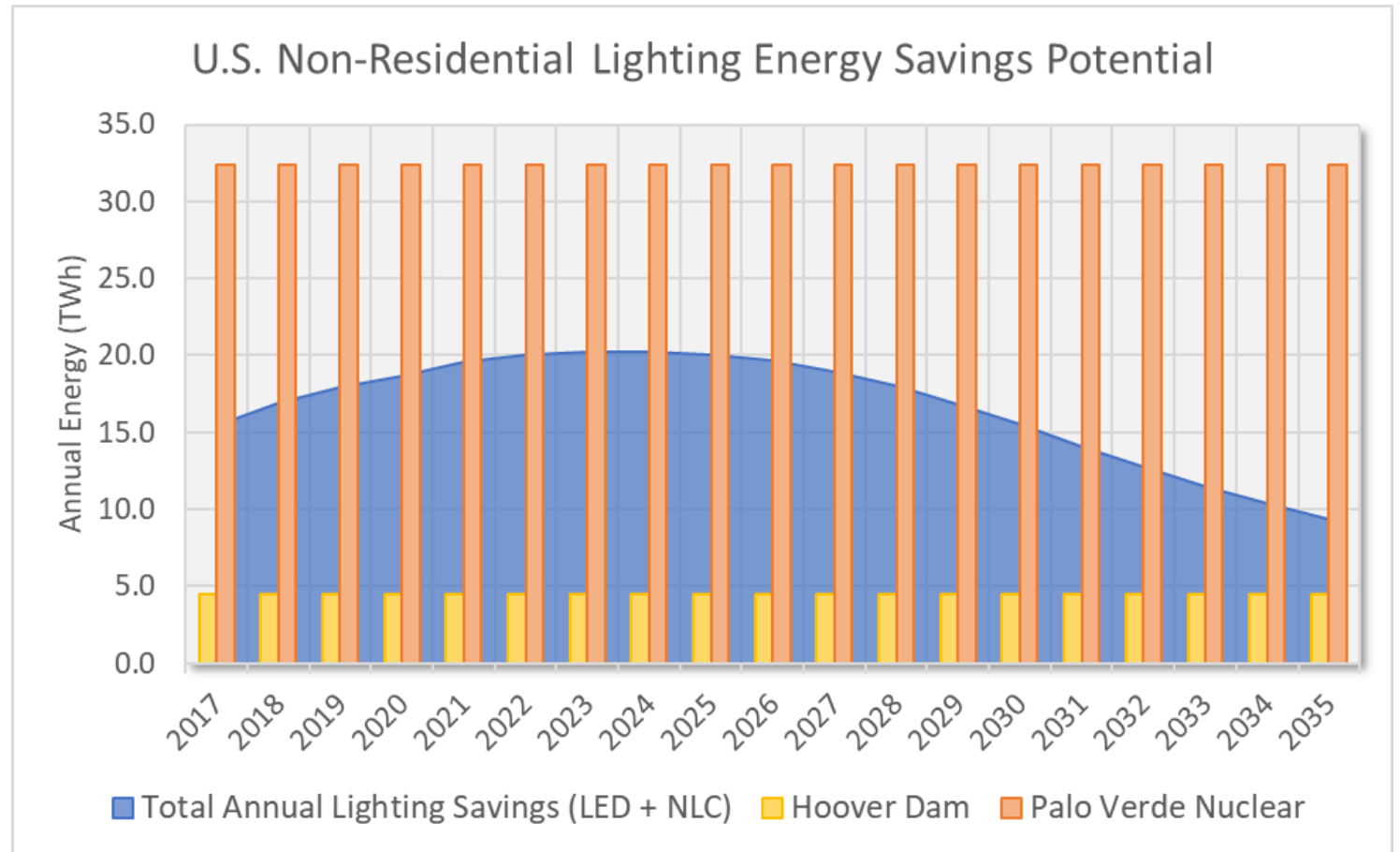
Putting This Potential Into Perspective...

The annual C&I lighting savings potential far exceeds the production of the Hoover Dam



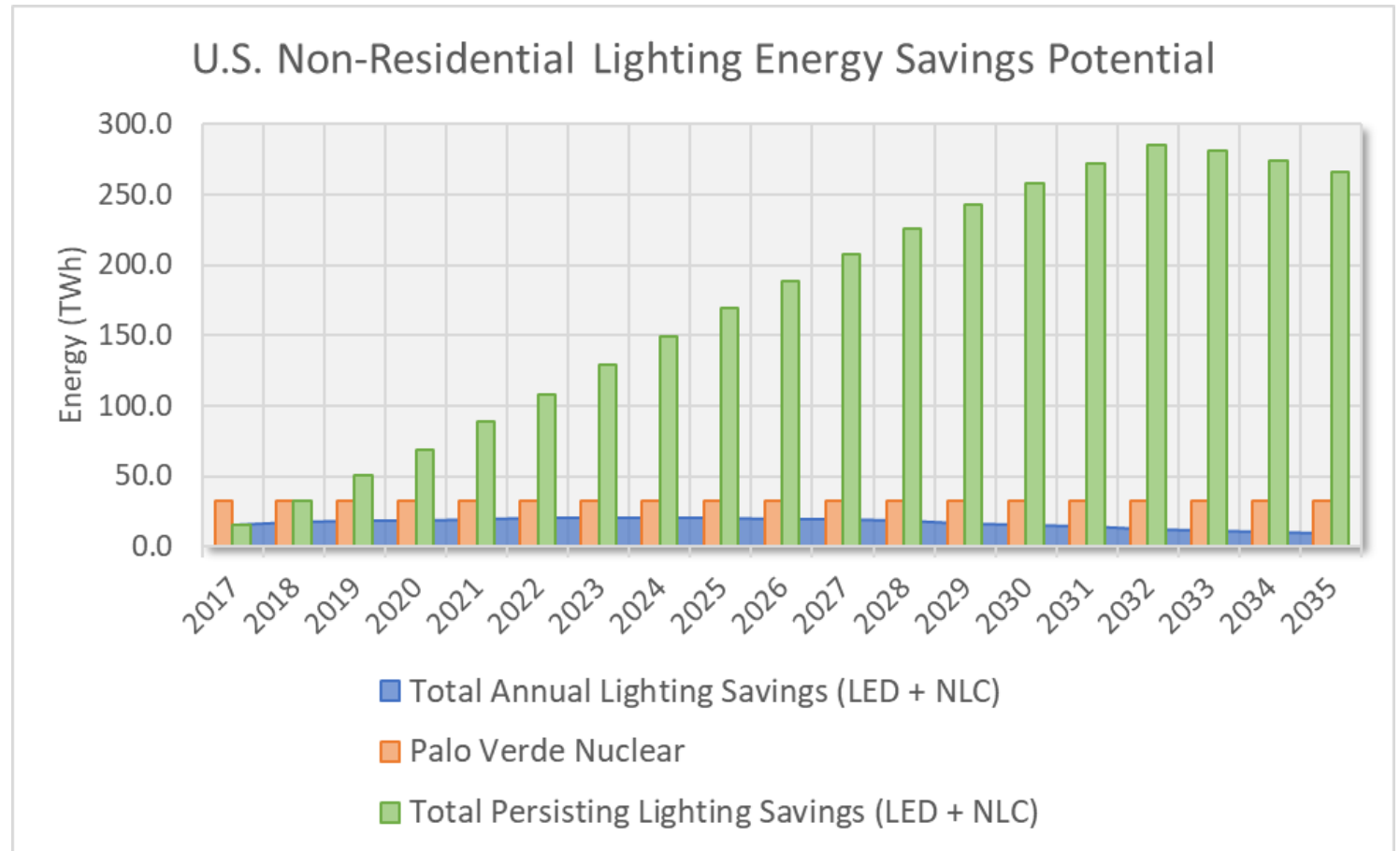
Putting This Potential Into Perspective...

The annual C&I lighting savings potential is roughly 60% of the output from the **LARGEST** power plant in the U.S. (Palo Verde Nuclear in Arizona)



C&I Lighting Savings Persist for Many Years

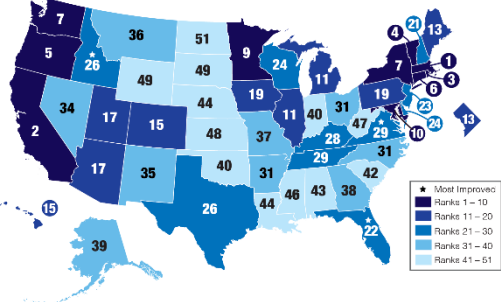

Most utility programs assume a 15-year measure life. In that case, even the largest power plant is dwarfed by the persisting savings potential of C&I lighting.



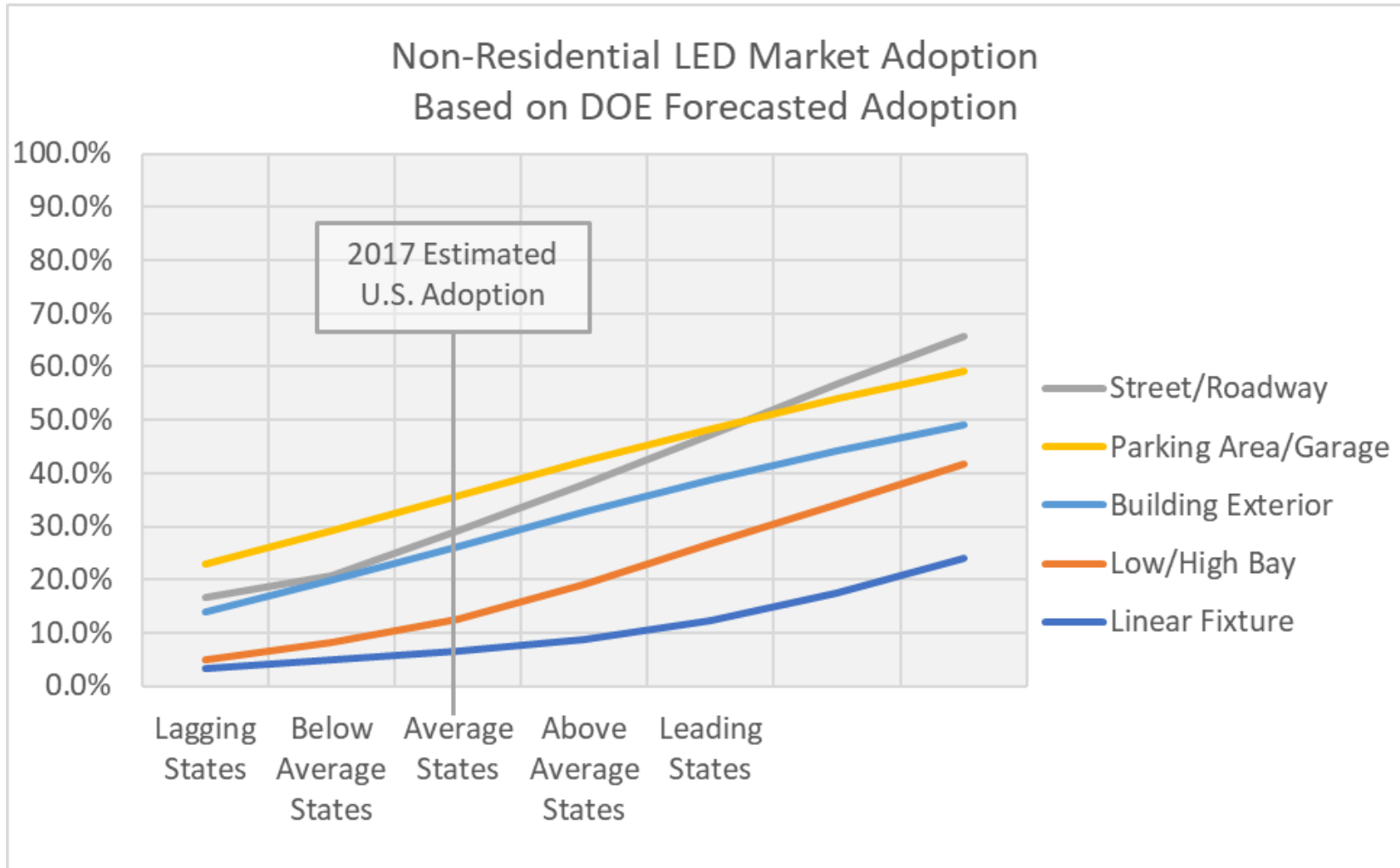
Regional C&I Lighting Forecast

Regional C&I Lighting Forecast

National analysis results plus:

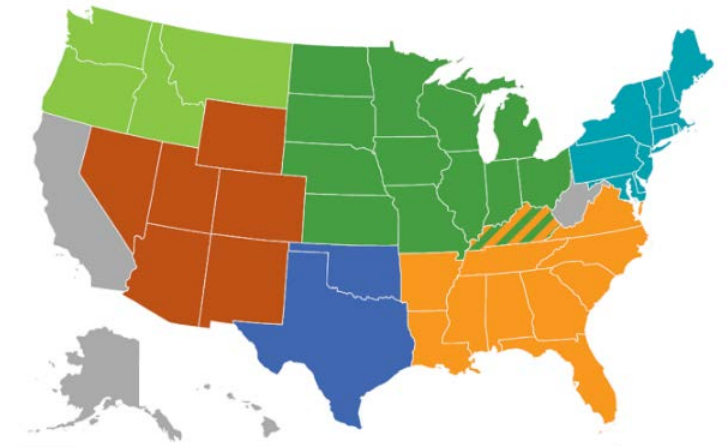
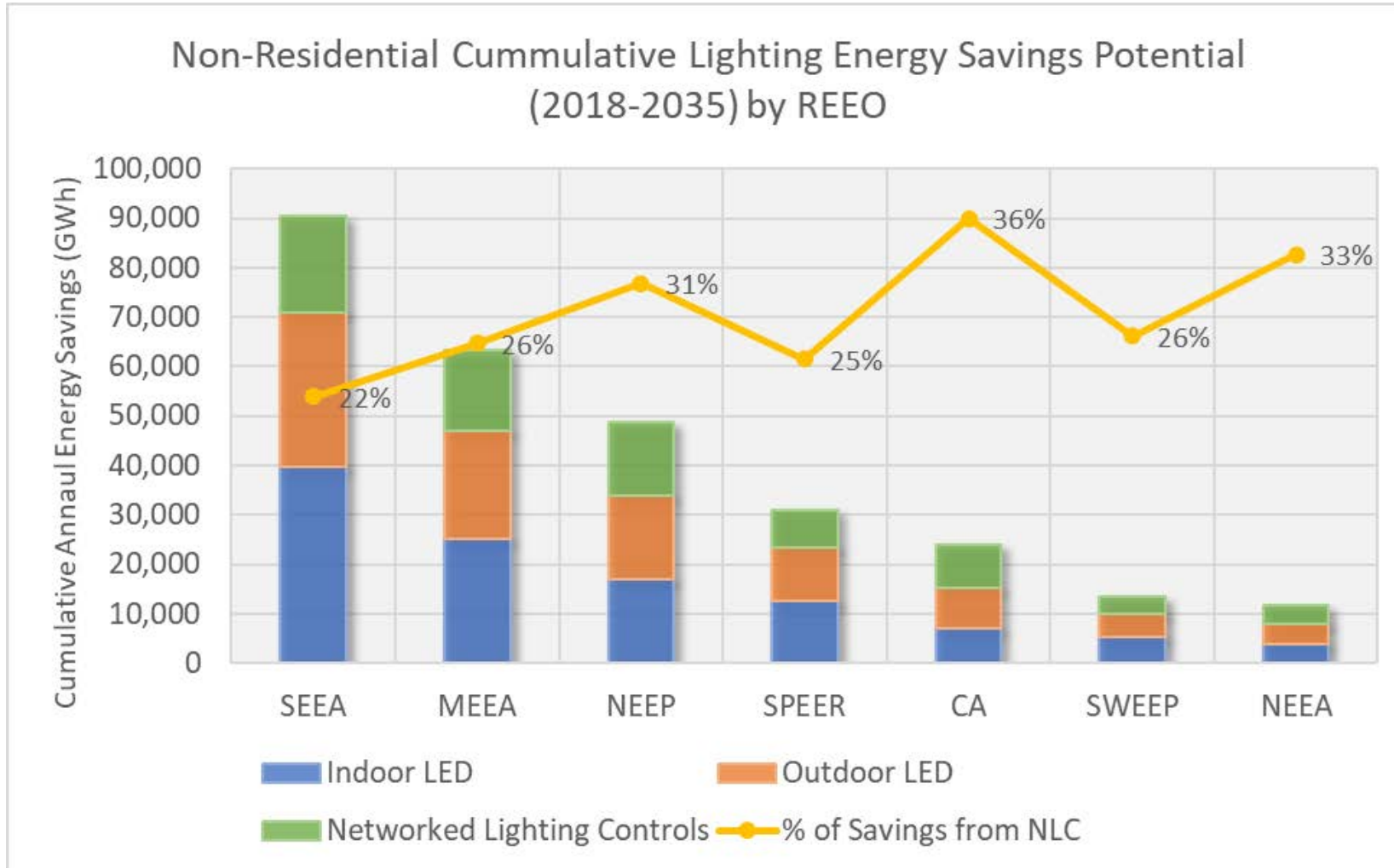
	<p>2017 State Energy Efficiency Scorecard (ACEEE, 2017)</p>	<ul style="list-style-type: none"> • State scores for utility programs and building energy efficiency policies • Used for moving states up/down the LED & NLC adoption curves and adjusting baselines
	<p>Commercial Building Energy Consumption Survey (EIA, 2012)</p>	<ul style="list-style-type: none"> • Commercial building floorspace by census region • Used for scaling national results

Adjusting LED Adoption by Region



C&I Lighting Savings by Region

Regional Energy Efficiency Organizations (REEO)



■ Northeast Energy Efficiency Partnerships



■ Southeast Energy Efficiency Alliance



■ Midwest Energy Efficiency Alliance



■ South-Central Partnership for Energy Efficiency as a Resource



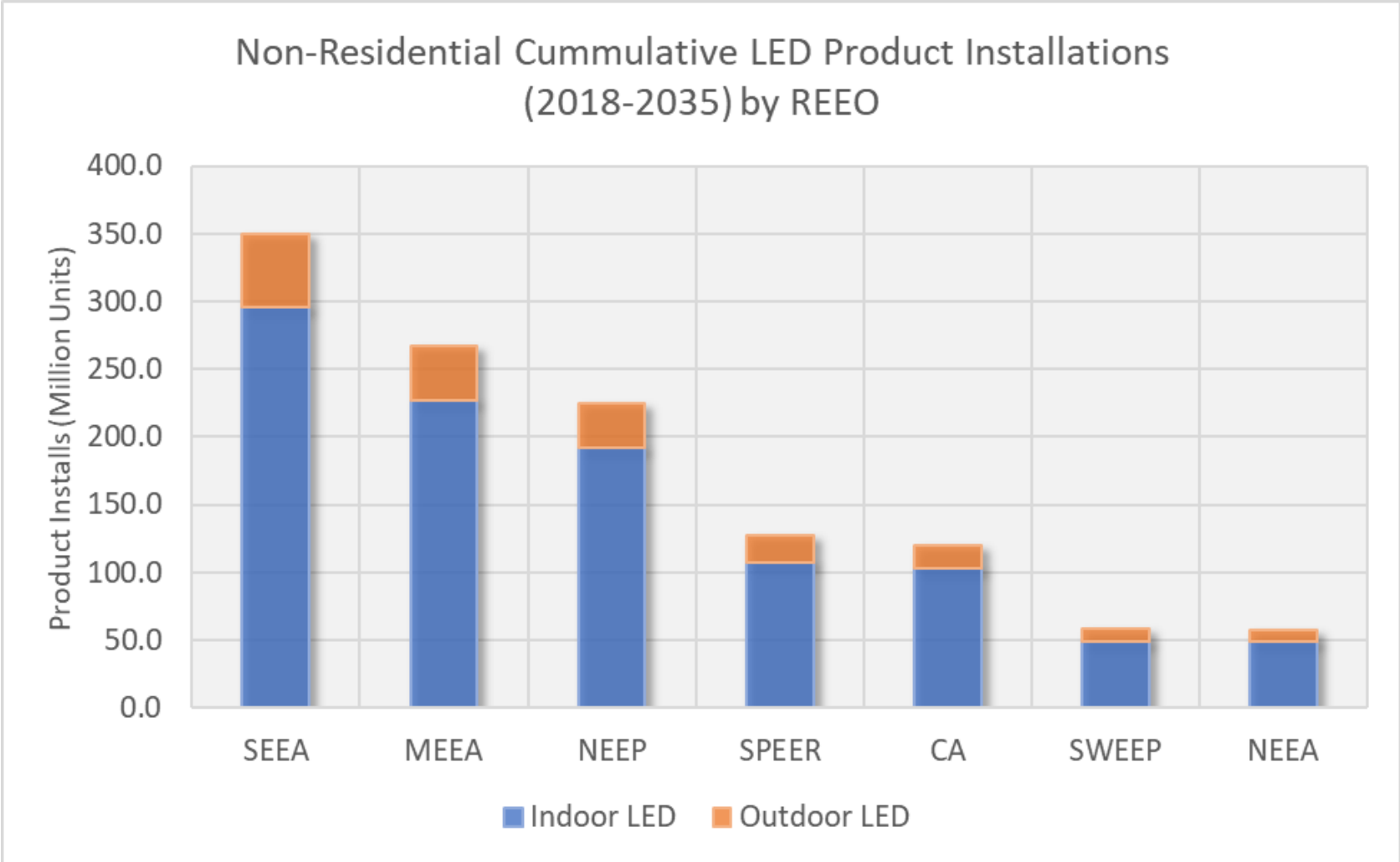
■ Southwest Energy Efficiency Project



■ Northwest Energy Efficiency Alliance



Indoor Installations will Far Exceed Outdoor

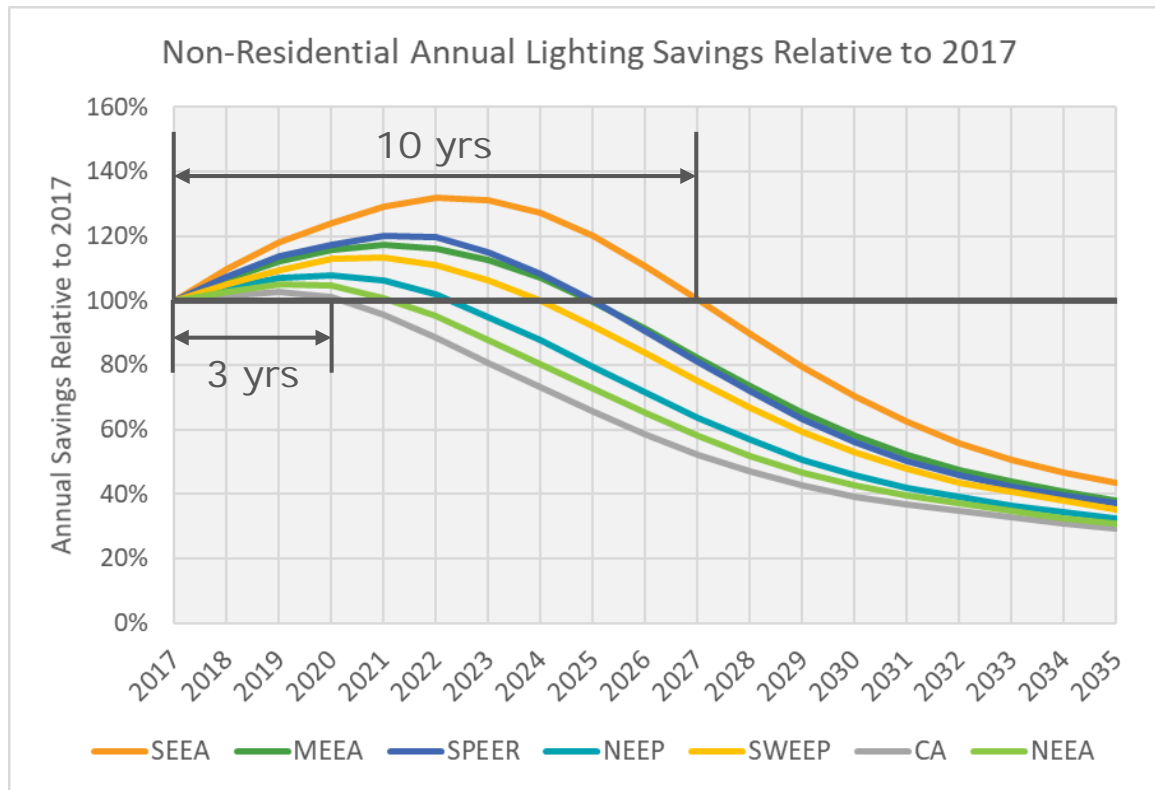


- Indoor product installations will outnumber outdoor by nearly 6-to-1 on average
- More pronounced in regions with progressive utility programs

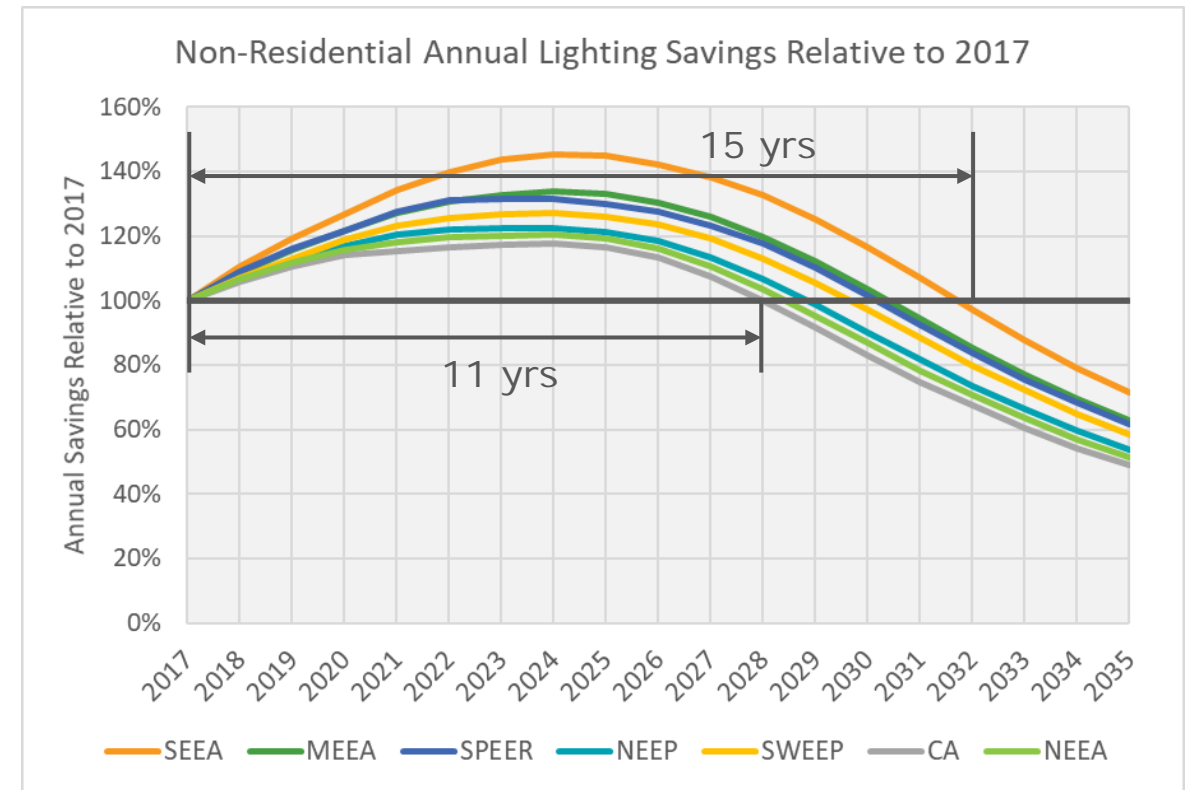


NLCs Create a Sustainable Savings Path

C&I Savings without NLC



C&I Savings with NLC



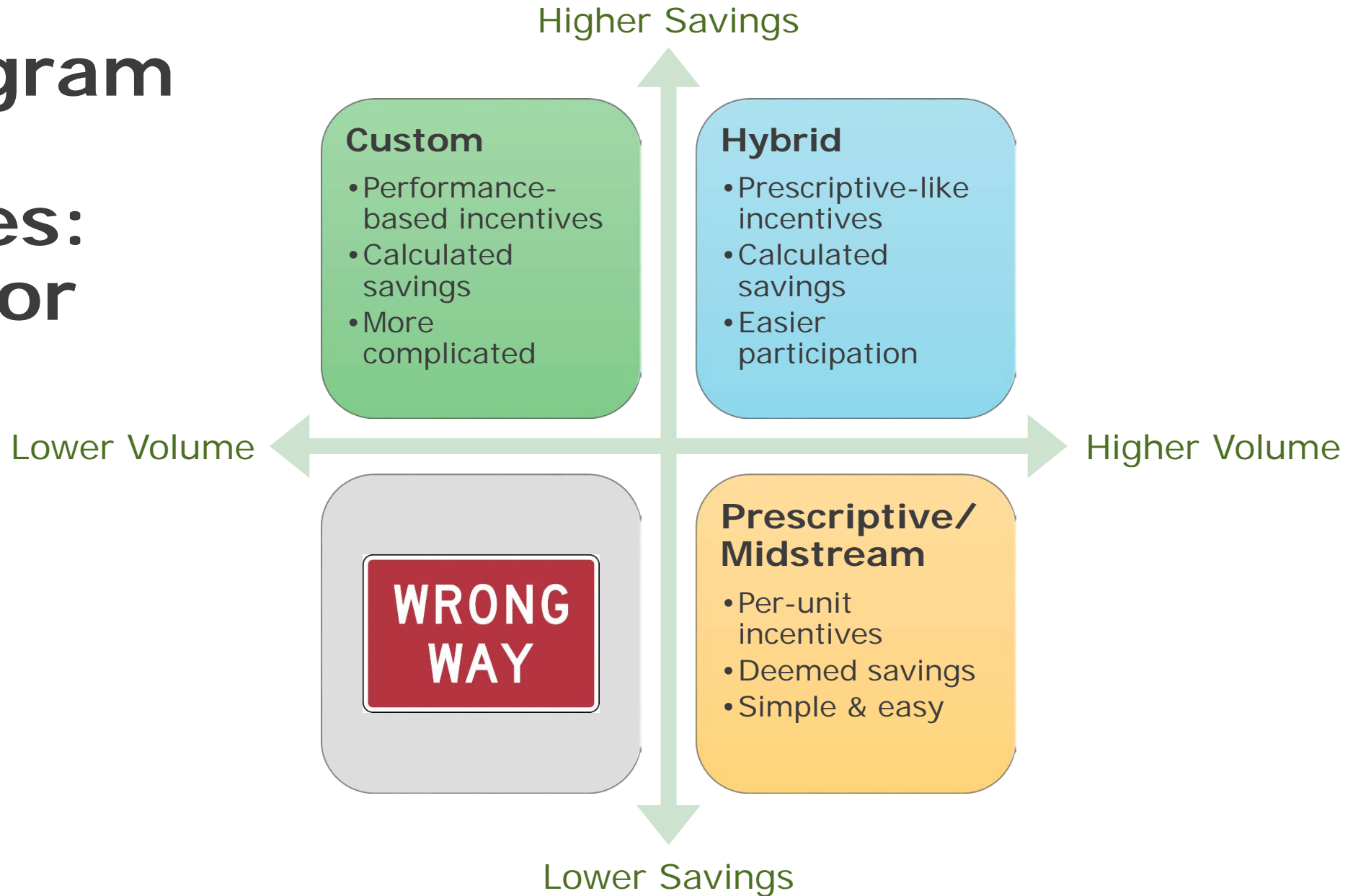
NLC Program Design Strategies

Networked Lighting Controls Face a Multitude of Barriers



Utilities can address many of these barriers by employing a comprehensive and balanced approach.

NLC Program Design Strategies: Breadth or Depth?



NLC Program Spotlight



Hybrid

[Wisconsin Focus on Energy](#)

- \$/ft² NLC rebate
- Savings based on both deemed and reported values
- Up to \$0.25/ft²
- Bonus for energy monitoring



Prescriptive

[Bonneville Power Authority](#)

- \$/unit “kicker” rebate for NLC
- Indoor LED fixtures and highbay
- \$40-100 adder



Midstream

[MassSave and National Grid RI](#)

- \$/unit point of purchase rebate
- LED troffers with integrated NLC
- \$40-45 adder

(also offers a Performance Lighting program)

Additional NLC Program Rebates

Program Type	Utility/Program	State	Incentives
Custom	ComEd	Illinois	\$0.18 per Watt controlled
	Duke Energy	Indiana	\$0.065 per kWh + \$150 per kW
	Duke Energy	Kentucky	\$0.065 per kWh + \$150 per kW
	Duke Energy	North Carolina	\$0.065 per kWh + \$150 per kW
	Duke Energy	Ohio	\$0.065 per kWh + \$150 per kW
	Duke Energy	South Carolina	\$0.065 per kWh + \$150 per kW
	Eversource MA	Massachusetts	\$1.50-4.00 per Watt saved
	Liberty Utilities	New Hampshire	\$9-18 per lifetime MWh
	National Grid - Massachusetts	Massachusetts	\$1.50-4.00 per Watt saved
	National Grid - Rhode Island	Rhode Island	\$1.50-4.00 per Watt saved
	National Grid - Upstate New York	New York	\$0.13-0.18 per kWh
	PG&E	California	\$0.24 per kWh + \$150 per kW
	SMUD	California	\$0.20 per kWh
Hybrid	WI Focus on Energy	Wisconsin	\$0.125-0.30 per ft ²
Prescriptive	BGE	Maryland	\$8-50 per fixture
	BPA	Pacific Northwest	\$40-100 adder
	Eversource MA	Massachusetts	\$25-30 per fixture
	National Grid - Massachusetts	Massachusetts	\$25-30 per fixture
	National Grid - Rhode Island	Rhode Island	\$25-30 per fixture
	Seattle City Light	Washington	\$50 per fixture
	Xcel Energy (Colorado)	Colorado	Under development
	Xcel Energy (Minnesota)	Minnesota	Under development
	Xcel Energy (New Mexico)	New Mexico	Under development

Source:
DLC Member
Summary

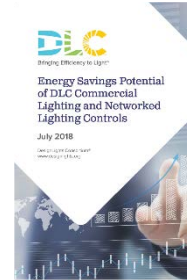


DLC Program Resources for Networked Lighting Controls



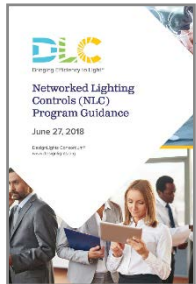
Networked Lighting Control Qualified Products List (QPL)

- Available at designlights.org



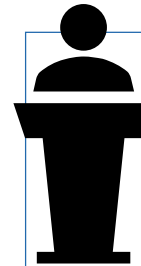
Energy Savings Potential of DLC C&I Lighting NLC

- Available at designlights.org



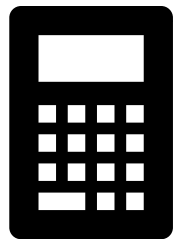
Networked Lighting Control Program Guidance

- Available to DLC Members



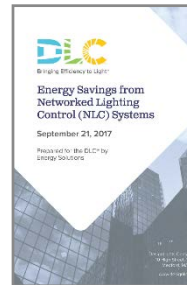
Advanced Lighting Control System Training Program

- Info at designlights.org



NLC Energy Savings Estimator Tool

- Available to DLC Members



Report on Energy Savings from NLC Systems

- Available at designlights.org

Conclusions

Ride the Wave of Savings

- Residential utility programs may be facing a cliff, but C&I utility programs will be riding a wave of savings for many years

NLCs Now

- Utility support for Networked Lighting Controls must ramp up now to capture savings during LED adoption

Sustain Program Savings with NLC

- Regardless of state or region, a path exists to maintain C&I lighting portfolios at or above current levels until at least 2028

Breadth AND Depth

- Utility programs should employ a multitude of program strategies and service delivery models to address barriers

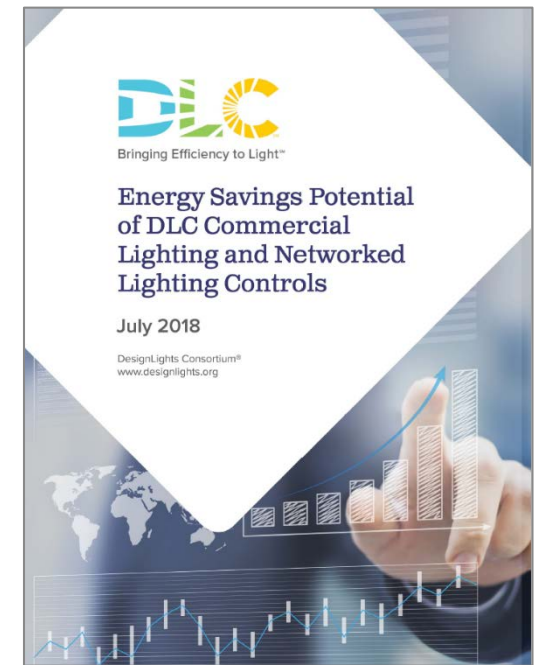
Materials are Available Online

The webinar will be saved in the DLC webinar repository at:

- <https://www.designlights.org/news-events/webinars/>

The complete *Energy Savings Potential of DLC Commercial Lighting and Networked Lighting Controls* report is available at:

- <https://www.designlights.org/resources/energy-savings-potential-of-dlc-commercial-lighting-and-networked-lighting-controls/>



Q&A



Bringing Efficiency to LightSM

Thank You!

Questions?

Contact us at info@designlights.org