U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

SSL Market Adoption: Status and Trends

DOE SSL Technology Development Workshop

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LED Market Studies

Navigant has conducted several market analyses for the U.S. DOE Solid-State Lighting (SSL) Program…

Lighting Market Characterization (2002, 2012)

Adoption of LEDs in Common Lighting Applications (2008, 2011, 2013, 2015)

2000 — 2016

Energy Savings Forecast of SSL (2003, 2006, 2010, 2012, 2014, 2016)

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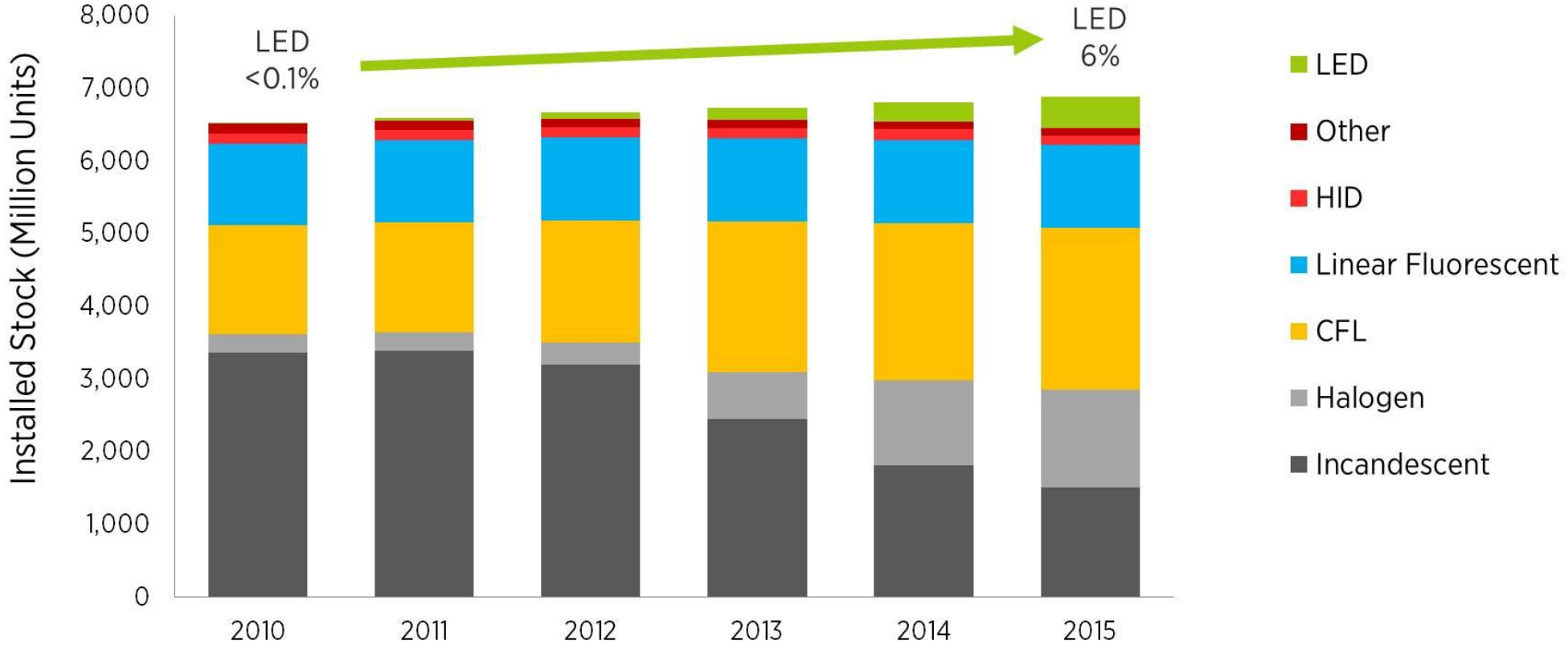
Where Have We Been and Where Are We Now?

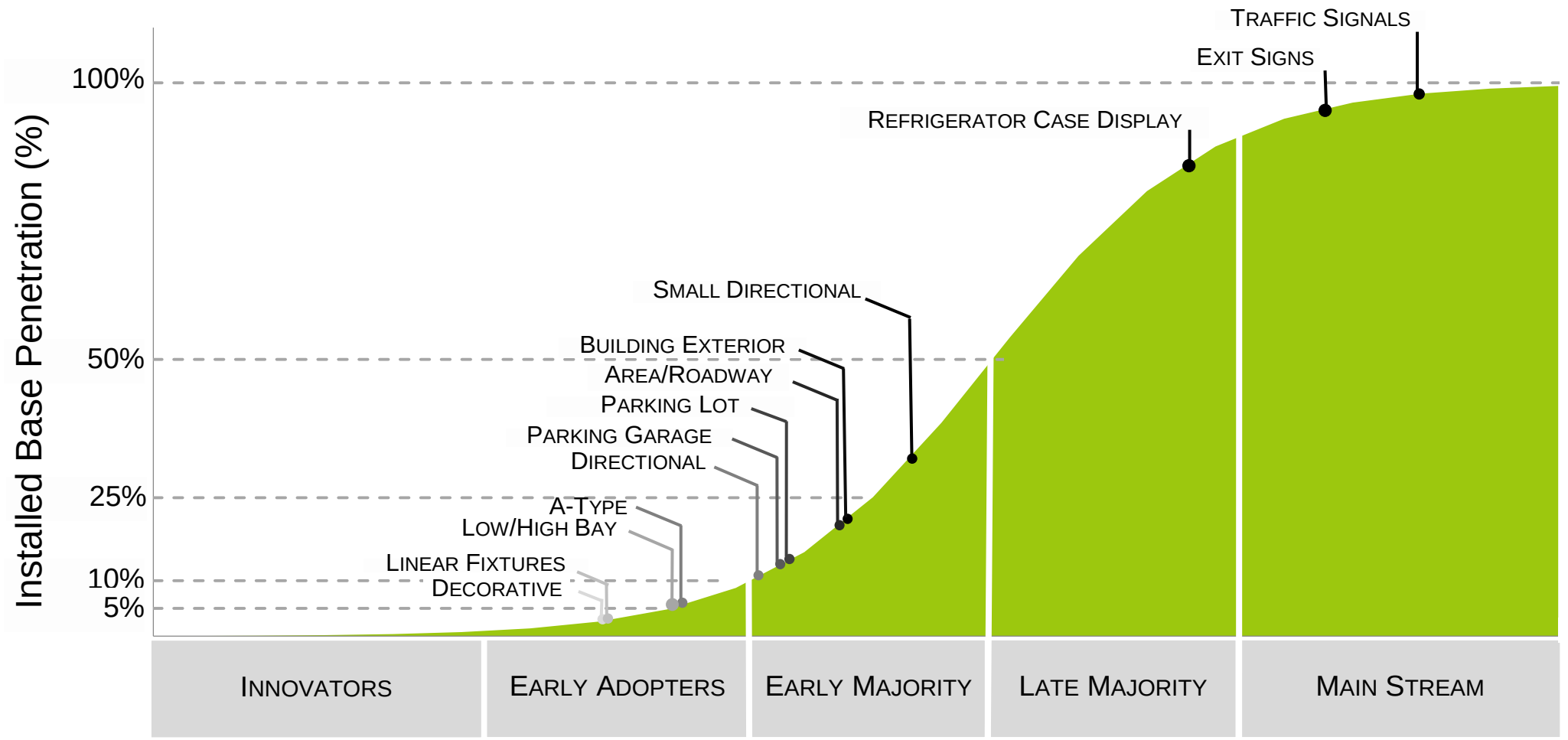
Source: http://eatsleeppublish.com/wp-content/uploads/2009/02/past-present.jpg

U.S. Lighting Installed Stock by Technology, 2010-2015

Energy efficiency standards, as well as increasing adoption of LEDs, are causing rapid change in lighting stock, however, there is still a long way to go…



2015 U.S. LED Installed Penetration

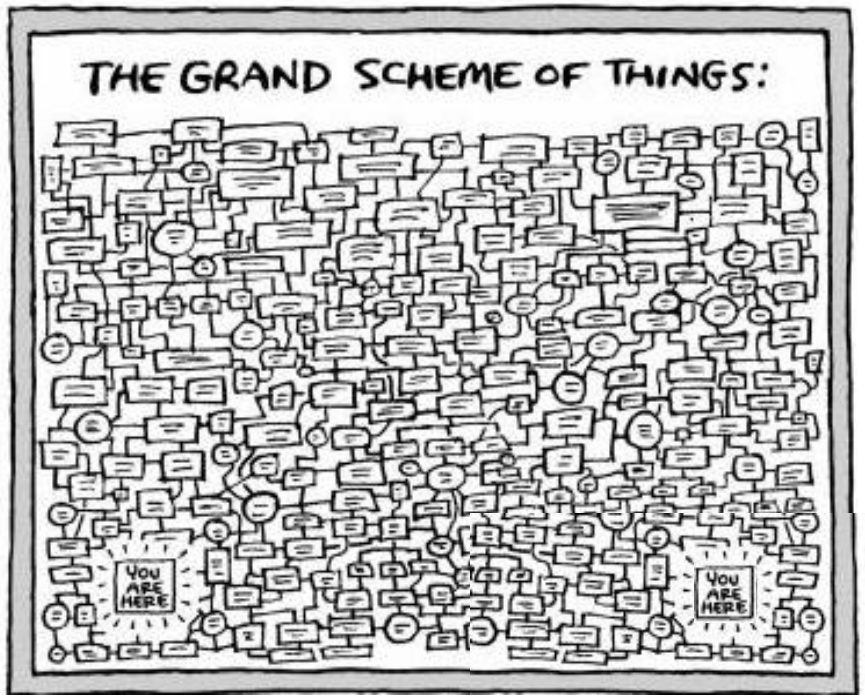


2015 U.S. Installed Penetration of Lighting Controls

In 2015, about 18% of lighting systems in the U.S. operate with controls.

Installed Penetration (%)	Commercial	Residential	Industrial	Outdoor
None	68%	86%	94%	41%
Dimmer	3%	11%	4%	<1%
Daylighting	<1%	<1%	<1%	39%
Occupancy	6%	<1%	2%	<1%
Timer	4%	<1%	<1%	20%
Energy Management System (EMS)	15%	<1%	<1%	<1%
Multi-Strategy	4%	<1%	<1%	<1%
Connected Lighting	<1%	<1%	<1%	<1%

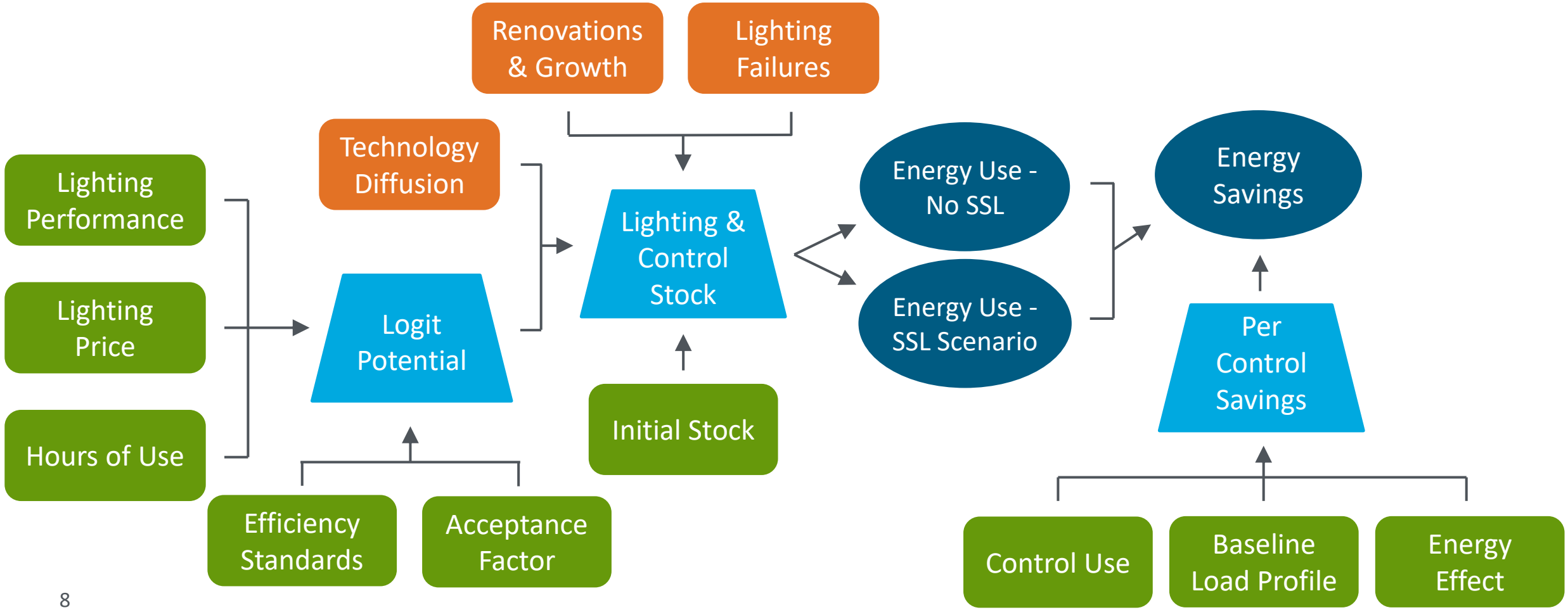
Lighting Market Model Overview



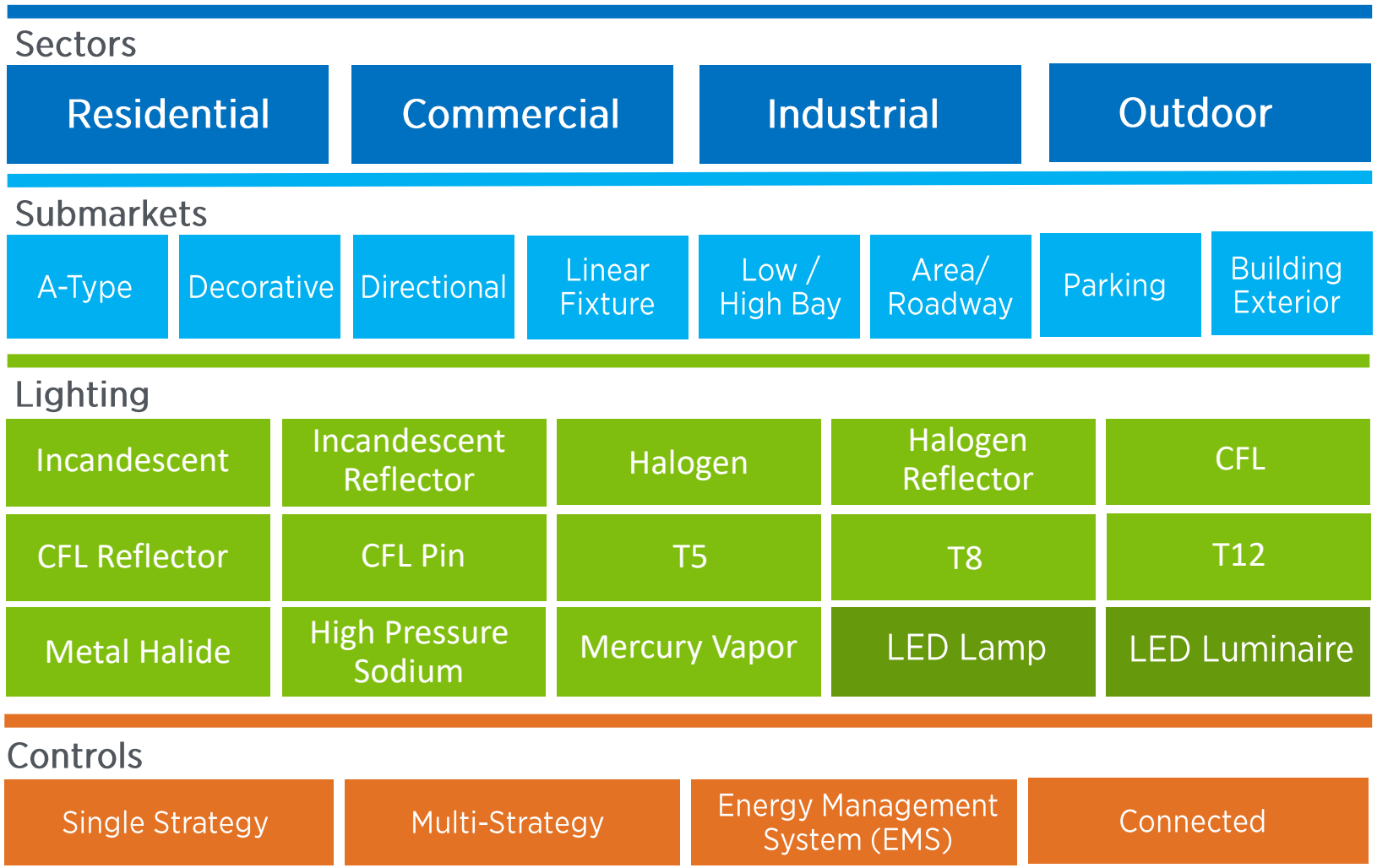
Source: http://www.cartoonstock.com/directory/p/philosophise.asp

Lighting Market Model Overview

Major inputs, modules and analytical flow of the lighting market model are shown below:



Lighting Market Model Overview



The lighting market model considers adoption across:

4 Sectors

8 Submarkets

For the following lighting and control systems:

15 Lighting

4 Controls

Lighting Control Definitions

This year, the lighting market model was updated to forecast the impact from several types of control systems:

- **Single Strategy** Traditional dimming, daylighting, occupancy, or timers are implemented individually.
- **Multi-Strategy** A combination of two, three, or four of the traditional control types implemented together.
- **EMS** Allows control of lamps and luminaires within a single building. All four traditional control strategies are implemented.
- **Connected** All four traditional control strategies are implemented. Additional energy savings based on communication between connected lamps and luminaires, as well as use optimization.

How Is the Market Predicted to Change?

Source: http://www.calvin.edu/chimes/2015/04/30/new-model-improves-hurricane-predictions/

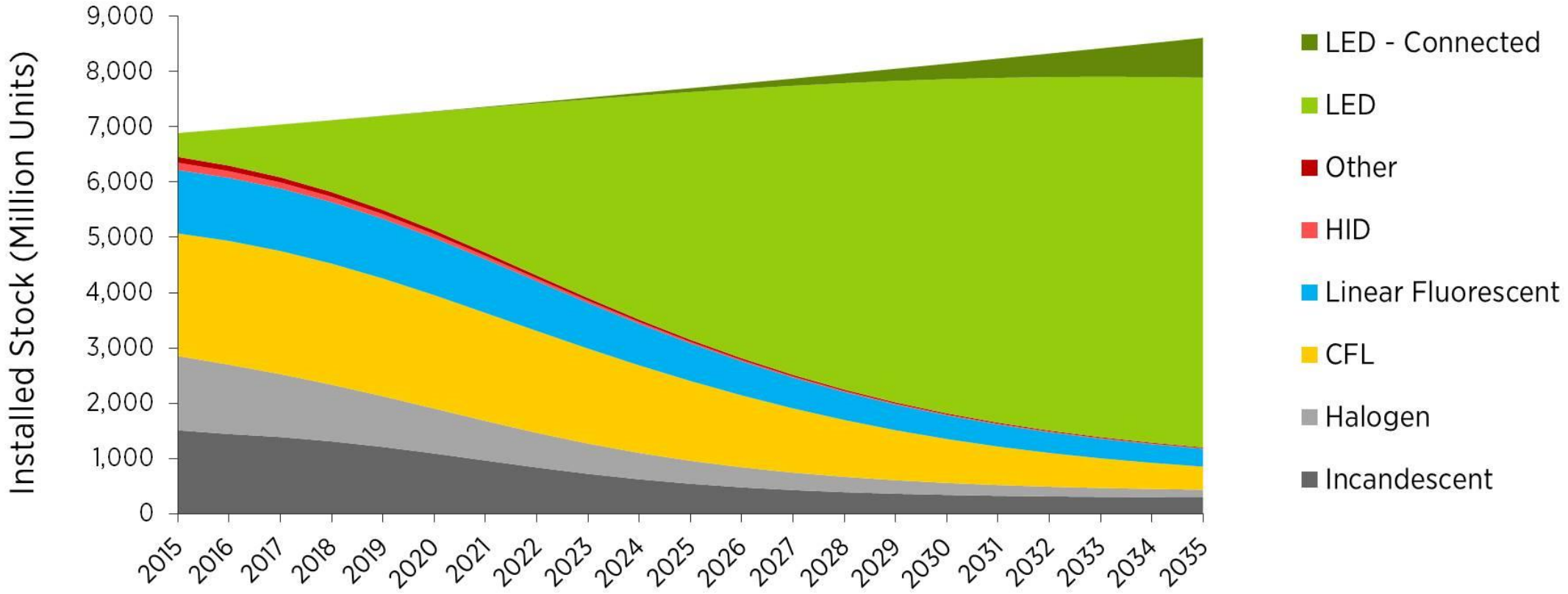
SSL Lighting Market Model Scenarios

LED installed stock and energy use is forecasted based on two scenarios:

Scenarios	Description	Connected Lighting Assumptions
Current SSL Path	The **expected future path for LEDs given continuation of current SSL investment and effort** from DOE and industry stakeholders.	Penetration rate is similar to occupancy sensors, resulting in a **slow adoption**.
DOE SSL Program Goals	The **future path for LEDs given DOE goals are met**, representing the ultimate potential of what DOE has determined is technically feasible in the given time frame.	Penetration rate follows the same trajectory of LEDs, resulting in **accelerated adoption**.

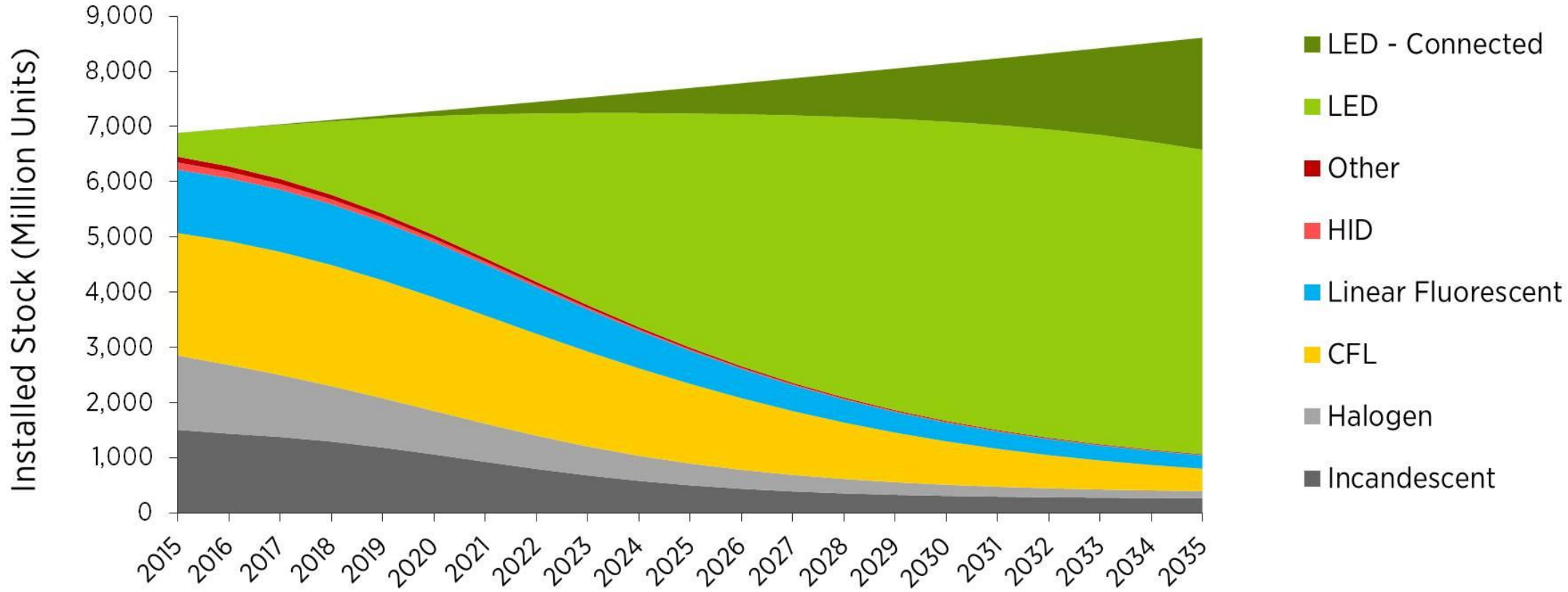
Installed Stock Forecast – Current SSL Path

With current levels of SSL investment, LEDs are expected to rise such that 78% and 9% of installed stock in 2035 are non-connected and connected LEDs, respectively.



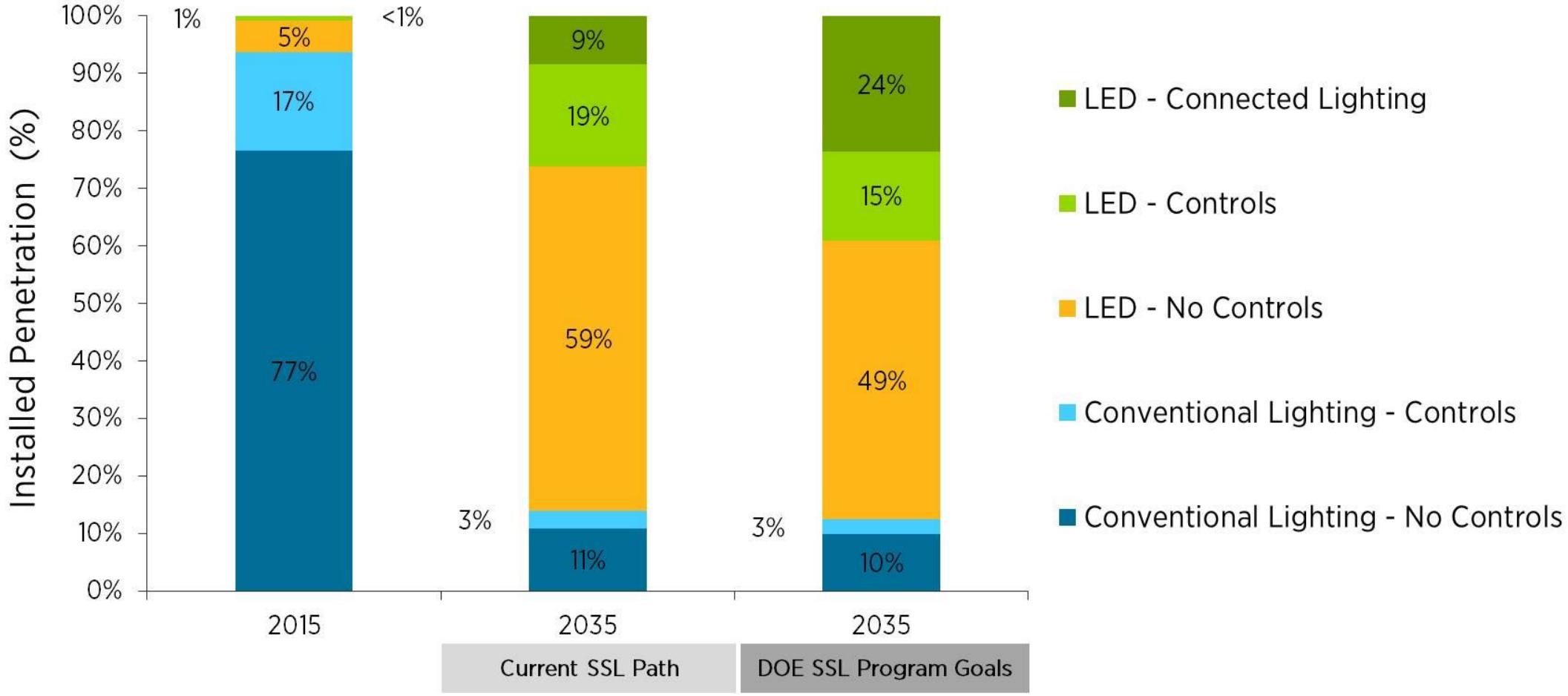
Installed Stock Forecast – DOE SSL Program Goals

If the DOE goals are met and efforts to advance connected lighting are successful, connected LEDs are expected to increase to 24% of installed stock in 2035.



Installed Stock Forecast – Lighting Controls

Both connected lighting and traditional control systems are expected to thrive. However, connected lighting represents the majority of the future savings from lighting controls.

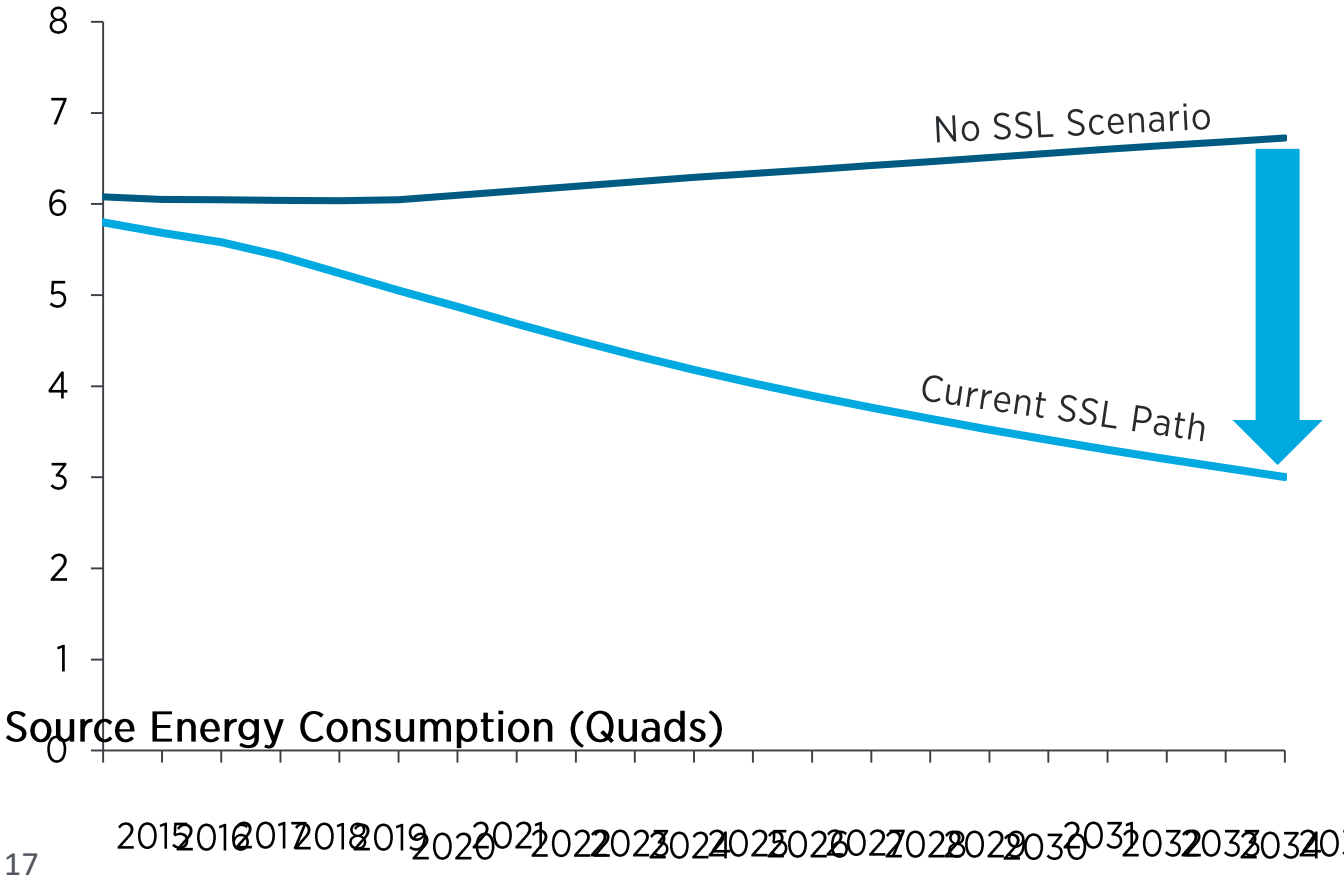


Where Are the Energy Savings?

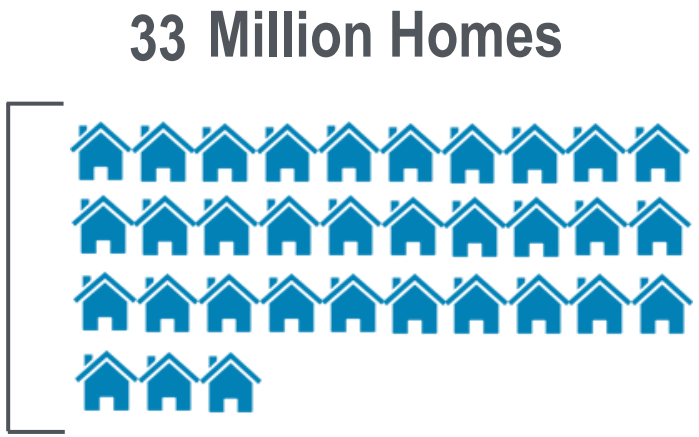
Source: https://s-media-cache-ak0.pinimg.com/originals/4d/01/15/4d01156238d5b14c67716095df3bfc2c.jpg/

LED Energy Savings Forecast

By 2035, LED lighting is forecasted to reduce annual U.S. energy consumption by as much as 5.1 quads.



55% Energy Savings = 3.7 Quads



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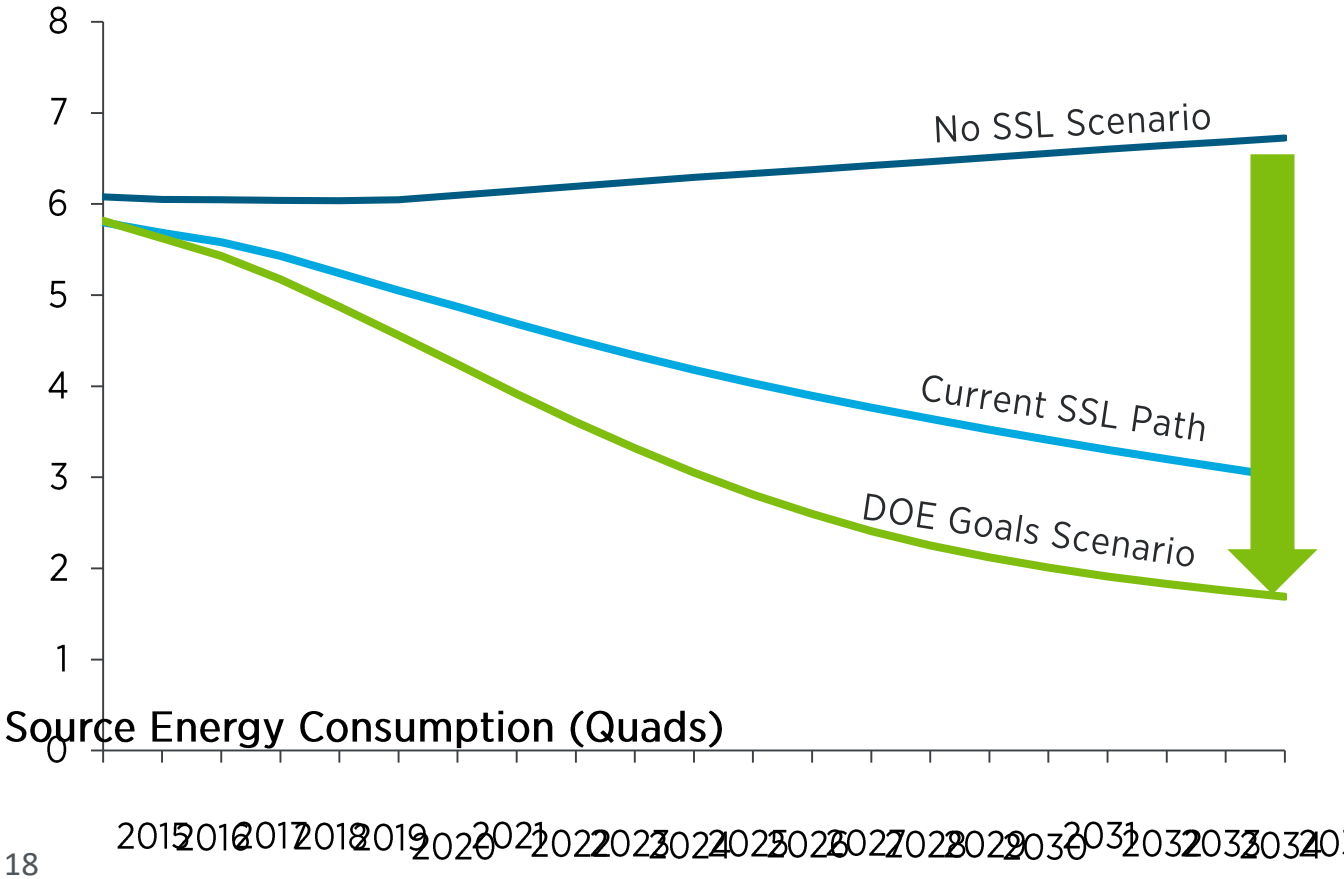
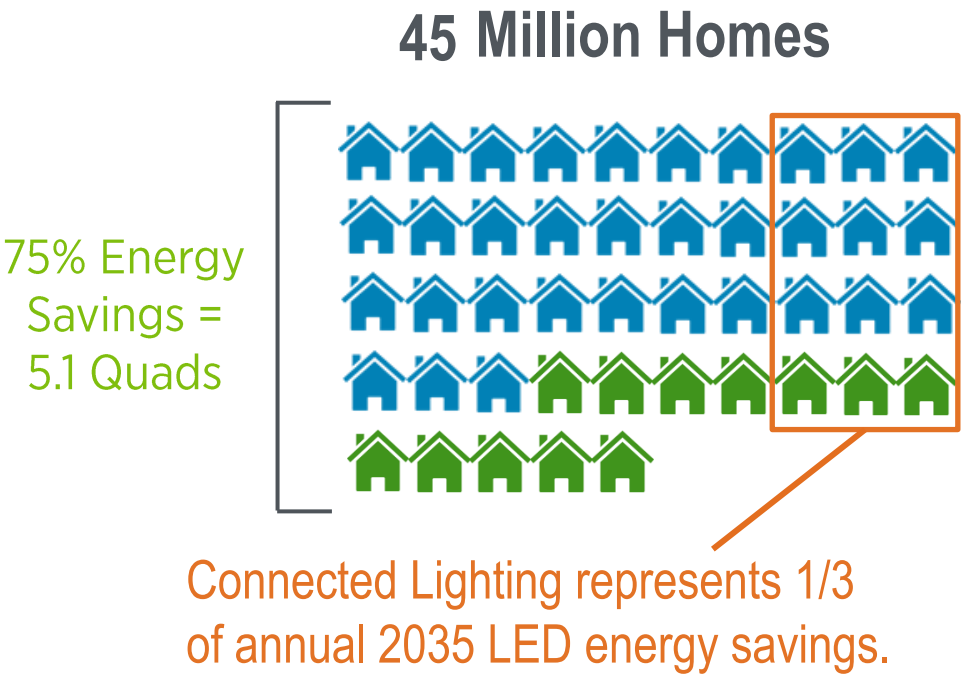
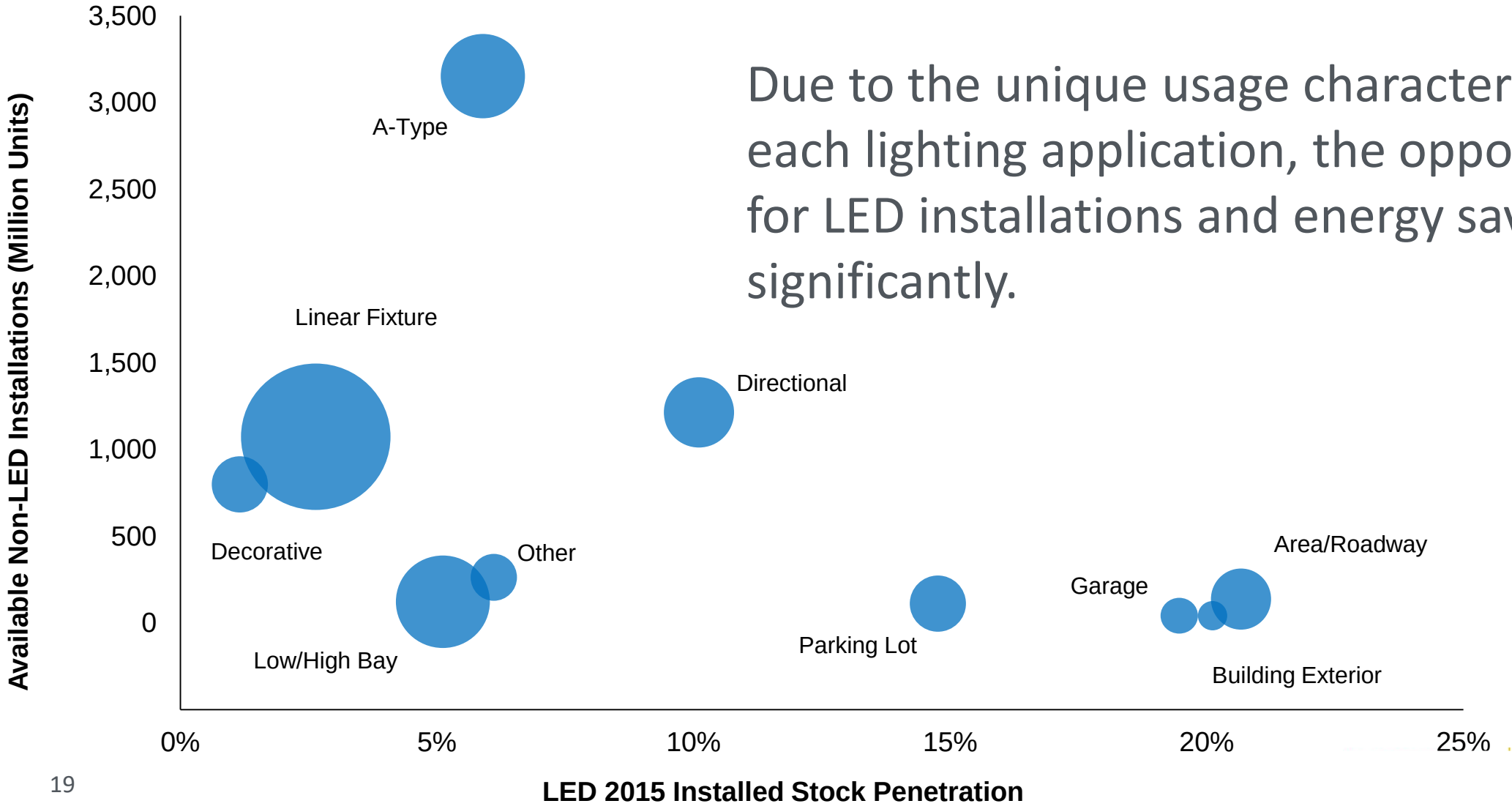


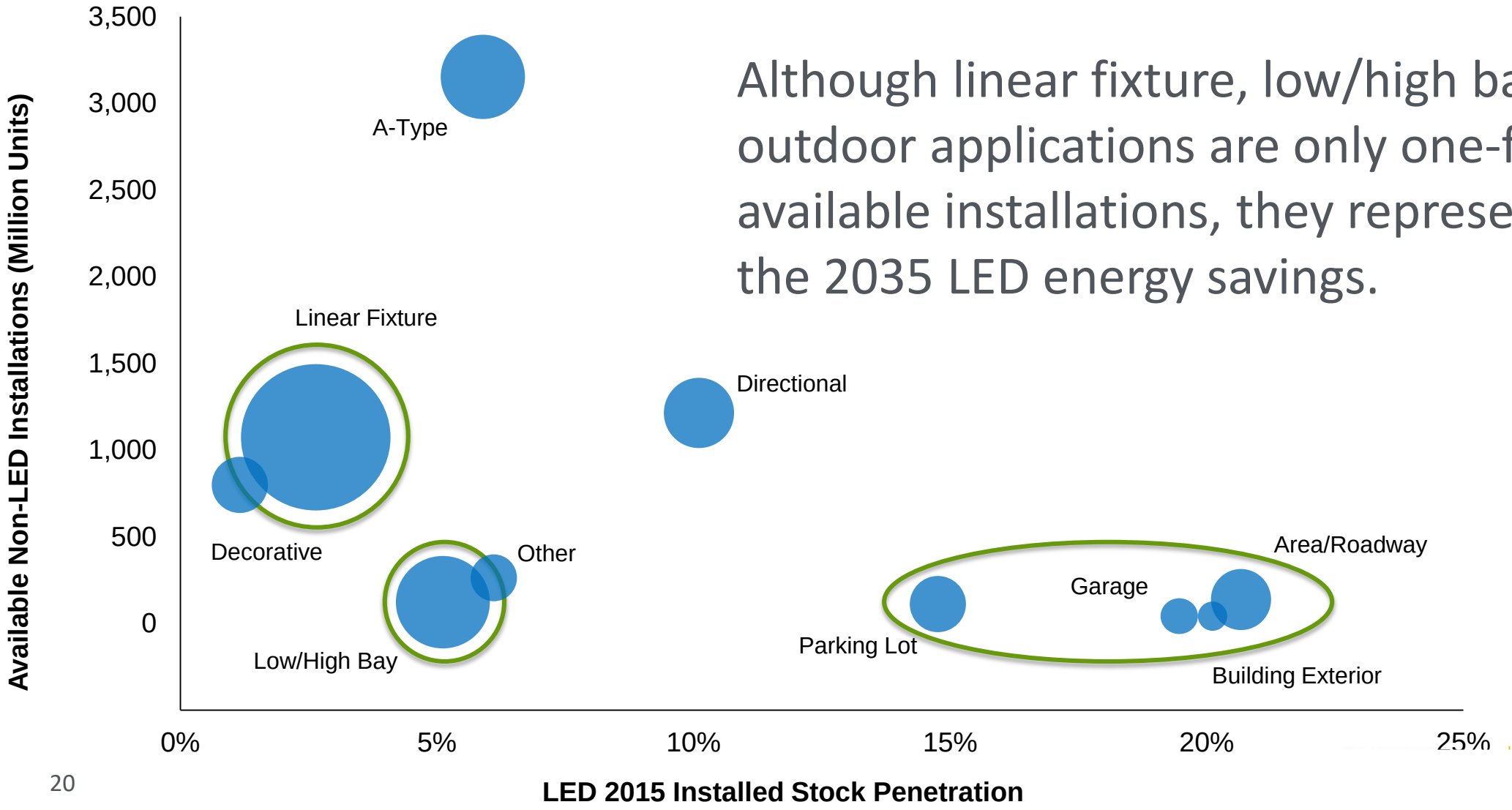


Energy Savings Opportunities for LED Lighting



Due to the unique usage characteristics in each lighting application, the opportunities for LED installations and energy savings vary significantly.

Energy Savings Opportunities for LED Lighting



Although linear fixture, low/high bay and outdoor applications are only one-fifth of all available installations, they represent 65% of the 2035 LED energy savings.

Industry Acknowledgements

Northeast Energy Efficiency Partnerships	Efficiency Vermont
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AEP Ohio	RAB Lighting Inc.
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Lutron	Enlighted
Leviton	Acuity Brands
Cree	Vistar Energy Consulting
WattStopper	Eversource
Lutron	Eaton
Enlighted	Cree
Southern California Edison	Pacific Northwest National Laboratory

Contact Information & Links

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DOE SSL Program, Market Studies
http://energy.gov/eere/ssl/market-studies

Questions?

Source: https://www.ipromedia.us/the-best-it-solutions-for-southern-businesses/