OUTDOOR LIGHTING

Bonneville
POWER ADMINISTRATION

WHAT DO WE KNOW?

WHAT SHOULD WE KNOW?

WHY SHOULD WE CARE?

~ 370

aMW

Source: 7th Plan Estimates

LOT OF PROGRAM ACTIVITY

Savings By Sector (aMW)

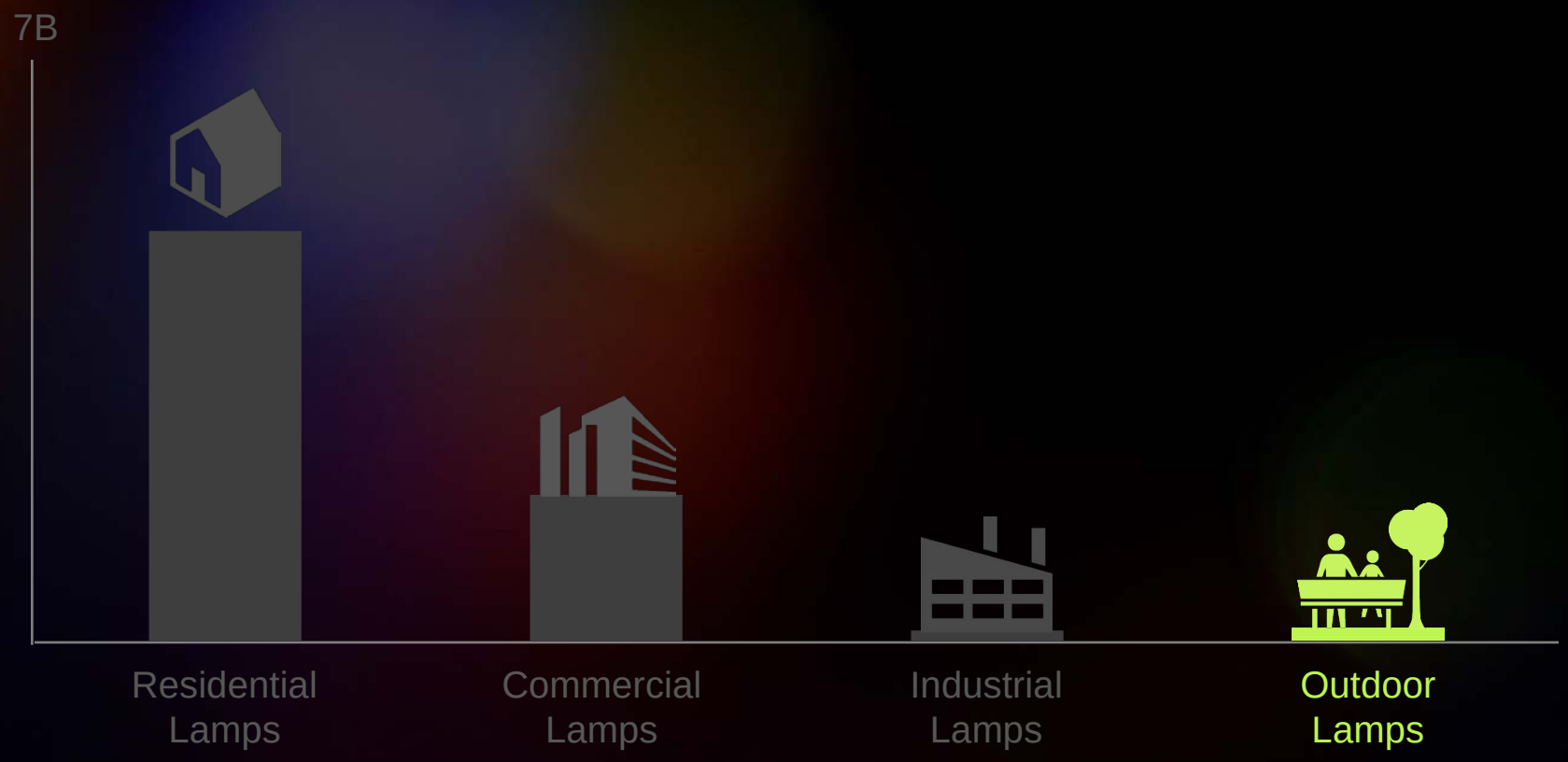
Agricultural	Commercial	Industrial	**Outdoor**	Total
2%	38%	14%	**46%**	100%

Source: BPA Option 1 Program Data for FY15

PROGRAM MEASURES

EXISTING → EFFICIENT TECHNOLOGY	% OF SAVINGS
HID → LED Exterior	83%
Incandescent → LED Exterior	6%
Incandescent → LED Small Lamp/Fixture	3%
HID → HID MH	2%
HID → LED Small Lamp/Fixture	1%
T12 → LED Tube	1%
Other	4%
Total	**100%**

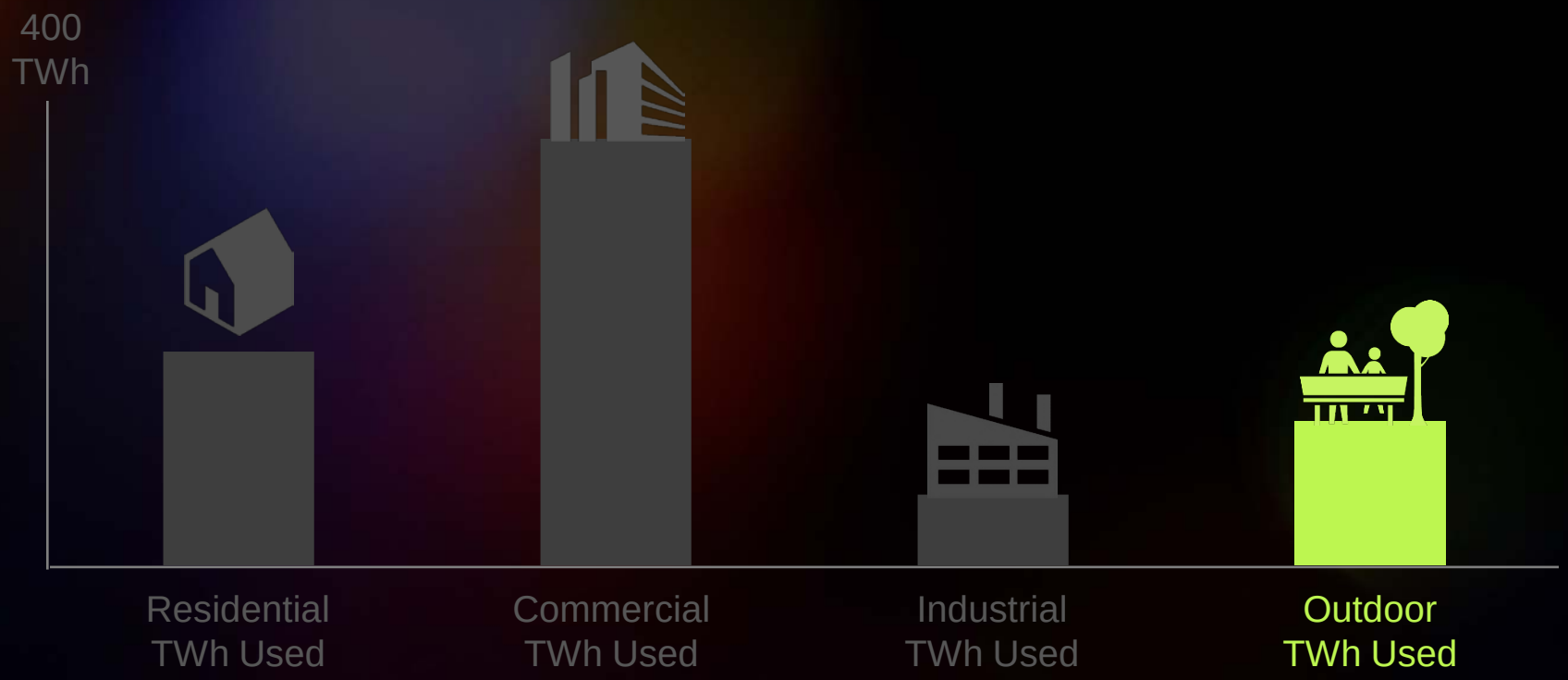
FEWER LAMPS….



2% Share of Installed Lamps

Source: http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/2010-lmc-final-jan-2012.pdf (table ES.1)

…HIGHER WATTAGE AND OPERATING HOURS



17% Share of Lighting Electricity Use

Source: http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/2010-lmc-final-jan-2012.pdf (table ES.1)

WHAT'S IN THE OUTDOOR MARKET?

Building Exterior, 234 aMW

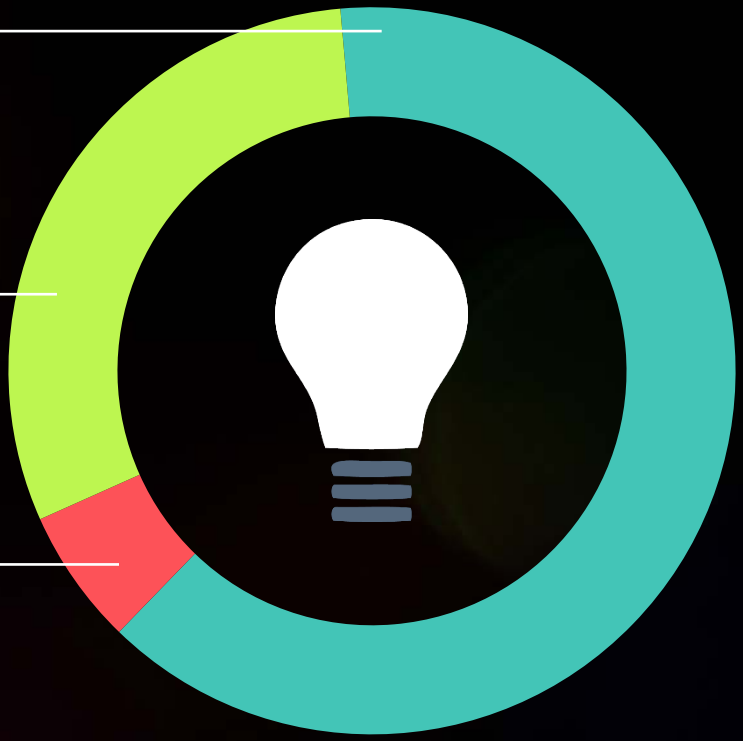
63%

Street & Roadway Lighting, 113 aMW

31%

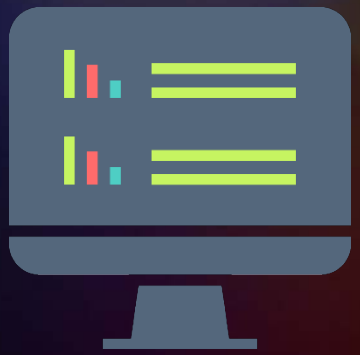
Covered Parking Garages, 23 aMW

6%



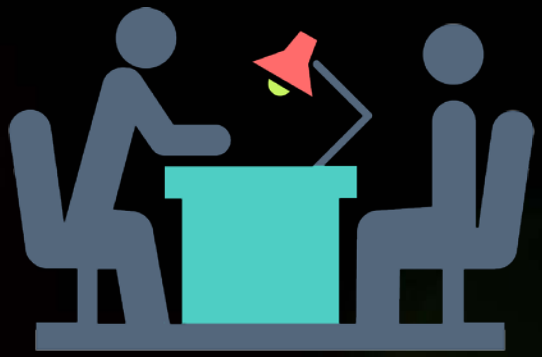
Source: 7th Plan estimates, based on CBSA and other sources

WHAT WE DID



Data Gap Analysis

Reviewed BPA program data, CBSA, 7th Plan, DOE reports

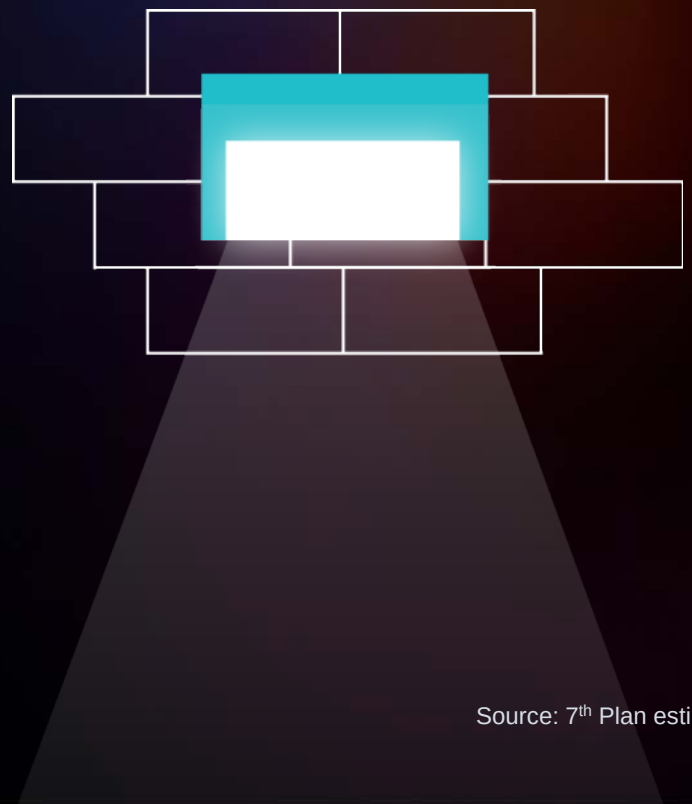


Interviews

13 market actors specializing in outdoor lighting, short interviews at Lightfair 2016

BUILDING EXTERIOR

FRAGMENTED MARKET



APPLICATION	Northwest aMW
Parking Lot	**107**
Building Facade	**55**
Walkway/Area	43
Other	12
Exterior Sales	9
Sporting Field	6
Signage	2
Total	**234**

Source: 7th Plan estimates, based on 2014 CBSA

HID DOMINATES STOCK

% of Building Exterior Watts in Stock

TECHNOLOGY	2014
HID	79%
LF	5%
CFL	5%
Incandescent	8%
LED, Induction, Neon, Other	2%

2014 CBSA

MARKET NICHES

Gas Stations – among first to adopt LED due to long operating hours

MARKET NICHES

Car Dealerships – driven by improved colored rendering, visibility and security

MARKET NICHES

Sports Fields – often municipal-owned; LED retrofits driven by desire for highly visible improvement

MARKET NICHES

Area Lighting – maintenance benefits important to commercial customers

BUILDING EXTERIOR DATA GAPS

Sign Lighting

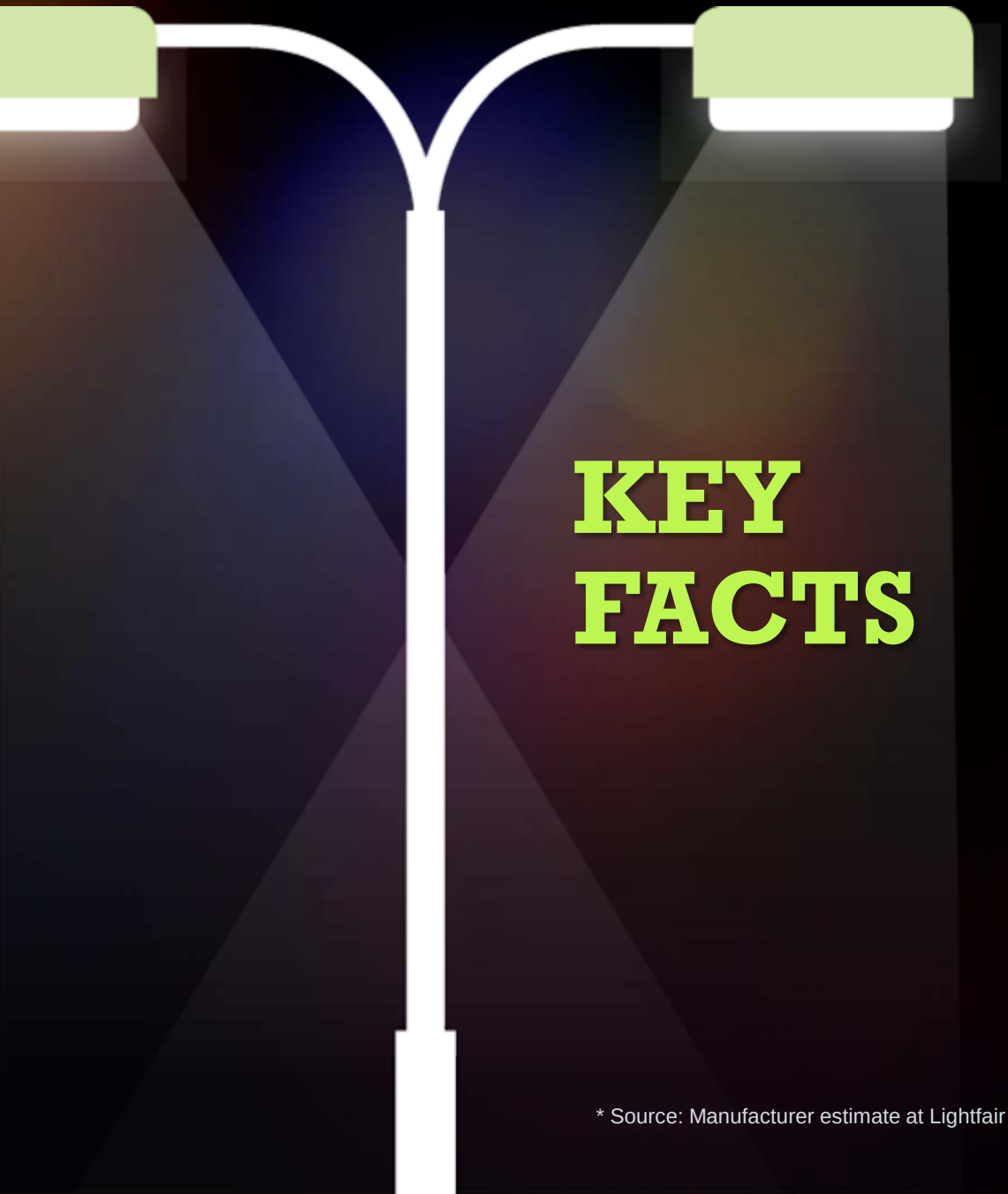
Area Lighting

Parking Lots

Industrial Outdoor

(CBSA did not sample directly)

STREET LIGHTING



KEY FACTS

113 aMW in NW, 31% of outdoor

High wattage lamps*:

- 15% - 400 W
- 40% - 250 W
- 45% - 150 W

Stock dominated by HID; rapid transition to LEDs

Natural controls opportunity

* Source: Manufacturer estimate at Lightfair (national)

UNIQUE OWNERSHIP STRUCTURE

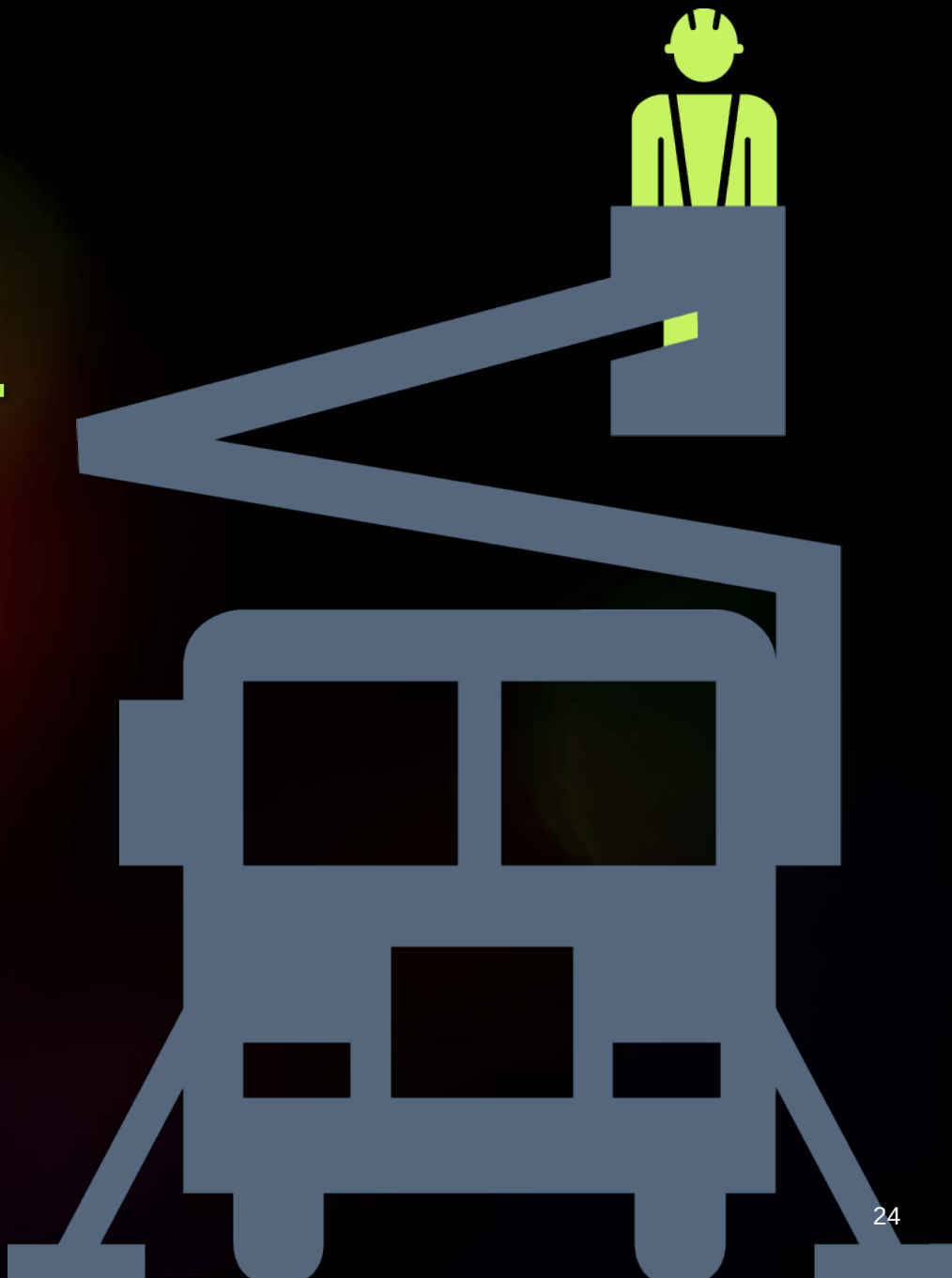
Cities, towns, and utilities makes decisions… slowly.

NOT A TECHNOLOGY DEBATE

SALES NOW 80% LED

Manufacturer Estimate at Lightfair

SAVING ENERGY IS SECONDARY



LOTS OF LED PROJECTS

	STATE	YEAR(S)	LAMP TYPE	COUNT
eattle	WA	2009-Present	HPS to LED	85,00 total (48% residential, 15% pedestrian 37% arterial) 41,000 converted so far (2014)
lympia	WA	Unclear	HPS to LED	4,500 total (3,200 city owned (1st), 1,300 PS
akima	WA	2014-Present	HPS to LED	4,400
ent	WA	2015-present	HPS to LED	2,600
ellevue	WA	2015-Present	HPS to LED	4,242 targeted by project
verett	WA	2015-Present	HPS to LED	2,300 (roughly one third of all lights)
arysville	WA	2011-2012	HPS to LED	roughly 100 (second round)
ongview	WA	2013	HPS to LED	2,023 to LED (another 564 MH lamp/ballast)
enton	WA	2013	HPS to LED	3,865 (out of 6,00 approximately
ortland	OR	2015-Present	HPS to LED	55,00 total (4,800 decorative, PBOT pays/maintains 11,000 Portland Gen. Elec. 44,000)
est Linn	OR	2014 (Unclear)	HPS to LED	800
stacada	OR	2014 (Unclear)	HPS to LED	340
ake Oswego	OR	2013-2014	Unclear to LED	3,680 total (1,400 converted)
ugene	OR	2015-Present	Unclear to LED	9,600 total (5,000 converted)
resham	OR	2013-Present	HPS to LED	8,000
ilwaukee	OR	Unclear	HPS to LED	2,000
lackamas	OR	2013-2015	HPS to LED	5,000 total (55% of street lights in the district
pringfield	OR	2014	LED Retrofit kits	1,000
alem	OR	2015-Present	HPS to LED	8,000 plus new installations of 70-80 per yea
oise	ID	2010-2012	HPS to LED	10,000 total (1,500 converted)
esier	ID	2015	HPS to LED	395
aho Falls	ID	2015	HPS to LED	80 (trial run)

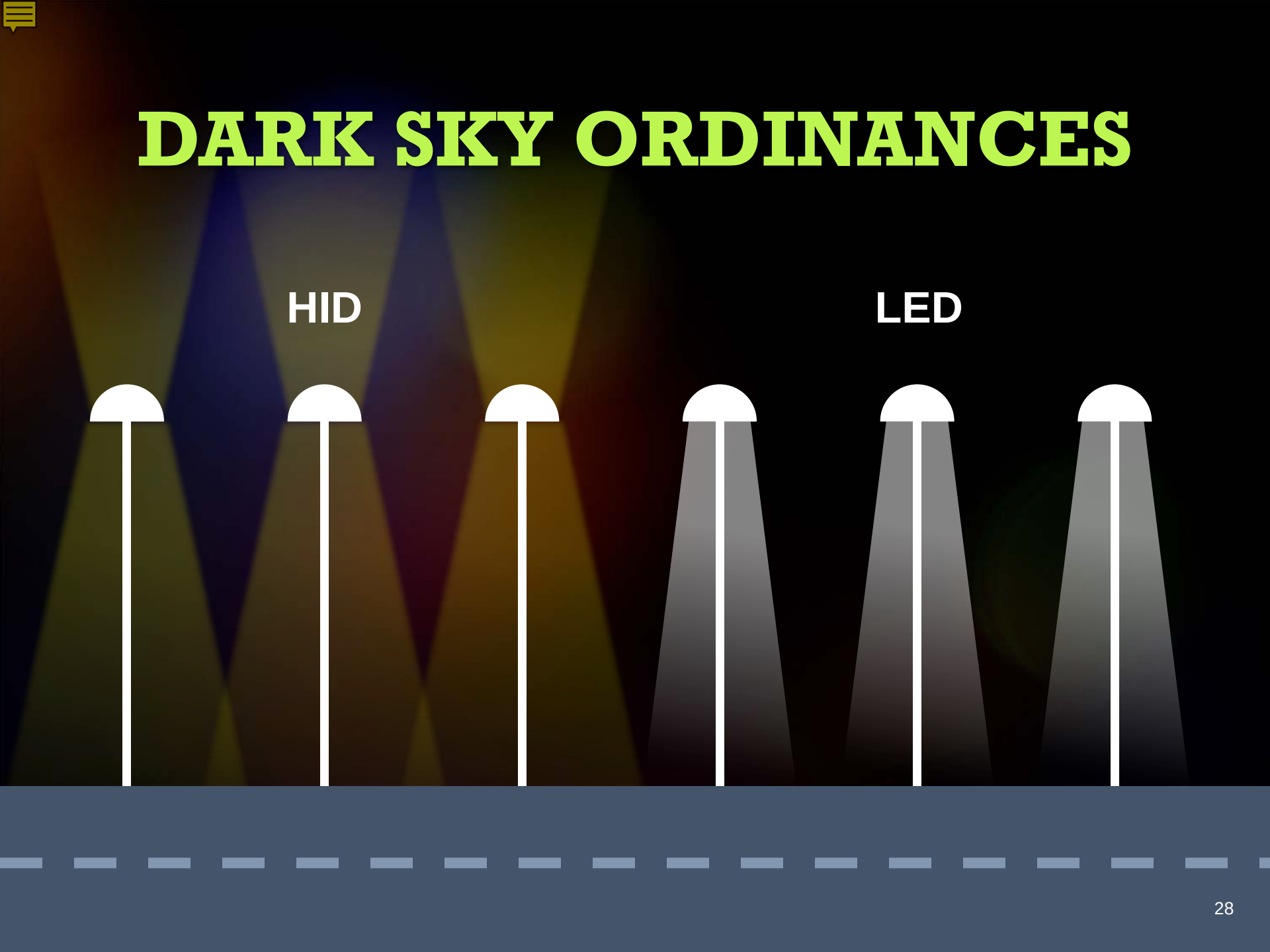
NEW DESIGNS

LEARNING FROM

PREVIOUS EXPERIENCES

GLARE BOMBS AWAY

DARK SKY ORDINANCES



DATA GAPS

Not captured
in the CBSA.

No comprehensive data
on market size and mix.

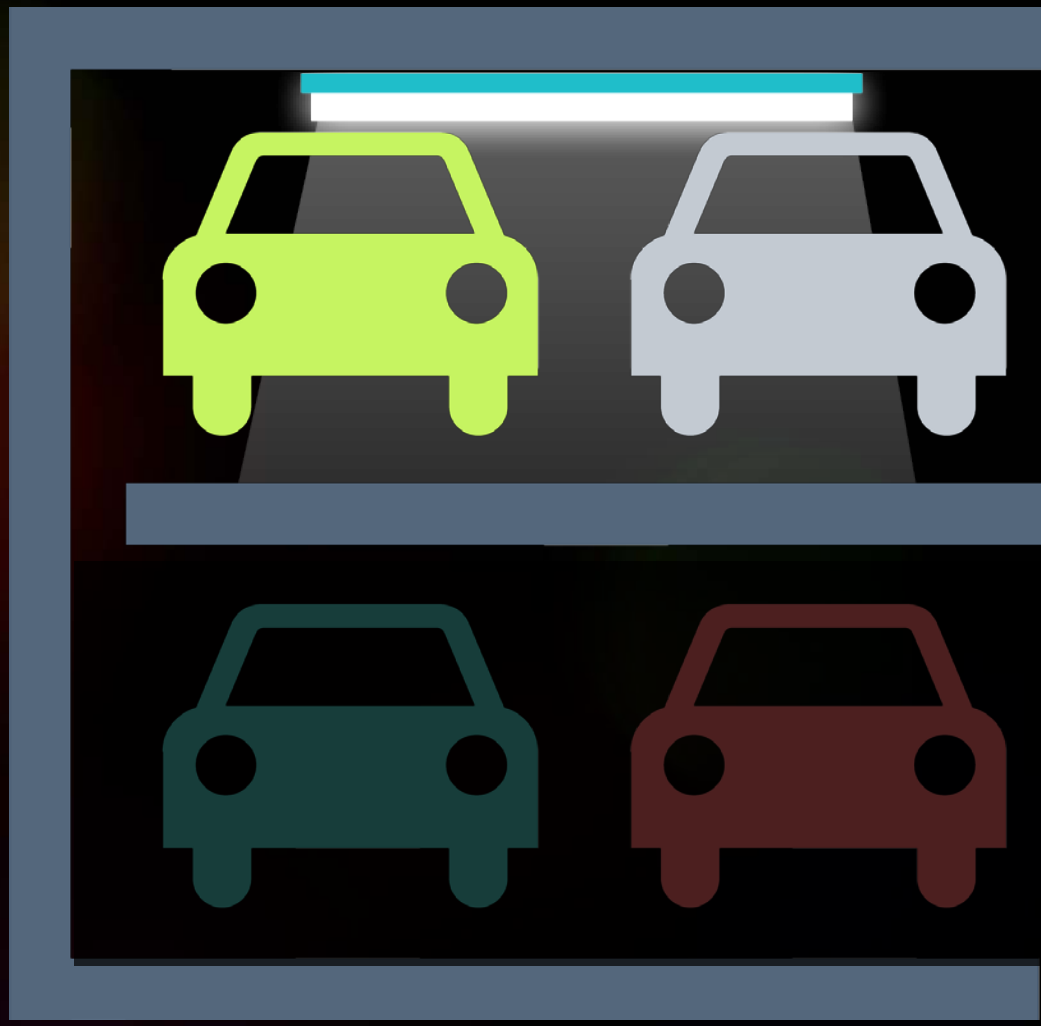
COVERED PARKING LOTS

KEY FACTS

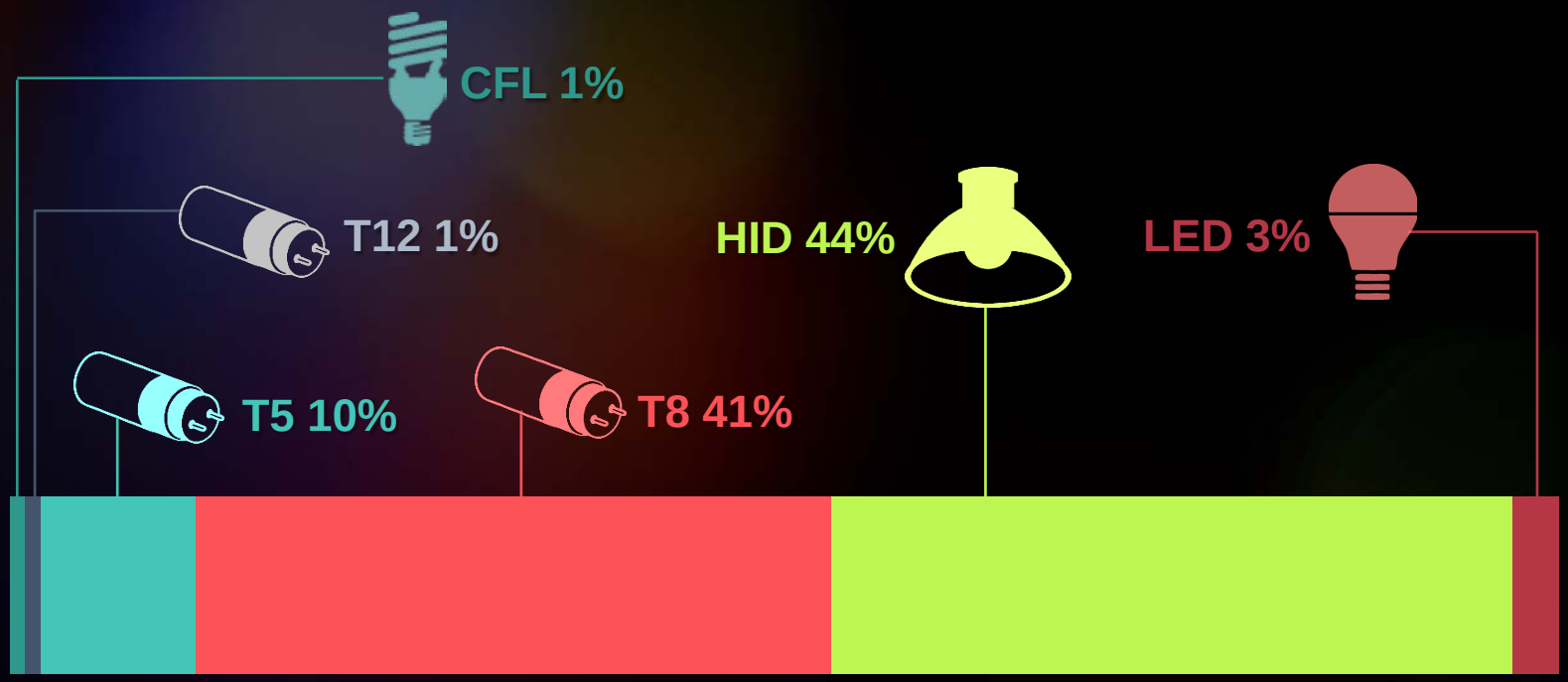
23 aMW in NW
(6% of outdoor)

“Only need to be
on 15% of the time”

Natural controls fit:
GE fixtures come
standard with
occupancy sensors



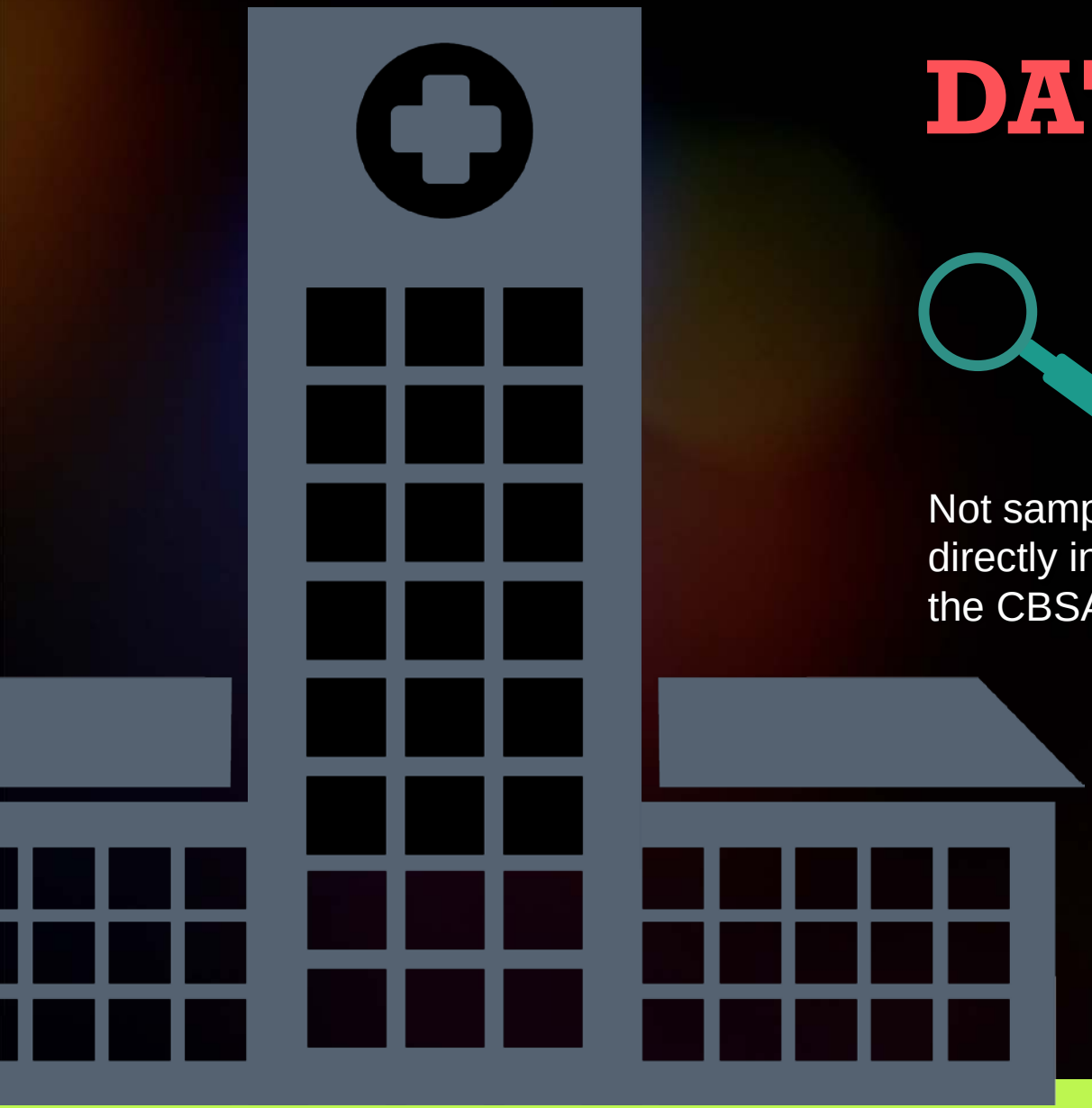
INSTALLED TECH MIX



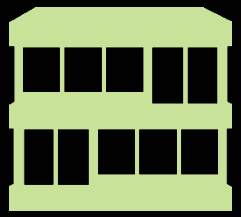
7th Plan assumes 20% baseline LED penetration

Source: 7th Plan, based on CBSA

DATA GAPS



Not sampled directly in the CBSA.



Spotty data: No data for universities or hospitals. Only one retail building in sample.

KEY TAKEAWAYS

1 Outdoor lighting is, by itself, a large end-use

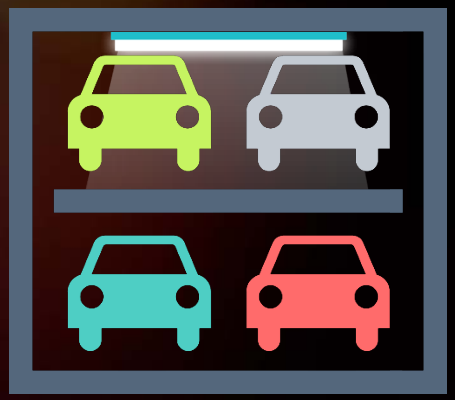
2 Building exterior, streetlighting, and covered parking lots are the main market segments

3 Streetlighting is rapidly moving to LED—nearly every retrofit is LED

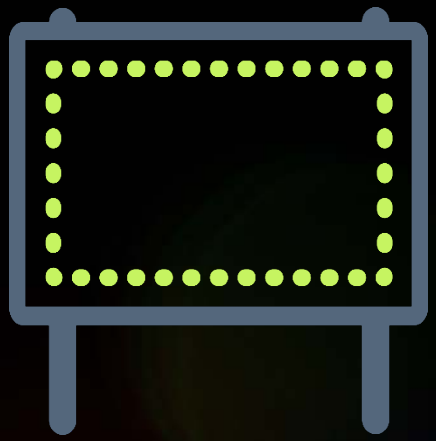
4 Nearly half of lighting program savings (for FY15 option 1 utilities) are from outdoor measures (nearly all HID to LED changeouts)

KEY REMAINING DATA GAPS

Streetlighting market size and mix



Parking garage and parking lot market size



Sign lighting market size and mix

POTENTIAL RESEARCH STRATEGIES

STREET LIGHTING STOCK ASSESSMENT

Direct count from towns, cities, state DOTs, and utilities

Supplement with sampling approach based on roadway miles, stratified by type of roadway

PARKING STOCK ASSESSMENT

1 Vet CBSA figures with series of top down and/or bottom up checks.

2 If checks reveal error in CBSA, pursue sampling approach (perhaps measuring parking lots and fixture counts with Google Earth and/or web scraping off parking apps)

APPENDIX

DEFINITIONS AND DATA

Subsegment	CBSA Data?	CBSA Definition	Typical applications	CBSA Representativeness Caveats
Building Façade	Yes	Used directly to light the building façade. This includes mounted down lights, and flood lights directed at the façade.	Wall mounts; wall wash	None
Exterior Sales	Yes	Used to highlight items the building is selling for areas indicated as exterior sales.	Pole lighting	None
Streetlighting/ Roadway	No		Street, Roadway, Decorative, Arterial	N/A
Parking Lots	Yes	Used to light the building's parking lot (typically lights on poles throughout the parking area)	Pole lighting	Not sampled directly; no stand alone lots; small sample in key building types.
Parking Garage	Yes		Low/high bay	Not sampled directly; no stand alone garages considered; small sample in key building types.
Walkway / Area	Yes	Used to light the path/walkway or an area where people would congregate	Bollards, Landscape, Decorative Streetlamps	Not sampled directly; no stand alone areas
Gas Station / Canopy	Yes		Fuel Pump Canopy	None
Signage/Billboard	Yes	Used for signage (lights up text)	Sign lighting	Only covered if part of building; no road/highway
Airfields	No			N/A
Stadiums		Used to light a sporting field.	High Output	N/A
Traffic Signals	No		Traffic signals	N/A