

Subcommittee Process Technical Overview Lighting

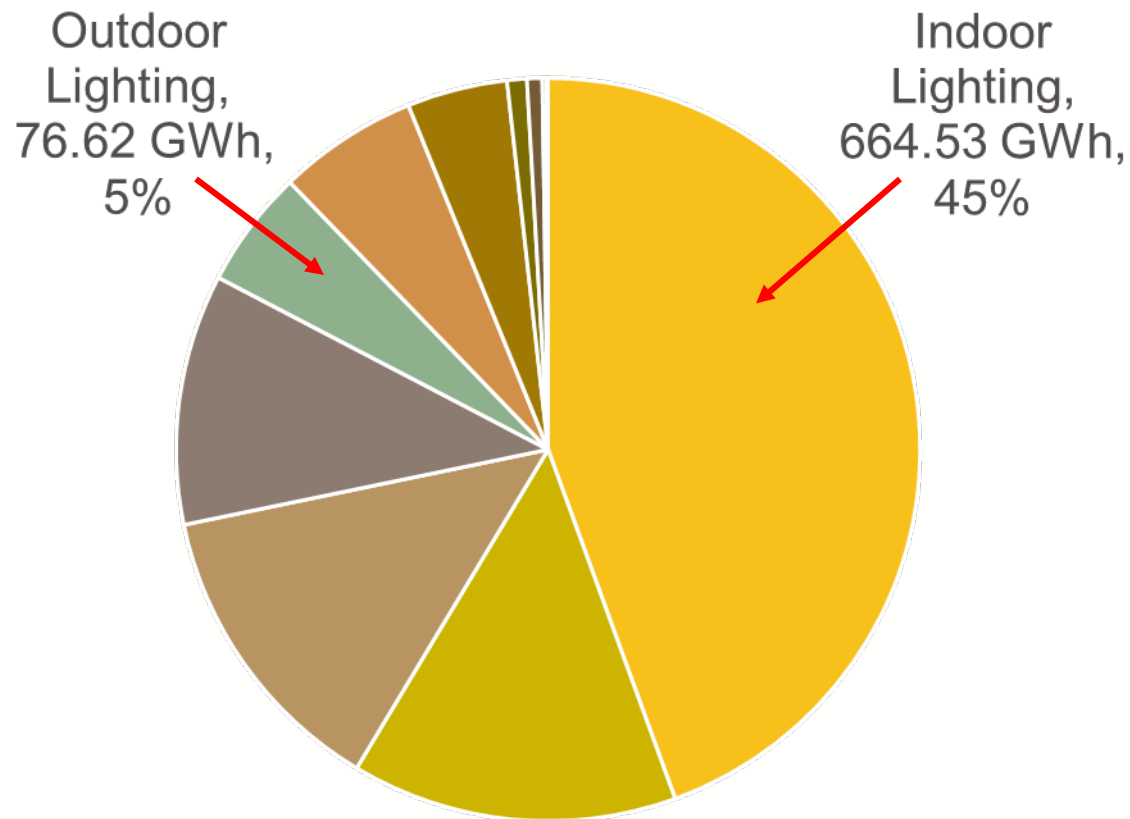


TIM MELLOCH
JULY 2017

2016: Lighting Savings Perspective

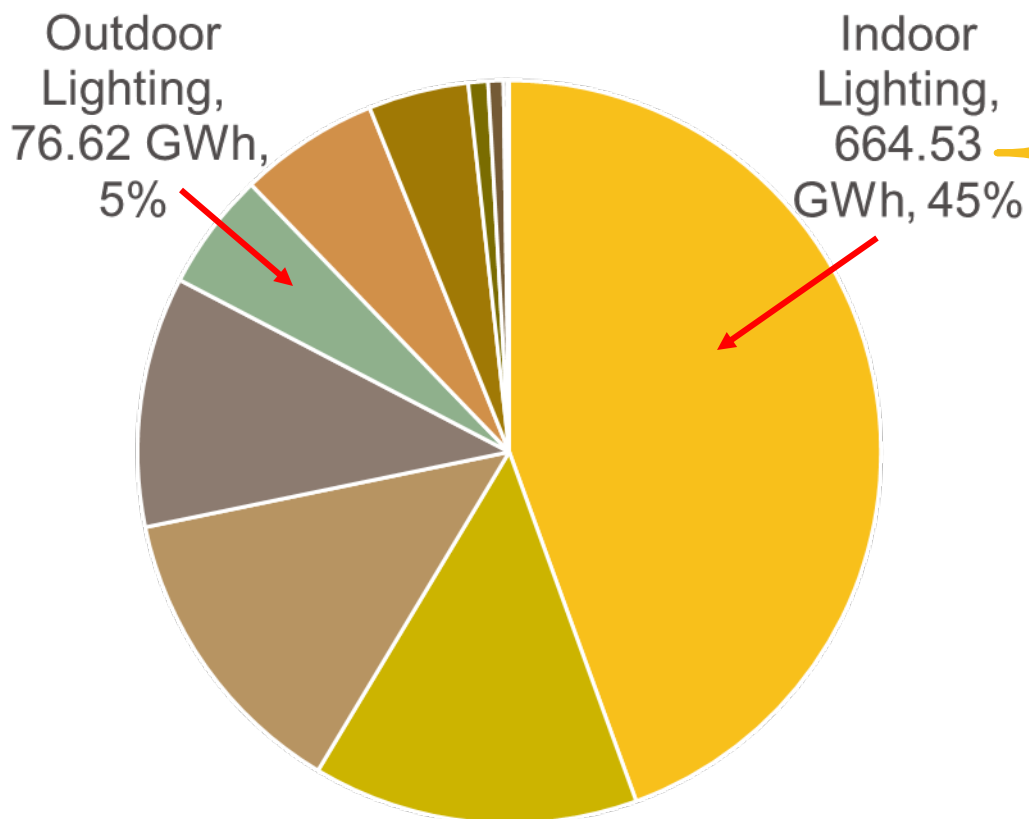
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2016 Q1-Q4 - EESat Data
Total: 1,494.88 GWh



Indoor Lighting

2016 - EESat Data
Total: 1,494.88 GWh



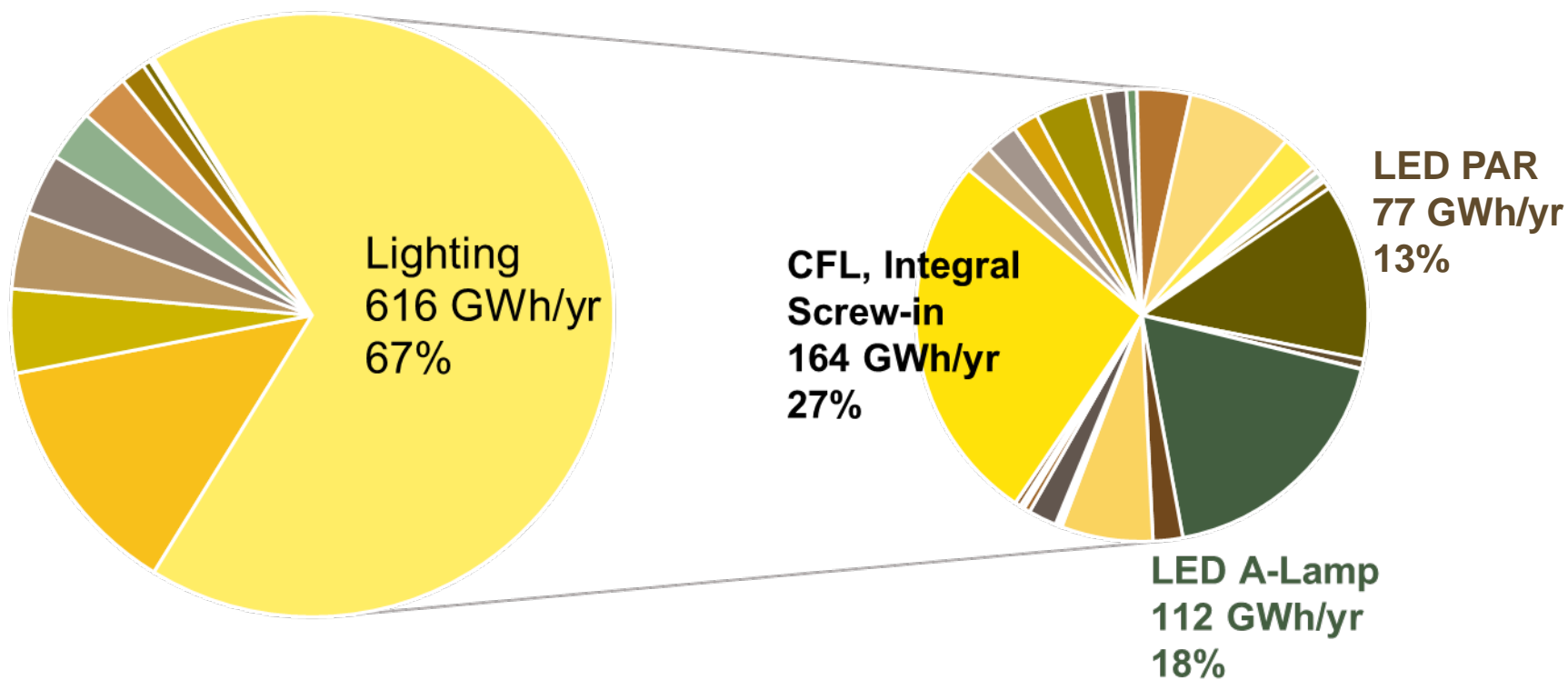
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| Indoor Lighting | |
|--|---------------|
| Lighting Indoor CFL > 30 Watts | 2.58 |
| Lighting Indoor CFL 3 Way | 13.54 |
| Lighting Indoor CFL A Lamp | 31.46 |
| Lighting Indoor CFL Basic | 138.87 |
| Lighting Indoor CFL Fixture | 1.76 |
| Lighting Indoor CFL Globe | 0.00 |
| Lighting Indoor CFL Other | 0.00 |
| Lighting Indoor CFL Reflector | 4.65 |
| Lighting Indoor Controls Daylighting | 0.17 |
| Lighting Indoor Controls Other | 1.40 |
| Lighting Indoor Controls Wall Or Ceiling | 1.30 |
| Lighting Indoor Fixture Integrated Occu | 0.17 |
| Lighting Indoor HID | 0.18 |
| Lighting Indoor High Bay Fluorescent | 2.21 |
| Lighting Indoor Induction | 0.02 |
| Lighting Indoor LED Fixture | 125.80 |
| Lighting Indoor LED Lamp | 123.43 |
| Lighting Indoor LED Night Light | 0.20 |
| Lighting Indoor LED Other | 19.97 |
| Lighting Indoor LED Reflector Lamp | 124.17 |
| Lighting Indoor LED Signage | 0.13 |
| Lighting Indoor Linear Fluorescent | 42.10 |
| Lighting Indoor Linear Fluorescent Dela | 3.96 |
| Lighting Indoor Other | 26.09 |
| Lighting Outdoor LED Fixture | 0.03 |
| Lighting Outdoor LED Streetlight | 0.28 |
| Other | - |
| Retrocommissioning Lighting | 0.06 |
| Indoor Lighting Total | 664.53 |

Lighting Savings Perspective

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2016 CA Deemed Electric Savings
(Total = 912 GWh/yr)



2017 Lighting Measures

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| No. | Description | Energy (kWh/yr) | % of Total |
|--------|----------------------------------|-----------------|------------|
| 4.01 | CFL, Interior Fixture | 1,639,129 | 0.3% |
| 4.02 | CFL, Exterior Fixture | 2,472,772 | 0.4% |
| 4.03 | CFL, BiLevel Fixture | 15,128 | 0.0% |
| 4.04 | CFL, Integral/Screw-in | 164,363,359 | 26.7% |
| 4.05 | CFL, Integral/Screw-in, Multiple | 12,639,624 | 2.1% |
| 4.06 | CFL, 3-Way | 14,063,950 | 2.3% |
| 4.07 | CFL, Spiral | 82,874 | 0.0% |
| 4.08 | CFL, Pin-Based | | |
| 4.09 | CFL, Plug-In | 3,806 | 0.0% |
| ★ 4.10 | LF, 4' Replace Lamp | 11,245,144 | 1.8% |
| 4.11 | LF, Dimming Ballast | | |
| 4.12 | LF, Ballast Retrofit | | |
| 4.13 | LF, Replacement Fixture | 23,561,653 | 3.8% |
| 4.14 | LF, HP Fixture | 7,312,149 | 1.2% |
| 4.15 | LF, Delamping Fixture | | |
| ★ 4.16 | LED, Interior Downlight | 9,762,830 | 1.6% |
| 4.17 | LED, Exterior Wallpack | 4,612,086 | 0.7% |
| 4.18 | LED, High/Low Bay | 23,523,635 | 3.8% |
| 4.19 | LED, Troffer (2x4, 1x4, 2x2) | 46,380,364 | 7.5% |
| 4.20 | LED, Street Light | 16,266,823 | 2.6% |
| 4.21 | LED, Interior Common, Res | 2,506,851 | 0.4% |
| 4.22 | LED, Landscape | 270,207 | 0.0% |
| 4.23 | LED, Exterior with Motion | 3,422,230 | 0.6% |
| 4.24 | LED, Exterior, Res | 1,687,353 | 0.3% |
| 4.25 | LED, Exterior, Pole | | |
| ★ 4.26 | LED, MR-16 | 3,639,850 | 0.6% |

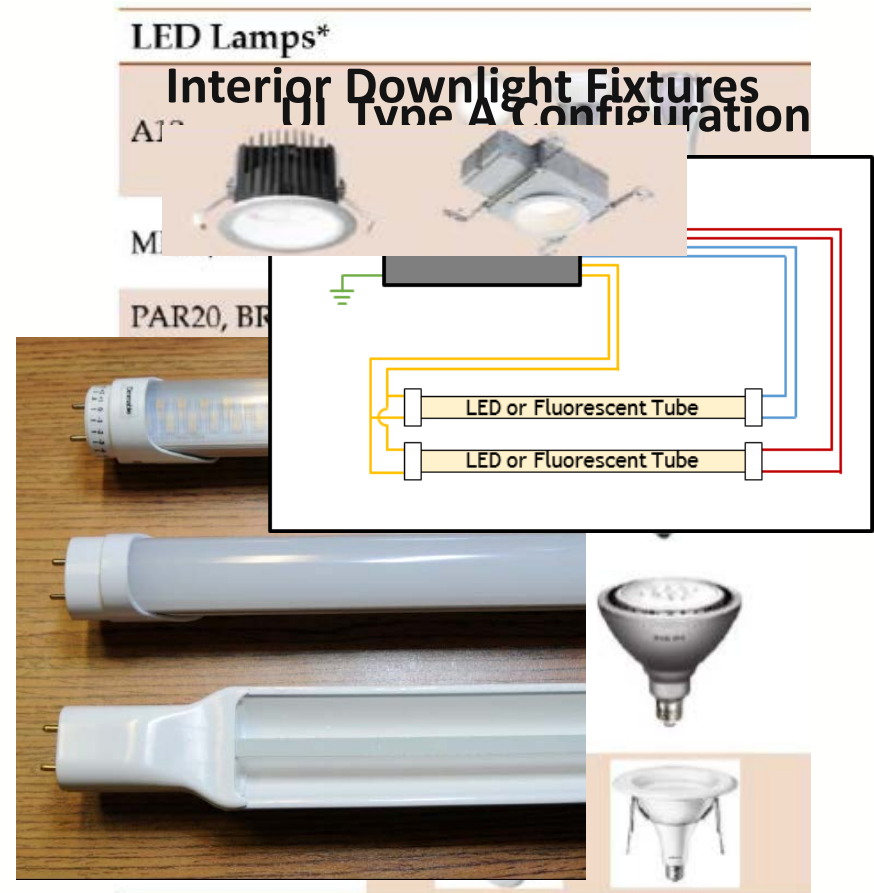
| No. | Description | Energy (kWh/yr) | % of Total |
|--------|--------------------------------|-----------------|------------|
| ★ 4.27 | LED, PAR20, 30, 38, | 77,757,805 | 12.6% |
| ★ 4.28 | LED, Candelabra | 4,150,347 | 0.7% |
| ★ 4.29 | LED, Globe | 236,283 | 0.0% |
| ★ 4.30 | LED, A-Lamp | 112,402,706 | 18.2% |
| ★ 4.31 | LED, Recessed Downlight | 13,090,543 | 2.1% |
| ★ 4.32 | LED, R-BR | 40,386,227 | 6.6% |
| ★ 4.33 | LED, GU-24 | | |
| 4.34 | LED, Various Lamps | | |
| 4.35 | LED, Exterior Lamps | 1,194,663 | 0.2% |
| ★ 4.36 | LED, Tube LED | 423,546 | 0.1% |
| 4.37 | HID, Interior Fixture | 22,981 | 0.0% |
| 4.38 | HID, Exterior Fixture | 20,173 | 0.0% |
| 4.39 | HID, Interior Lamp | | |
| 4.40 | Sensor, Residential Occ | 57,408 | 0.0% |
| 4.41 | Sensor, Wall or Ceiling Occ | 889,086 | 0.1% |
| 4.42 | Sensor, Integrated Fixture | 154,002 | 0.0% |
| 4.43 | Sensor, Photocell | | |
| 4.44 | Open Sign | 130,576 | 0.0% |
| 4.45 | Menu Board | | |
| 4.46 | Channel Letter Sign | | |
| 4.47 | Refrig, Case Door | 12,515,846 | 2.0% |
| 4.48 | Refrig, Walk-in | 15,982 | 0.0% |
| 4.49 | Refrig, Reach-in | 2,732,405 | 0.4% |
| 4.50 | Cold Cathode | | |
| 4.51 | LED, Pool | | |
| 4.52 | CFL, Ceiling Fan | | |
| 4.53 | LED, Sports or Athletic Fields | 398,406 | 0.1% |

Lighting Measures for 2017

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Lighting Measures for 2017

- LF, 4' Replace Lamp
- LED, Interior Downlight
- LED, Tube LED
- LED, A-Lamp
- LED, Candelabra
- LED, MR-16
- LED, PAR20, 30, 38,
- LED, R-BR
- LED, Globe
- LED, GU-24
- LED, Recessed Downlight



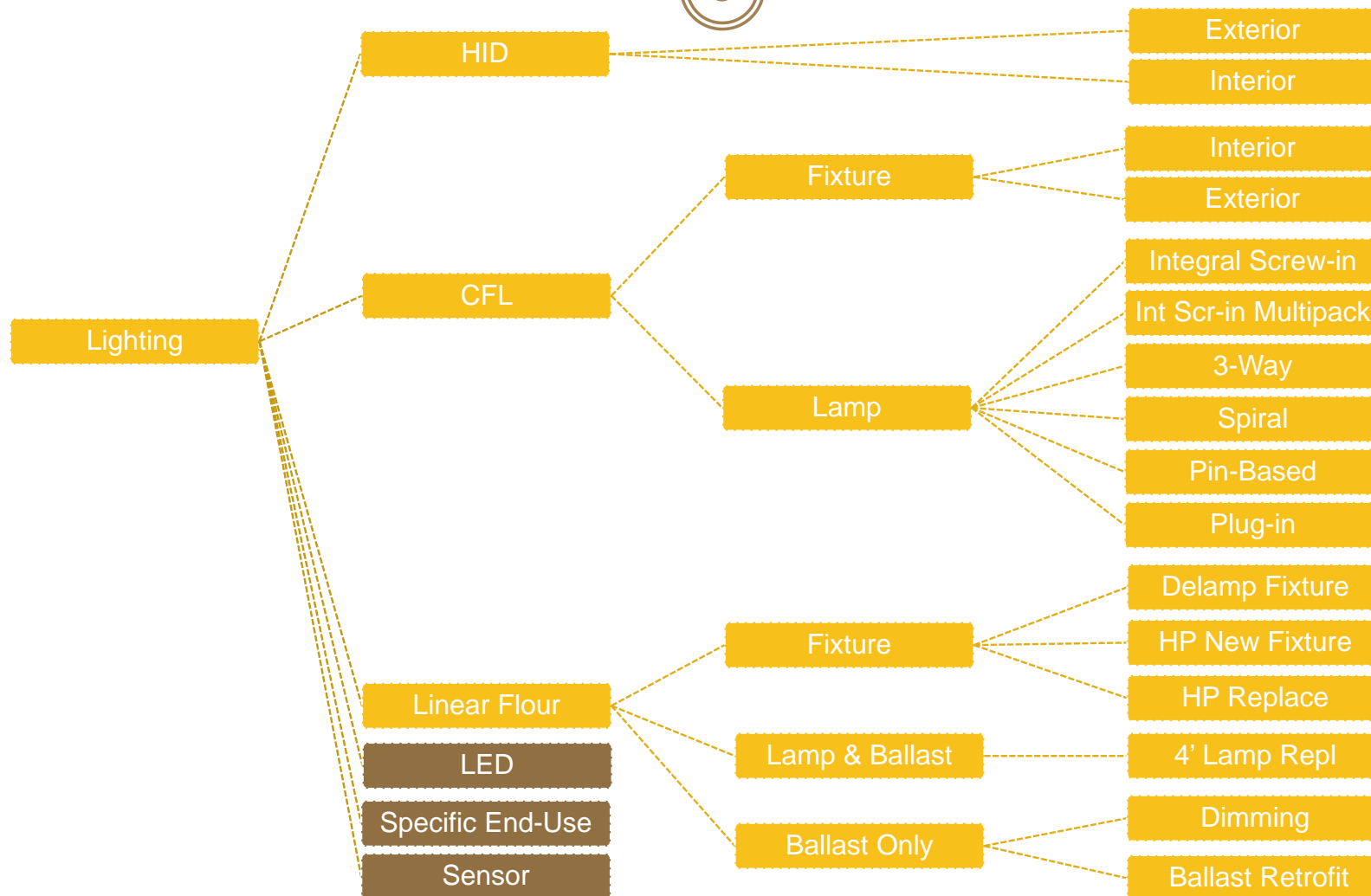
Lighting – Cross Cutting Issues

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- Savings methodology
 - Wattage Reduction Ratio vs Wattage Range vs Lumen Bins
 - Interactive effects
 - Hours of Use support
 - Baseline
 - Existing Conditions – AB802
- Cost variation due to Climate Zone
- Permutation collapse
- Categorization

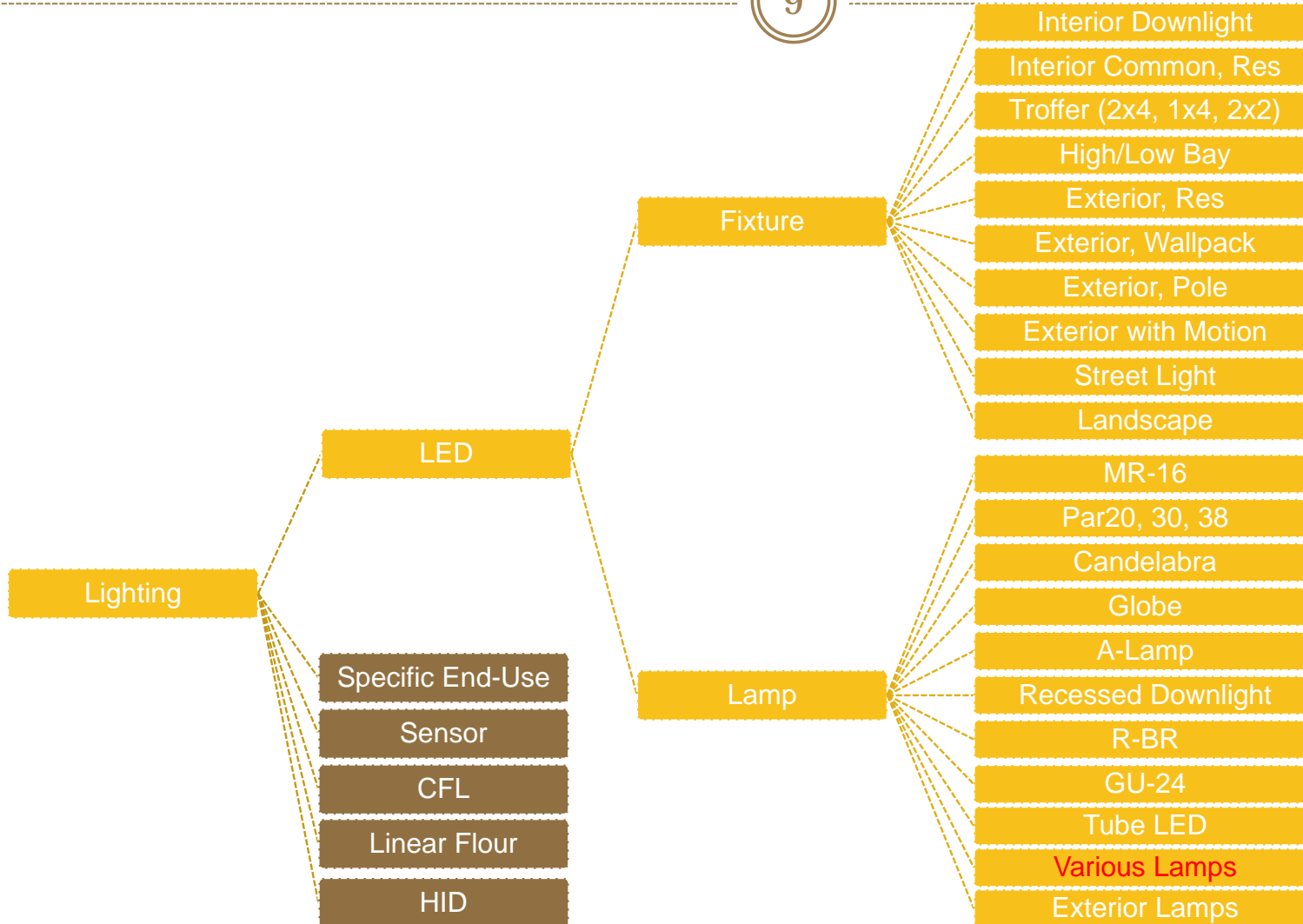
Lighting Measure Tree

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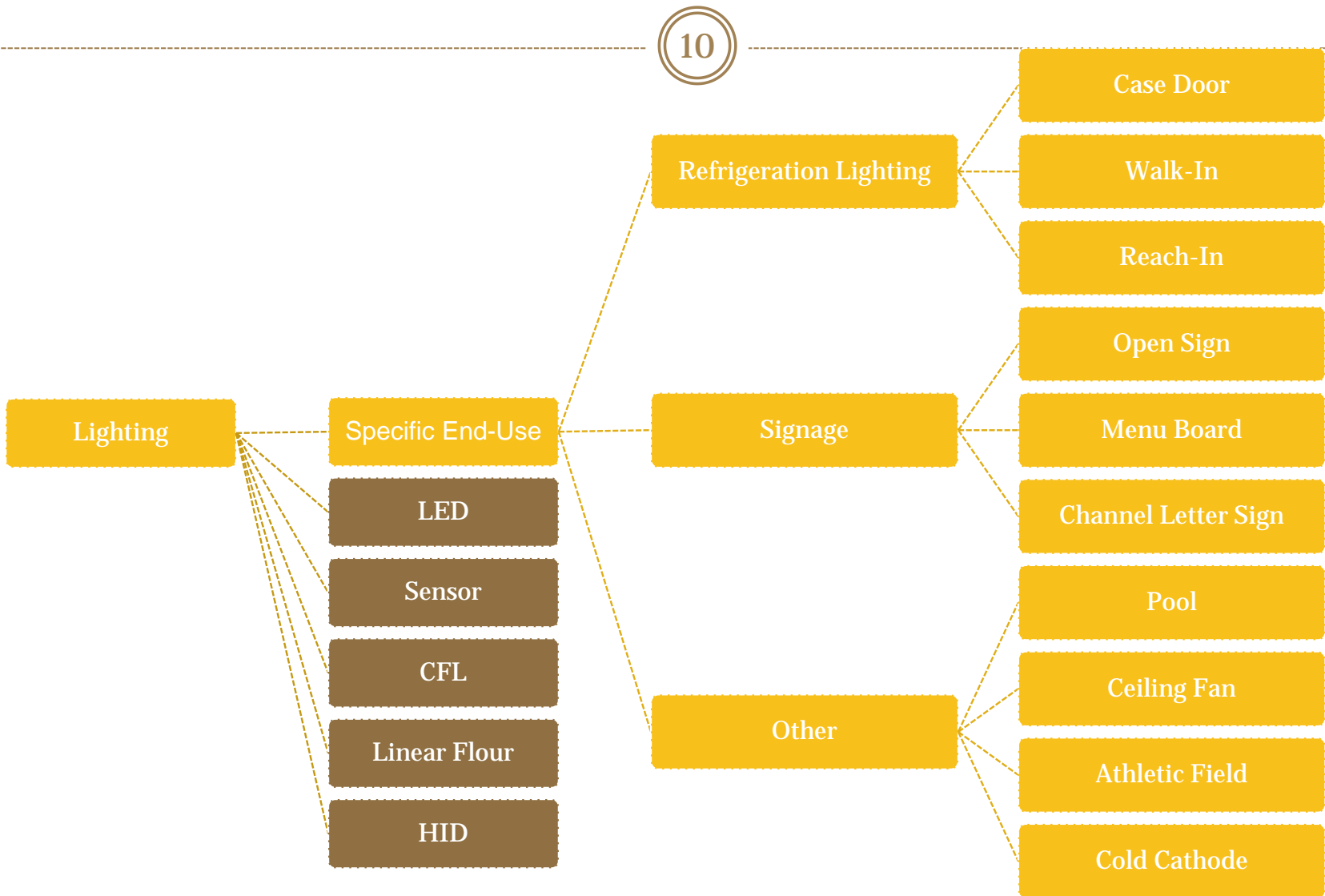


Lighting Measure Tree

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Lighting Measure Tree



Backup Slides

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