What is the LED Specification Checklist?

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Specification Checklist

- Color quality
- Appropriate illuminance
- Light distribution
- Glare Control
- Serviceability and replacement
- Energy efficiency
- Power quality
- Lumen maintenance
- Dimmability
- Value
- Aesthetic appearance

Important Standards and Resources

- IES LM-80 – Measures Lumen Depreciation of LED module
- **IES LM-79 – Luminaire Performance**
  - Photometrics
  - Color
  - Efficacy
  - Power Quality
- **IES TM-21** – Predicting Useful lifetime
- Lighting Facts – Performance Facts
- **DOE New Generation Lighting Competition (NGL) –** meets strict criteria AND is field tested and judged by independent panel

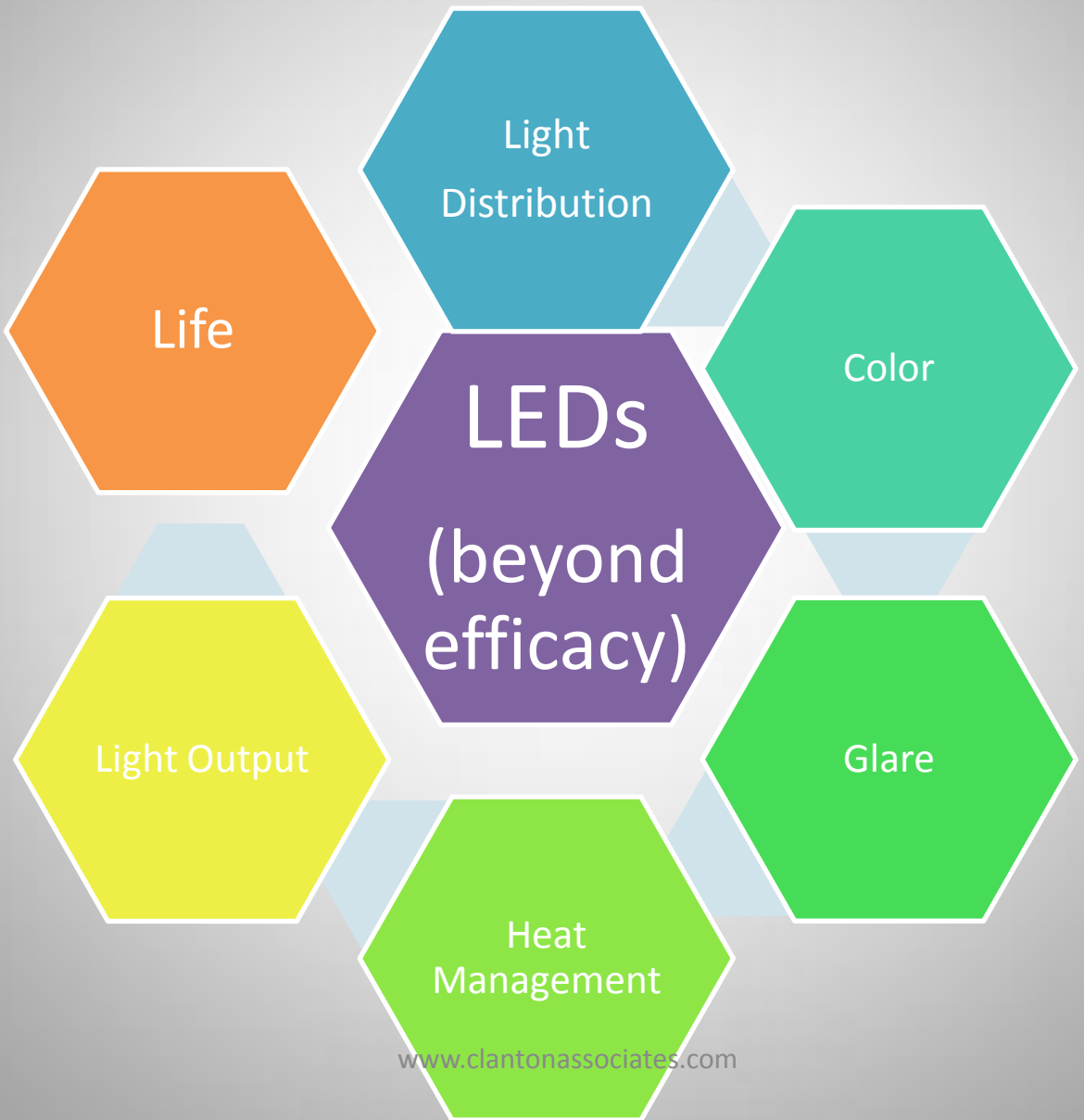
Next Generation Luminaires (NGL)

- The Next Generation Luminaires™ (NGL) Solid-State Lighting (SSL) Design Competition

"recognize and promote excellence in the design of energy-efficient LED commercial lighting luminaires."

- http://www.ngldc.org/

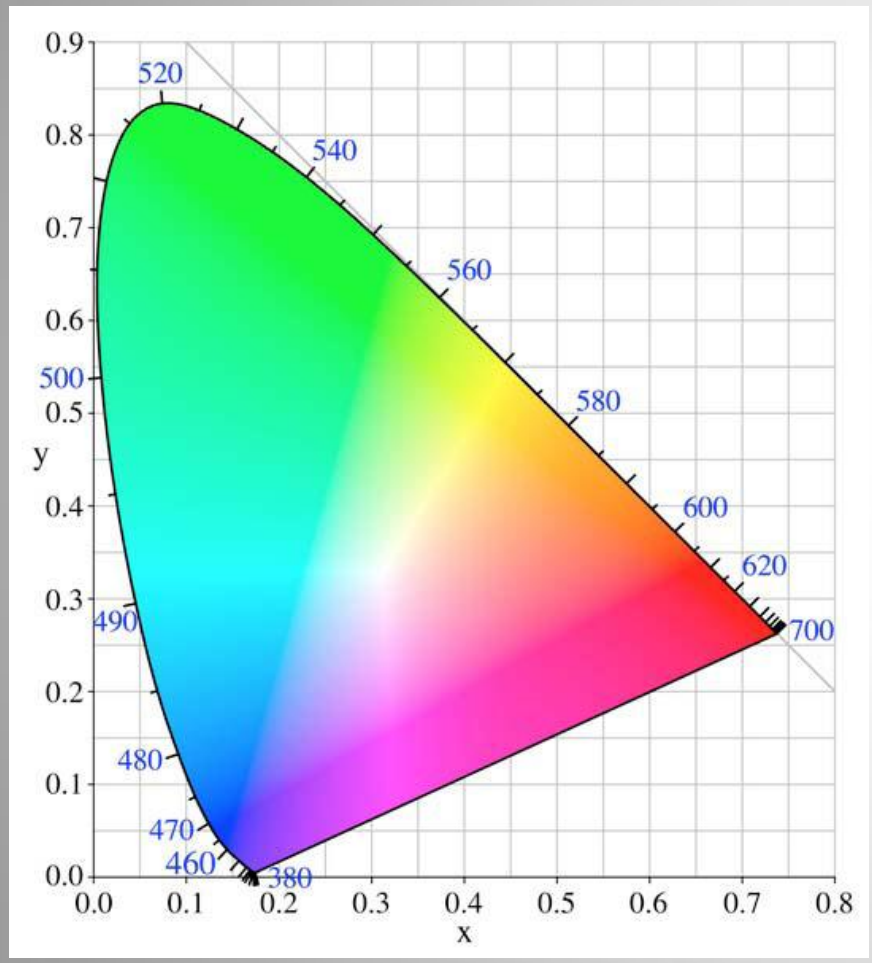
LED Checklist #1

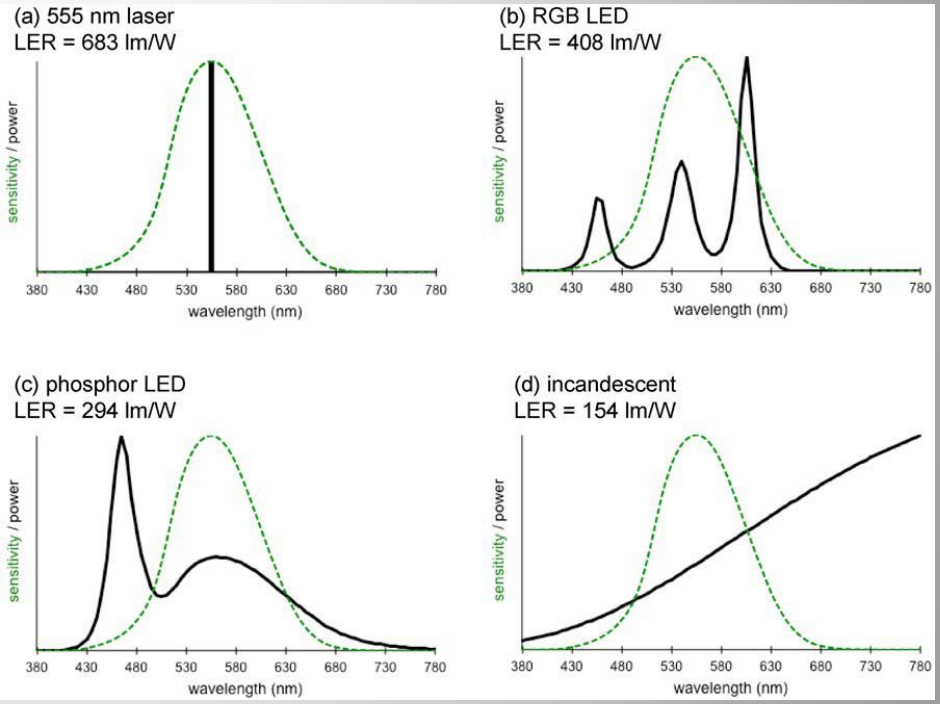


Light Distribution –
(*LM-79 report for photometric .ies files)*

NGL exterior lighting judging 2012 http://www.ngldc.org/

Color (spectral distribution)

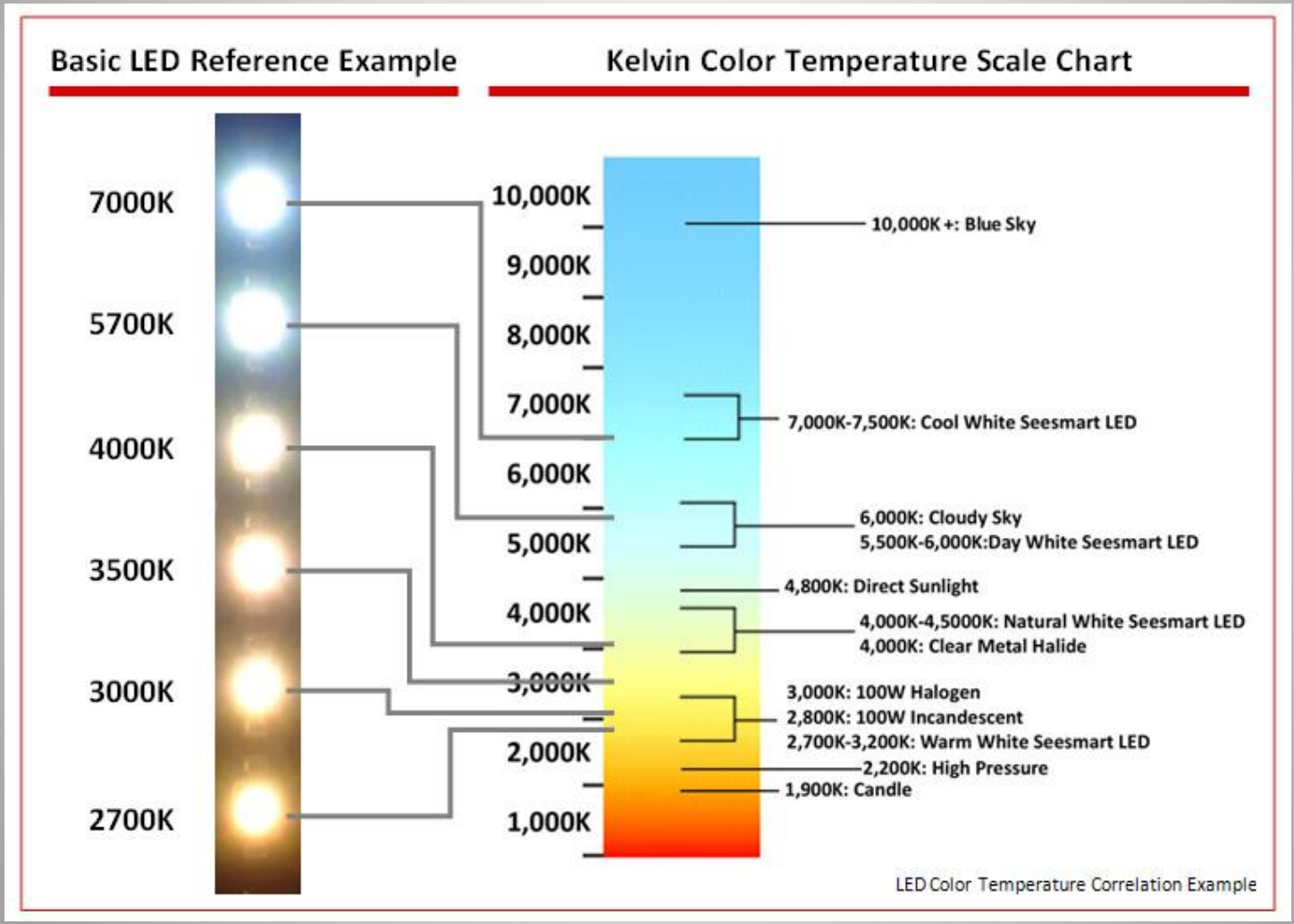




Reprinted with permission from Assessment of Advanced Solid State Lighting, 2012 by the National Academy of Sciences, Courtesy of the National Academies Press, Washington, D.C. http://www.nap.edu/catalog.php?record_id=18279.

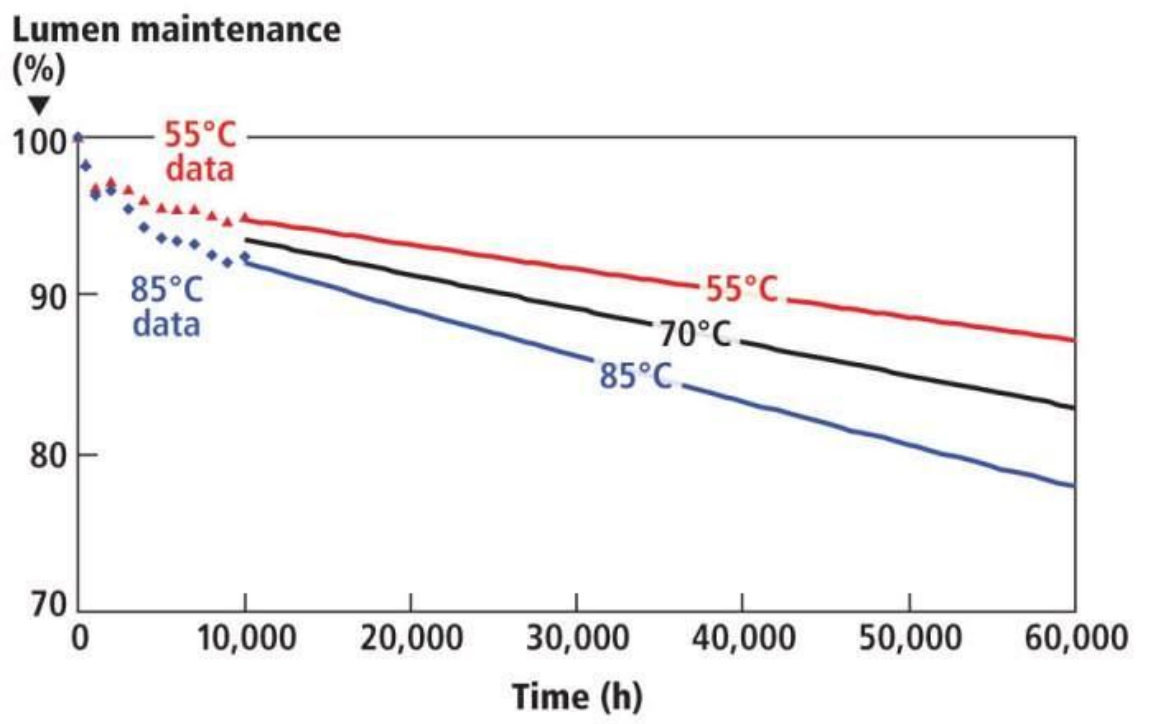
Color Temperature – CCT

IES - LM-79



Life - Do LEDs last a long time? – *It depends on <u>operating temperature</u>*

- L70 (hours) = time to 70% lumen maintenance
- L50 (hours) = time to 50% lumen maintenance



EPA ENERGY STAR Lamp Round Table

Glare

LM-79 photometric luminance

Exterior – TM-15 BUG – Recommend ≤ G2

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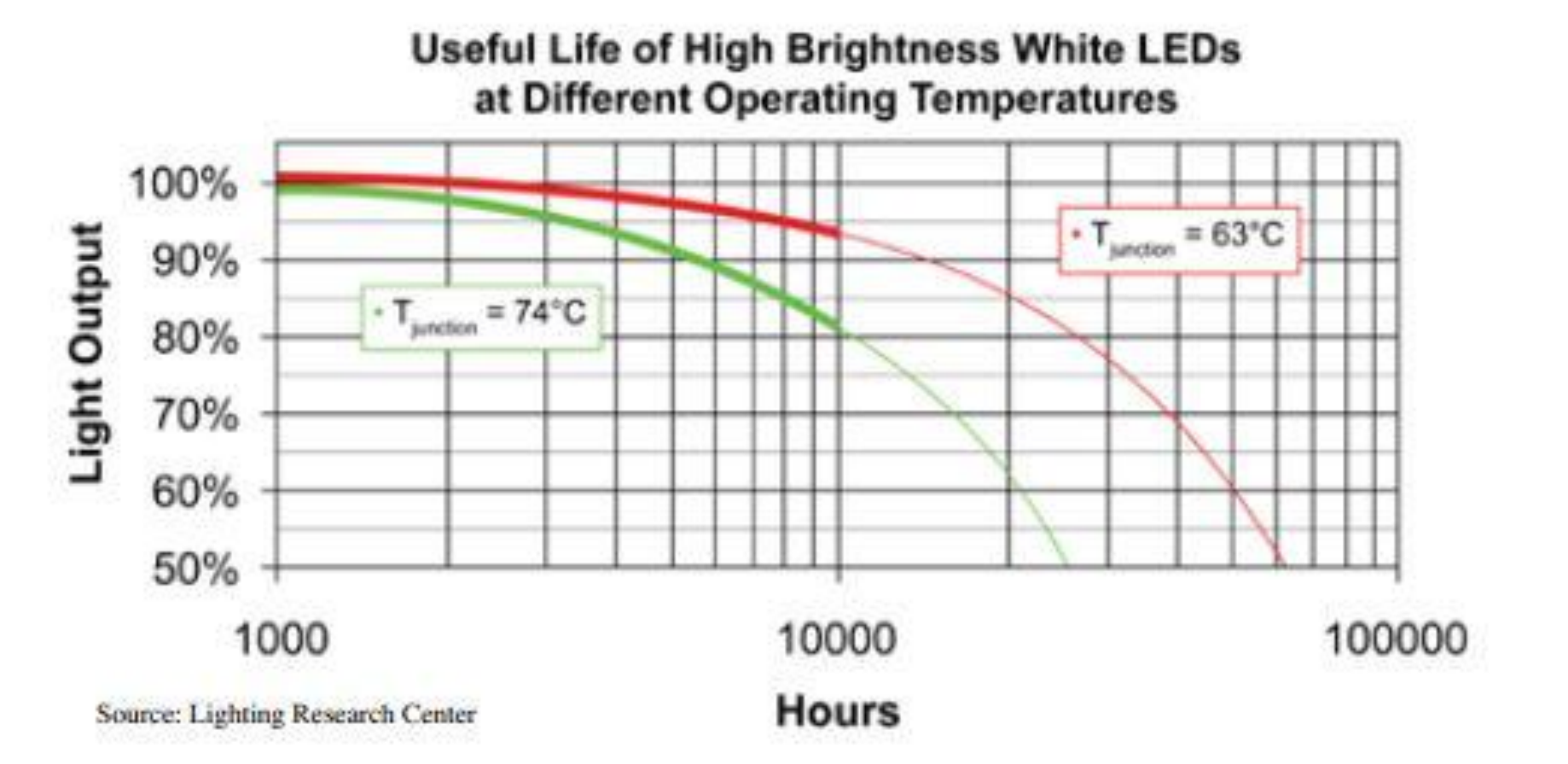
NGL exterior lighting judging 2012 http://www.ngldc.org/

Heat Management – Power Conversion of White Light Sources

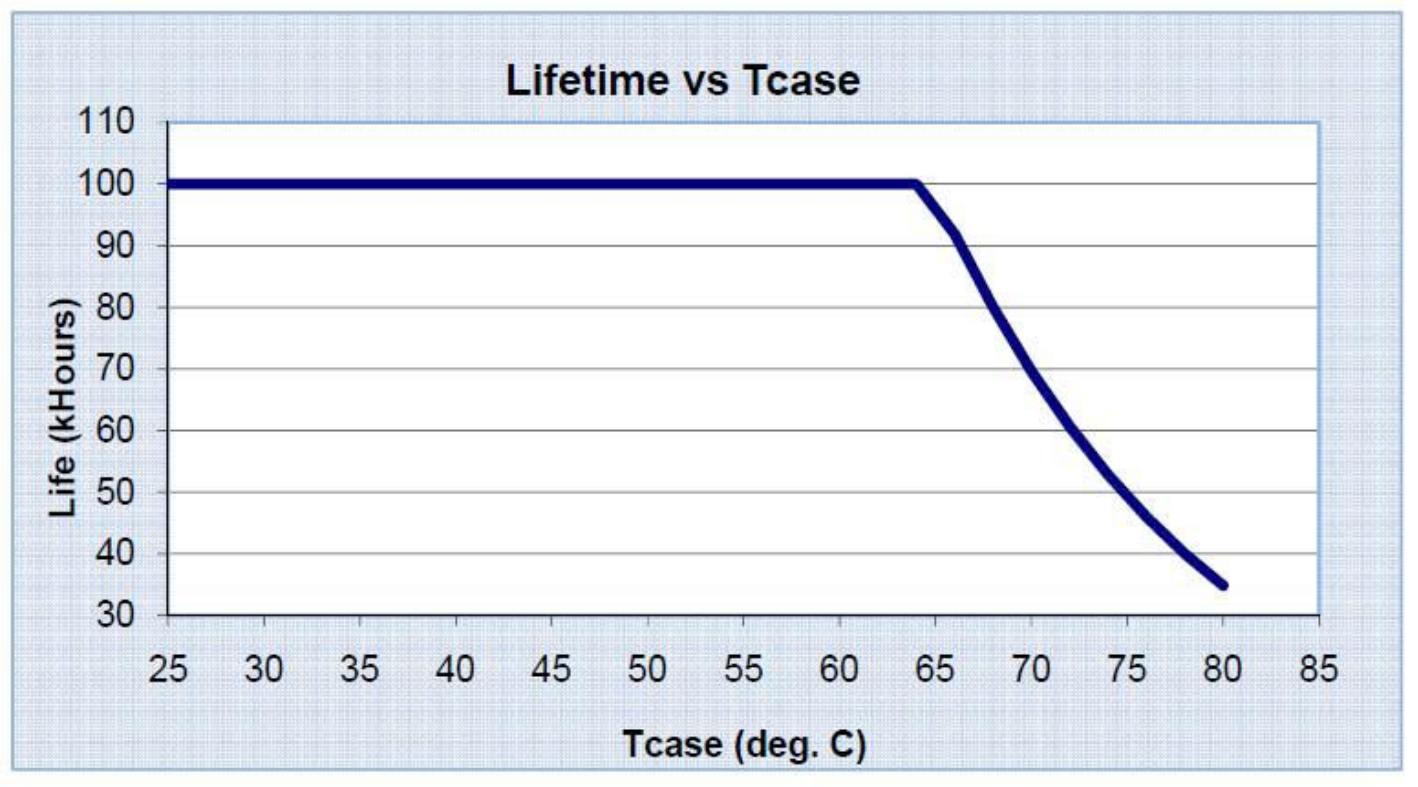
Description	Incandescent* (60W)	Fluorescent* (Typical linear CW)	Metal Halide*	LED**
Visible Light	8%	21%	27%	15-25%
IR	73%	37%	17%	≈0%
UV	0%	0%	19%	0%
Total Radiant Energy	81%	58%	63%	15-25%
Heat (Conduction + Convection)	19%	42%	37%	**75-85%**
Total	100%	100%	100%	100%

* IESNA Handbook and Osram Sylvania
** Varies depending on LED efficacy
Source: DOE Solid State Lighting – Using Light Emitting Diodes www1.eere.energy.gov/buildings/ssl/m/comparing_lights.html

Heat Management



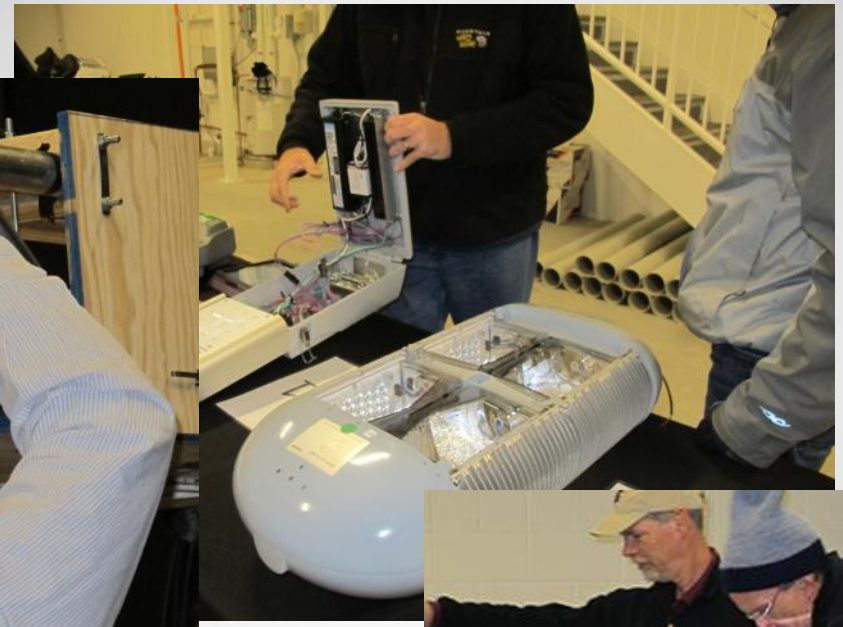
Heat Management - Driver (NAS)



Courtesy of Philips Lighting

LED Checklist #2

Serviceability and Replacement



NGL exterior lighting judging 2012 http://www.ngldc.org/

Warranty - 5 year standard .. 10 year is often offered

- LED failure
- Light level maintenance
- Warranty both LEDs and drivers
- Reputable manufacturers!!

Specification Checklist

- Color quality
  - ≤ 4000K
- Appropriate illuminance
- Light distribution
  - UO, G2
- Glare Control
  - ≤ G2
- Serviceability and replacement
- Energy efficiency
- Power quality
  - THD ≤ 20%; PF
  - Power Factor ≥ .90
- Lumen maintenance
- Dimmability
  - Control System compatible
- Aesthetic appearance

Questions?