

# Performance Standards – Parameters

Possible Key Performance parameters  
Concept of a Tiered Approach

Steve Coyne



**Asia-Pacific  
Economic Cooperation**



**Australian Government**  

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**Department of Climate Change  
and Energy Efficiency**

# PERFORMANCE PARAMETERS

There are numerous parameters which relate to different aspects of LED lighting products.

These can be broadly categorised into:

- electrical safety
- photobiological safety
- power quality
- Photometric
- light quality

Most of the parameters within each are covered well for existing lamp technologies but LED lighting products present some imminent challenges.

# Performance Parameters

## Electrical Safety

## Power Quality

- Power factor
- Harmonic distortion
- Electrical interference

## Photometrics

- Total light output
- Efficacy
- Light distribution
- Beam angle
- Lifetime
- Light depreciation

## Photobiological safety

- UV
- Blue light
- Radiance levels

## Light Quality

- Start time
- Colour temp (colour of light)
- Colour consistency (between products)
- Colour rendering (colour of illuminated objects)
- Colour uniformity (spatially)
- Colour stability (with time)
- Dimming
- Flicker

# Basic Consumer Expectations

- Truth in claim
  - An equal replacement to particular incandescent/halogen product
  - Efficacy
  - Lifetime
  - Colour temp
- Similar or better performance qualities as replaced lamp
  - Colour consistency
  - Colour rendering
  - Light distribution
  - Dimming
  - Start time
  - Efficacy
  - Sustained light output
- Assumed to be covered under generic consumer protection
  - Electrical safety
  - Photobiological safety
  - Power quality

# Key Performance Parameters to be considered

## Electrical Safety

## Power Quality

## Photometrics

- Total light output & Efficacy
- Light distribution & Beam angle
- Lifetime & Light depreciation

## Photobiological safety

## Light Quality

- Start time
- Colour temp & Consistency
- Colour rendering
- Dimming & Flicker

# **DO WE NEED STANDARDS ?**

Results from testing products from the  
market

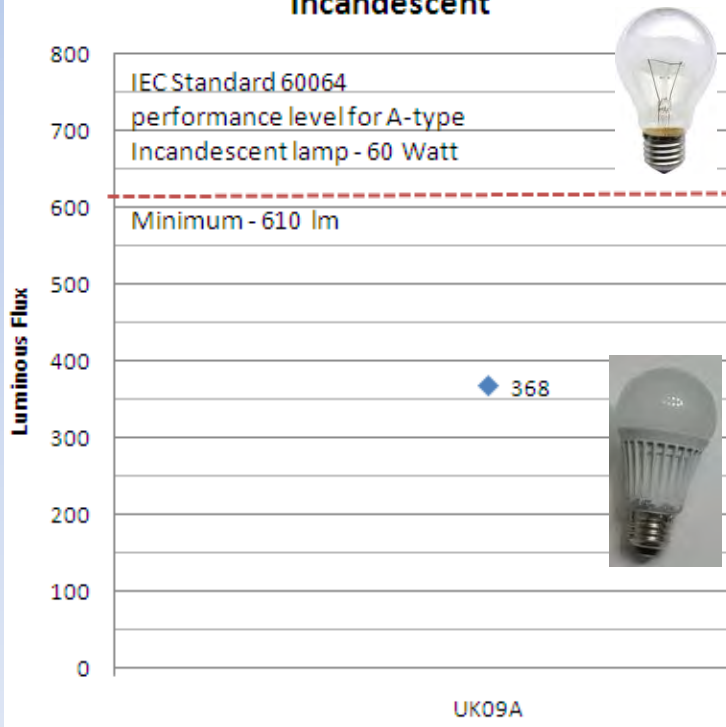
**CLAIMS**

**LIGHT OUTPUT**

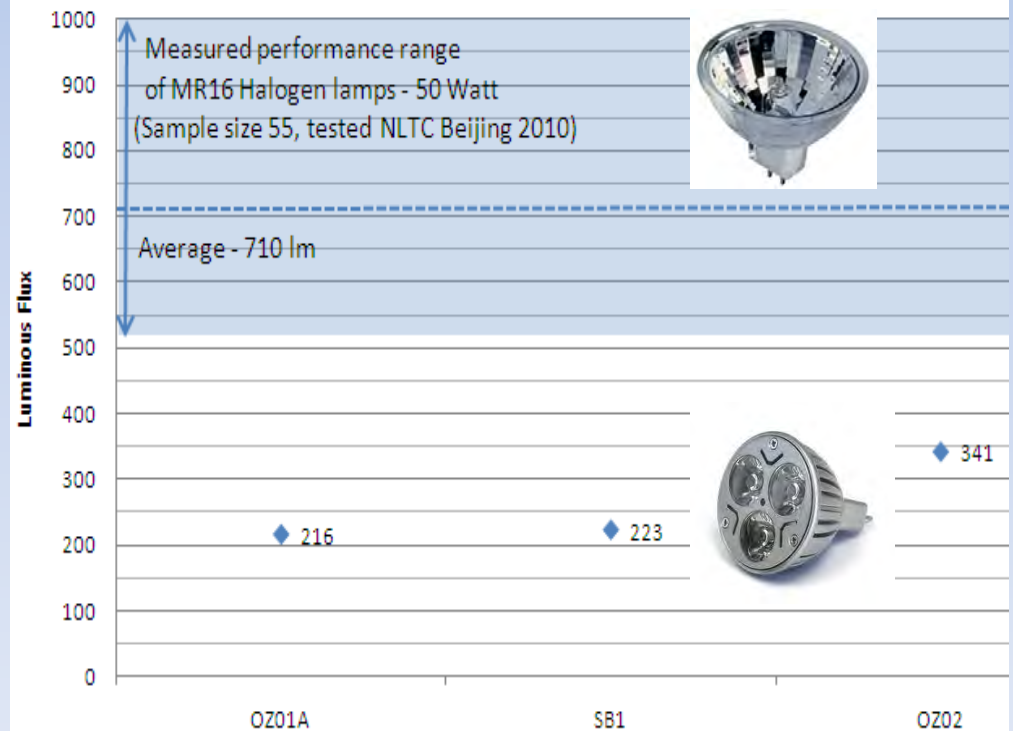
# Light Output

- Packaging that suggests replacement wattage for incandescent/halogen lamps is not achieving like-for-like lumen output.

Lamp claiming equivalency to 60 Watt 'Light Bulb' - Comparison of test results to IEC minimum performance for 60 W A-type Incandescent



Lamps claiming equivalency to 50 Watt Halogen - Comparison of test results to performance of 50 W MR16 Halogen Lamps

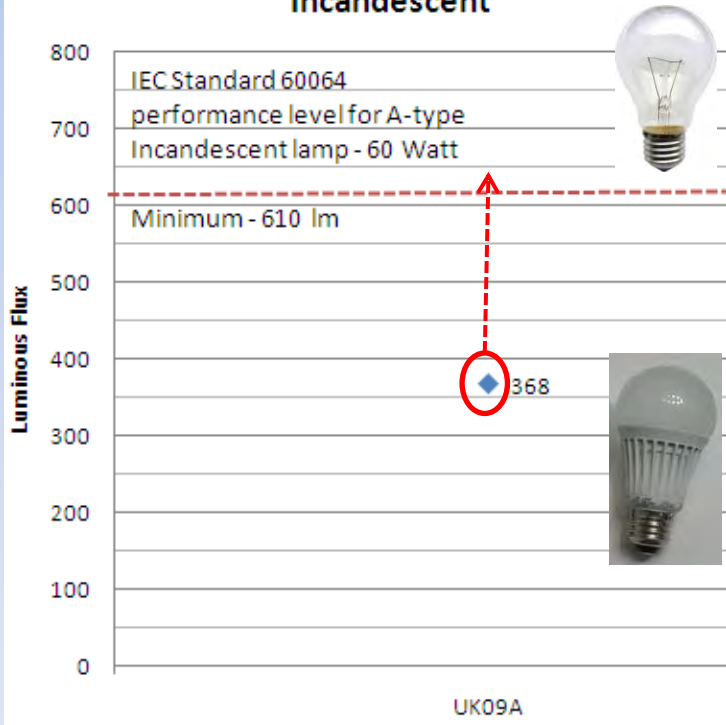




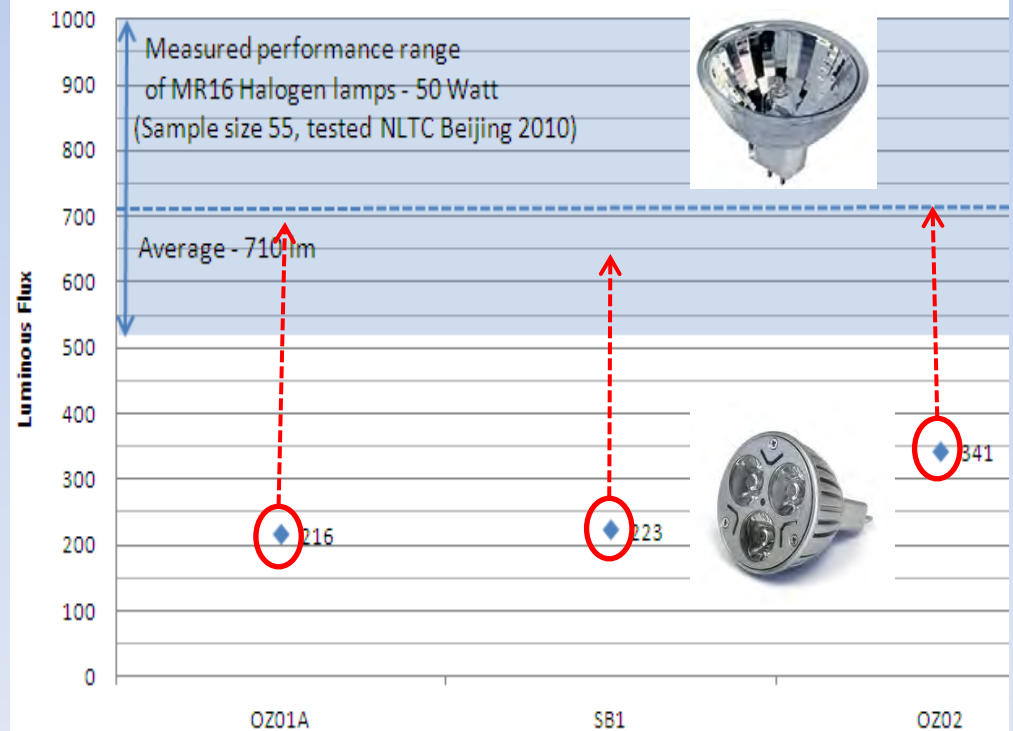
# Equivalence Claims – Light Output

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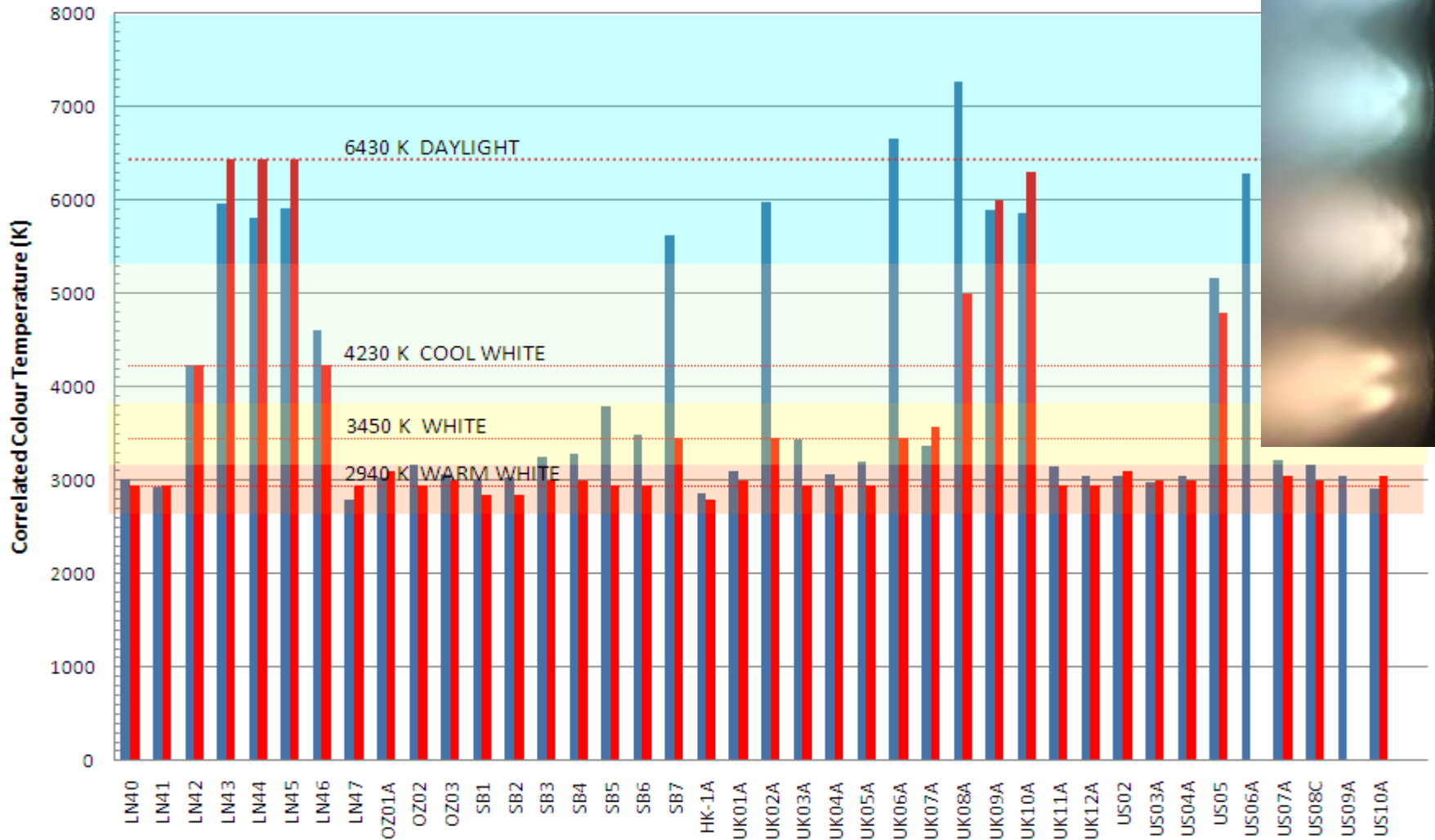
**CLAIMS**

**COLOUR TEMPERATURE**

# Colour Temperature

## LED Correlated Colour Temperature (CCT) - Rated Values and Test Values

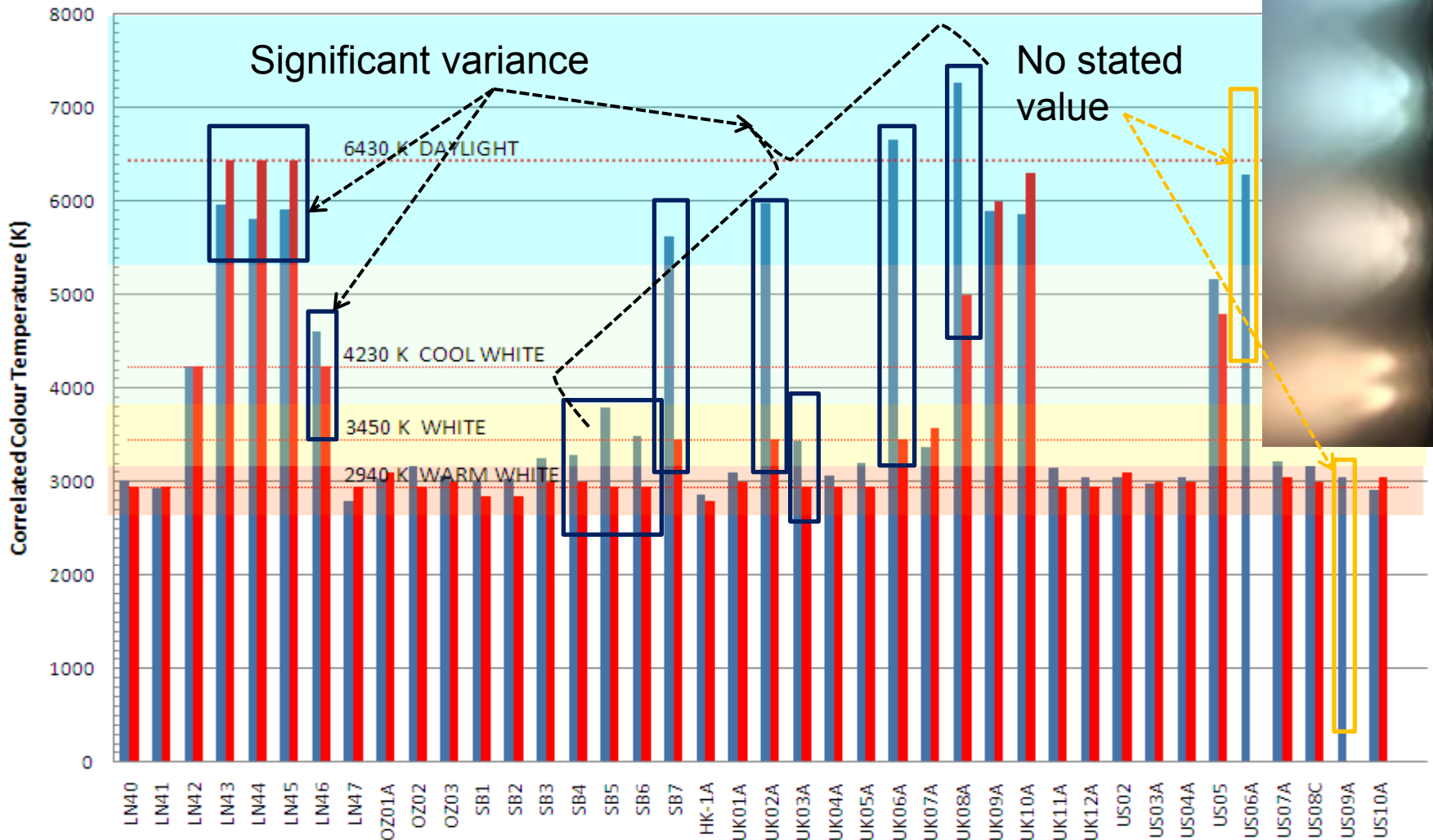
■ Test CCT (K) ■ Rated CCT (K)



# Colour Temperature

LED Correlated Colour Temperature (CCT) - Rated Values and Test Values

■ Test CCT (K) ■ Rated CCT (K)

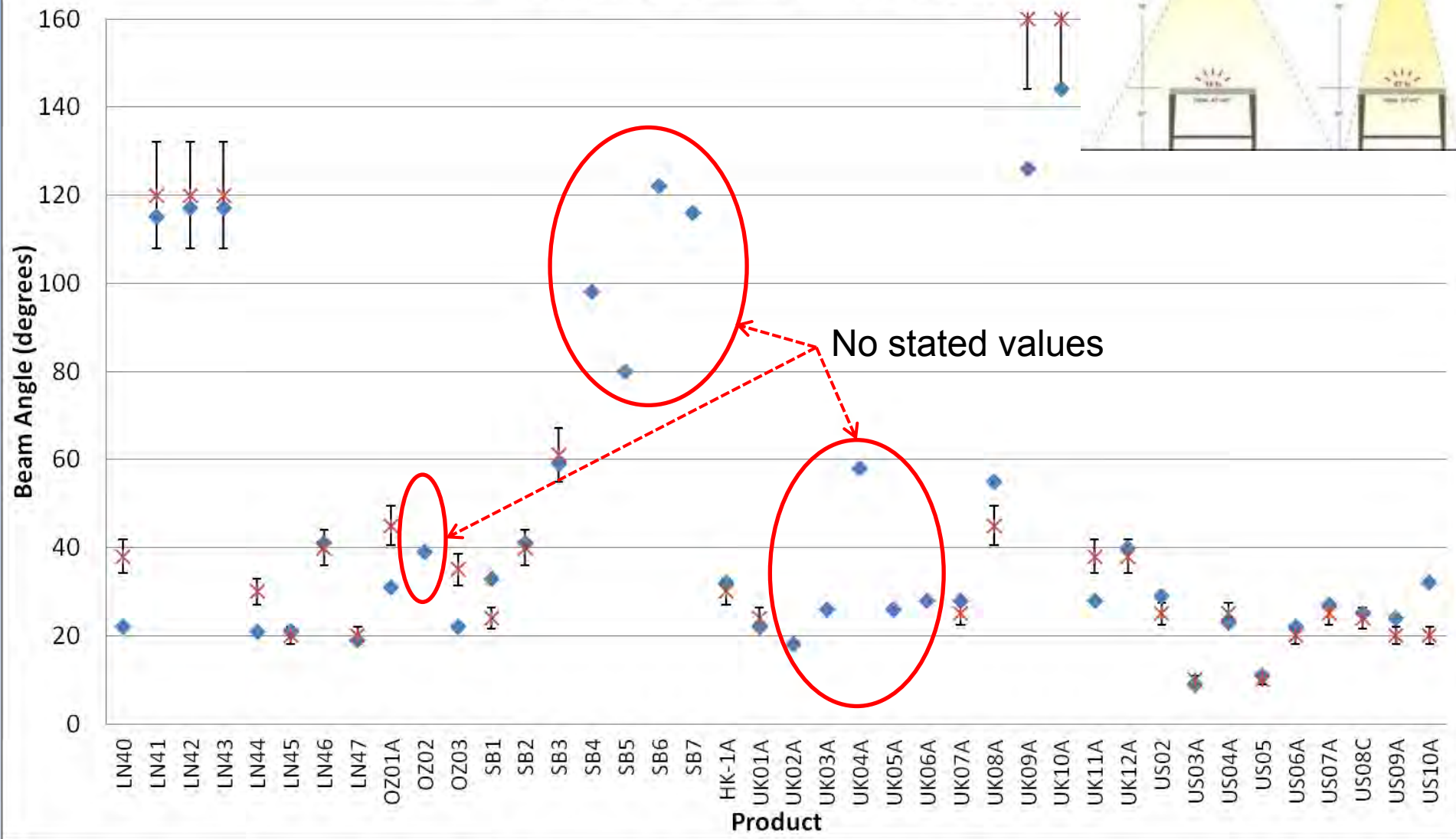
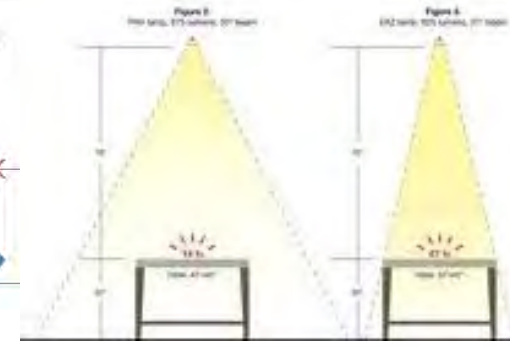


**CLAIMS**

**BEAM ANGLE**

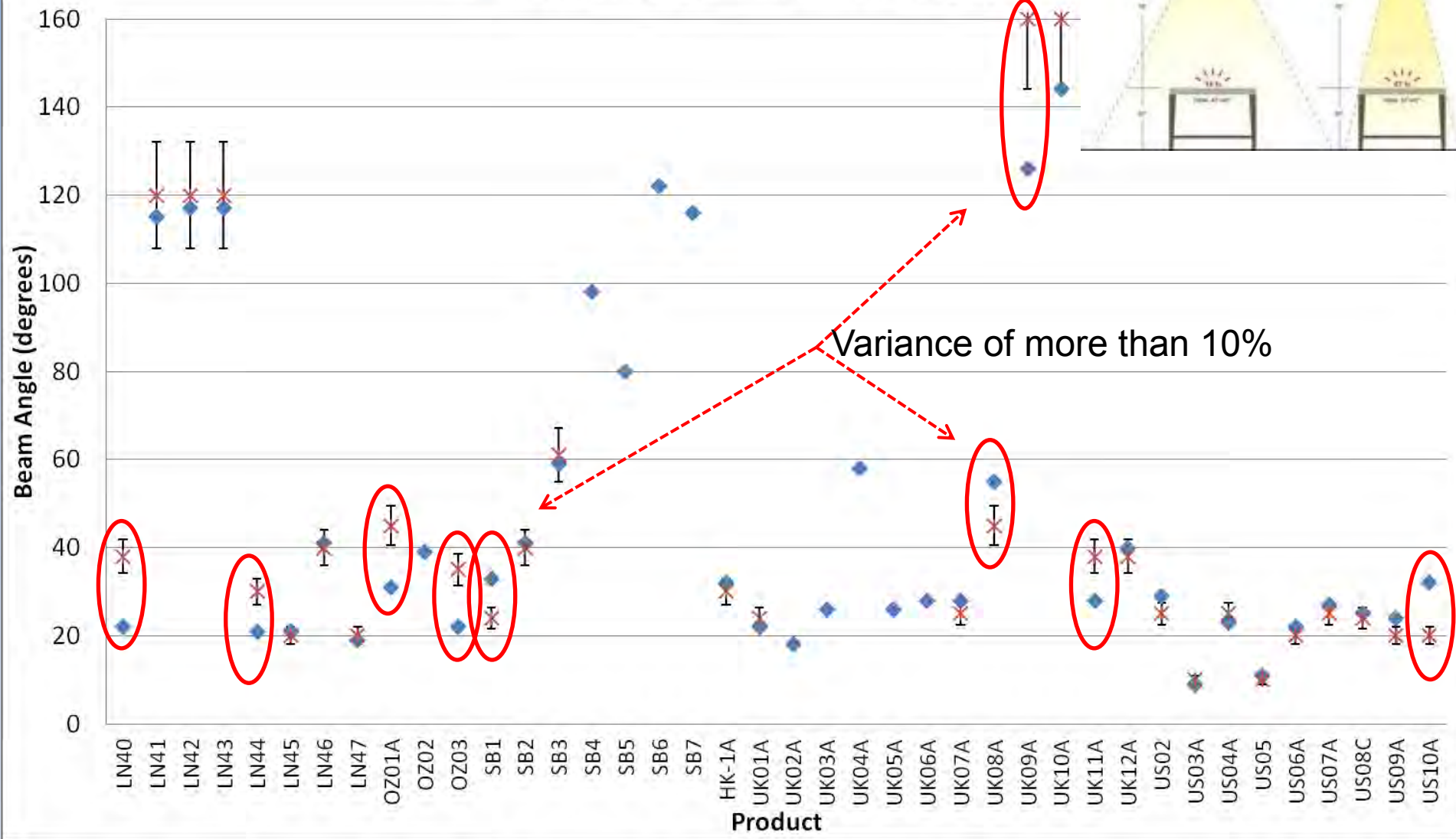
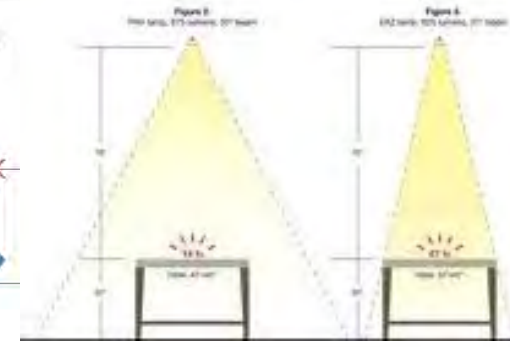
# LED Beam Angle - Rated Values and Test Values

◆ Test Beam Angle (°)    ✱ Rated Beam Angle (°)



# LED Beam Angle - Rated Values and Test Values

◆ Test Beam Angle (°)    ✱ Rated Beam Angle (°)



**CLAIMS**

**LIFETIME**



# Claimed Lifetime of LED Products

- Within lamp cap types, *claimed* life times vary significantly.
- Little similarity between cap groups in quoted life time bands



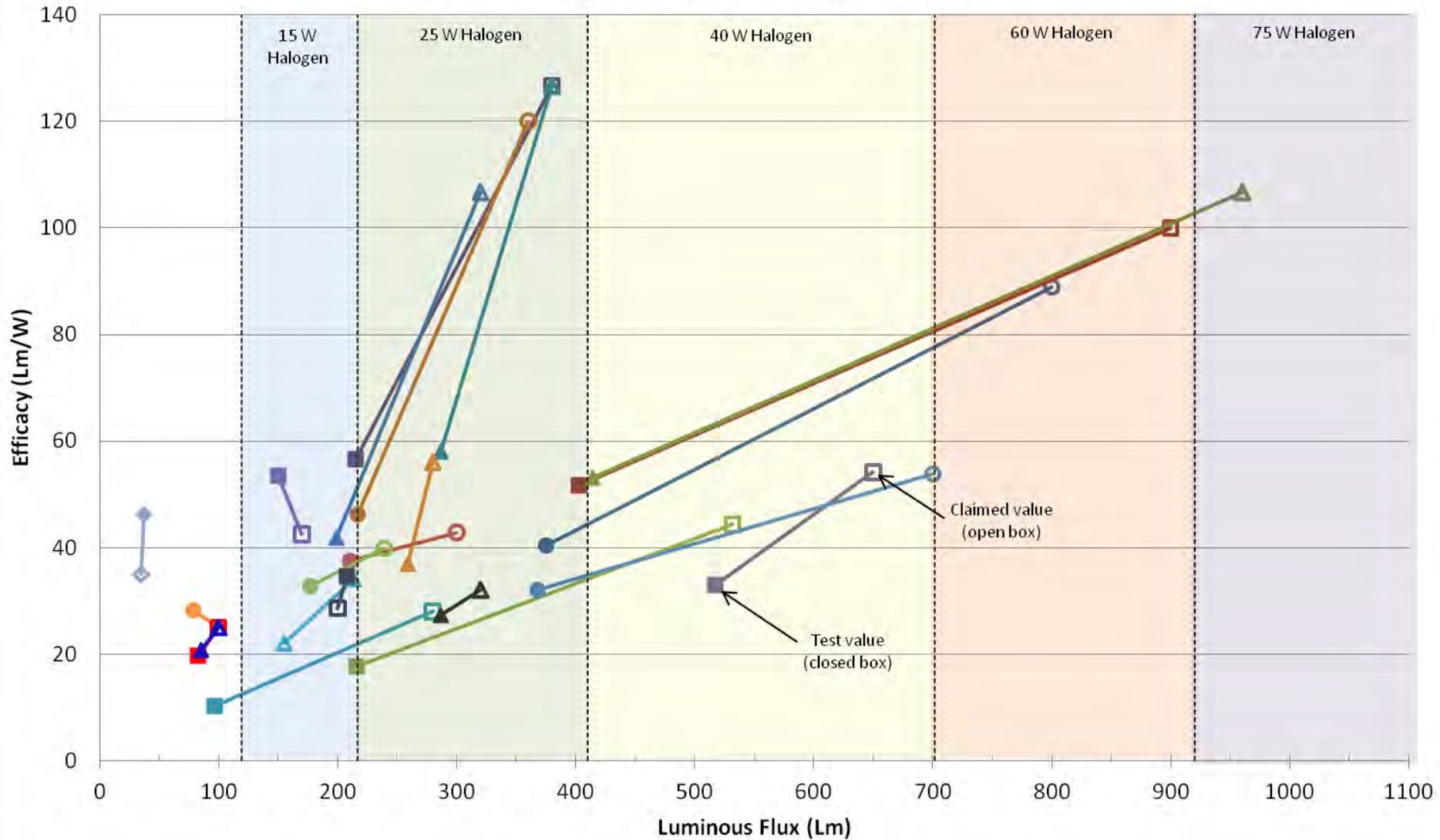
*claimed*

Lamp Cap	E26/E27	GU10	GU5.3	Fixture
Lifetime (hrs)	No of Lamps	No of Lamps	No of Lamps	No of Lamps
12 000		1		
15 000	1	2		
20 000	3		1	
25 000		5		
35 000		1	4	
40 000	1			
45 000			1	
50 000	3	3	2	2
100 000				1

**CLAIMS**

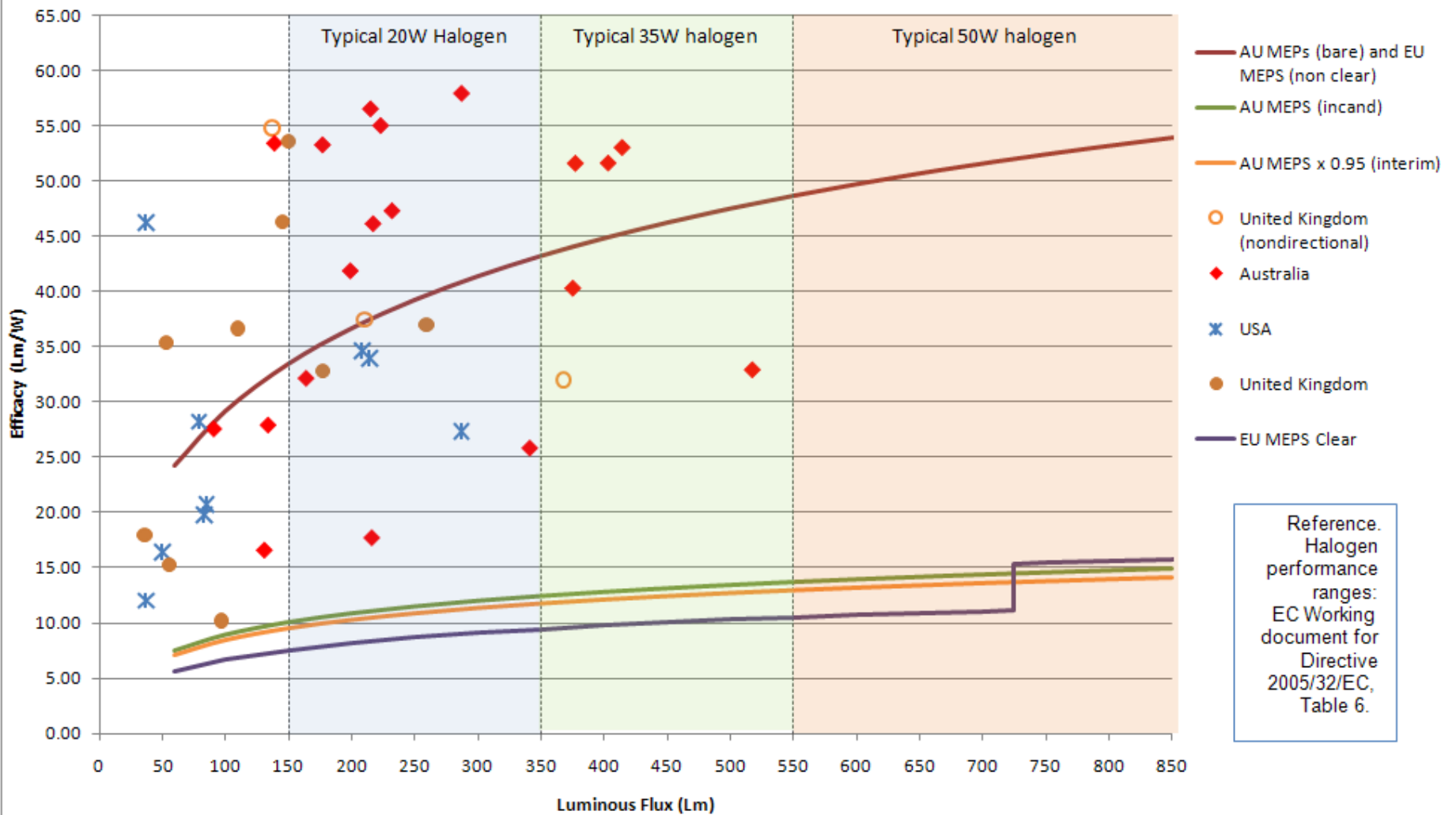
**ENERGY EFFICIENCY**

Variance between Rated Efficacy to Tested Efficacy of LED lamps.  
Equivalent incandescent luminous flux ranges shown.





# Performance of LED lamp technologies purchased from UK, USA, and AUS

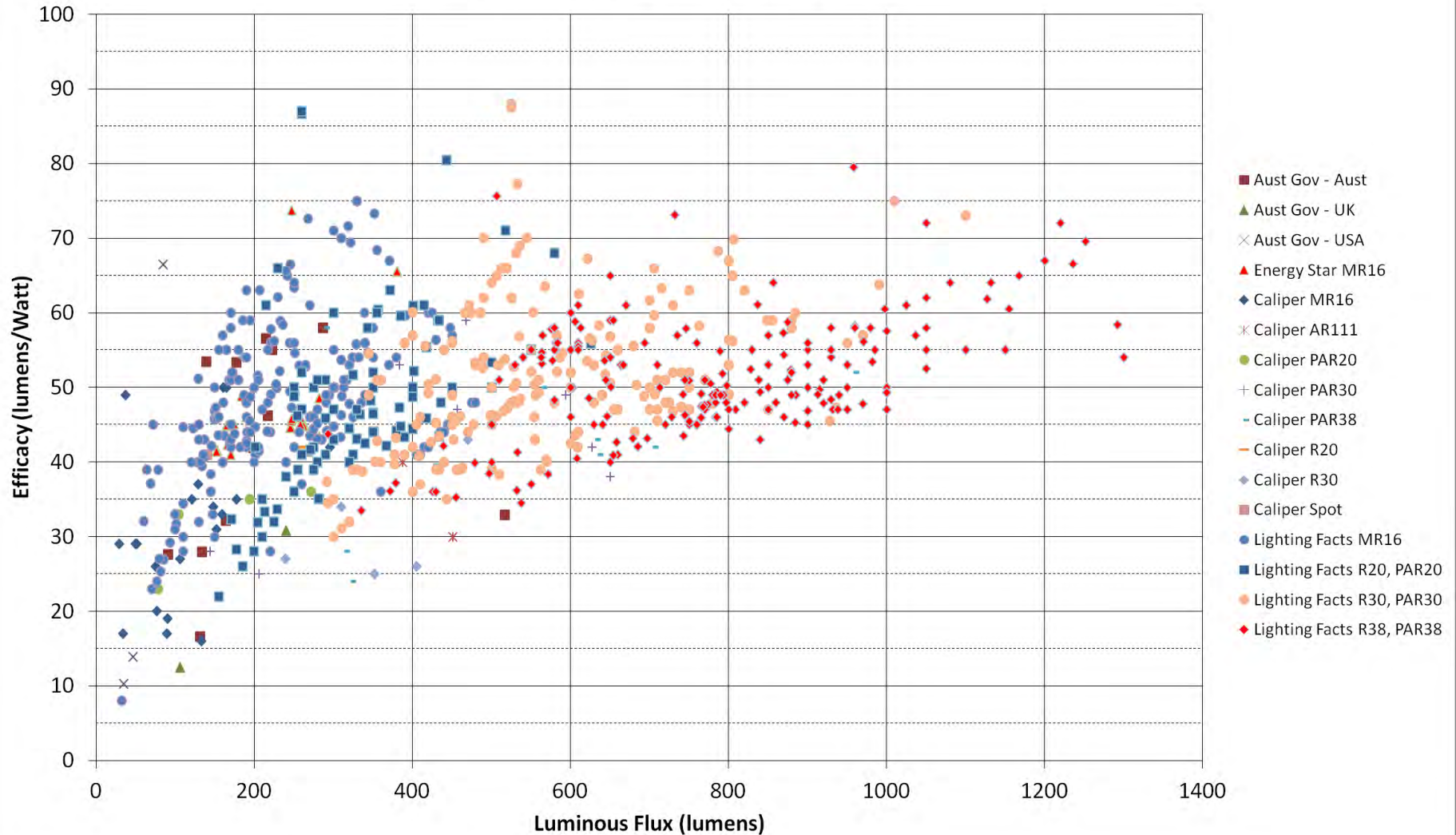


# WHAT LEVELS SHOULD BE SET FOR PERFORMANCE PARAMETERS ???

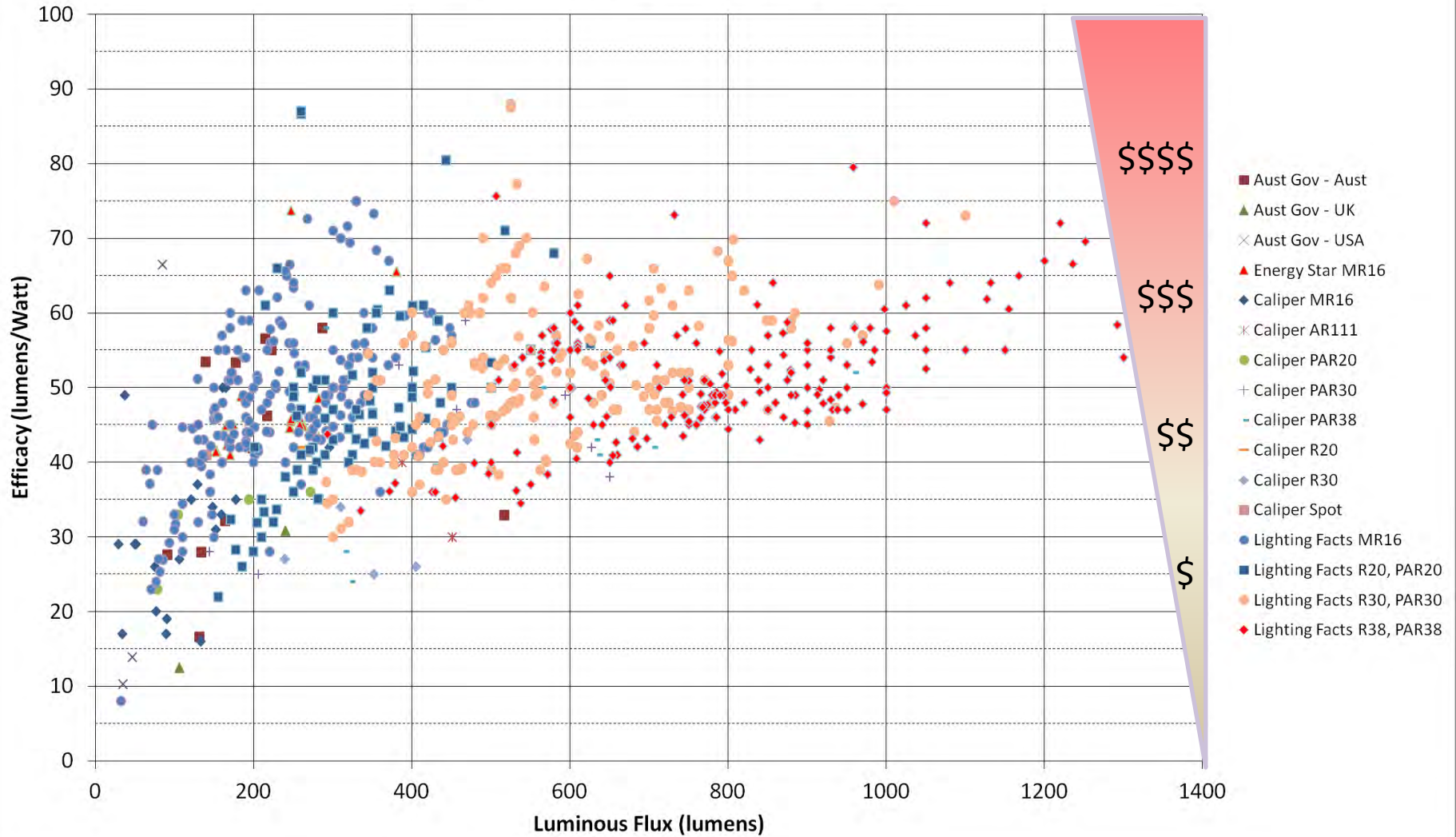


# Product benchmarking

## Directional LED replacement lamps



### Directional LED replacement lamps



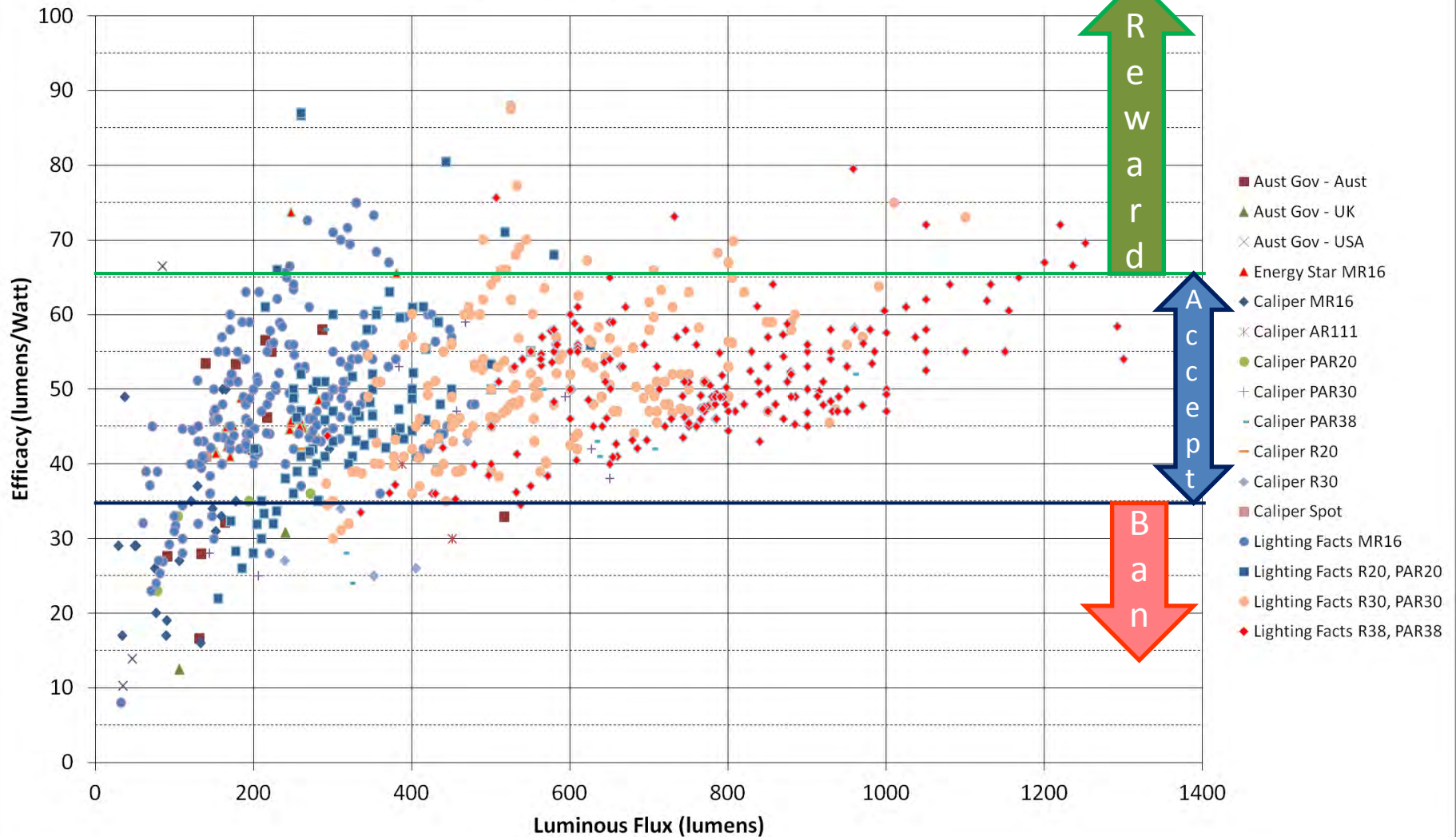


# Is there a case for a multilevel performance approach?

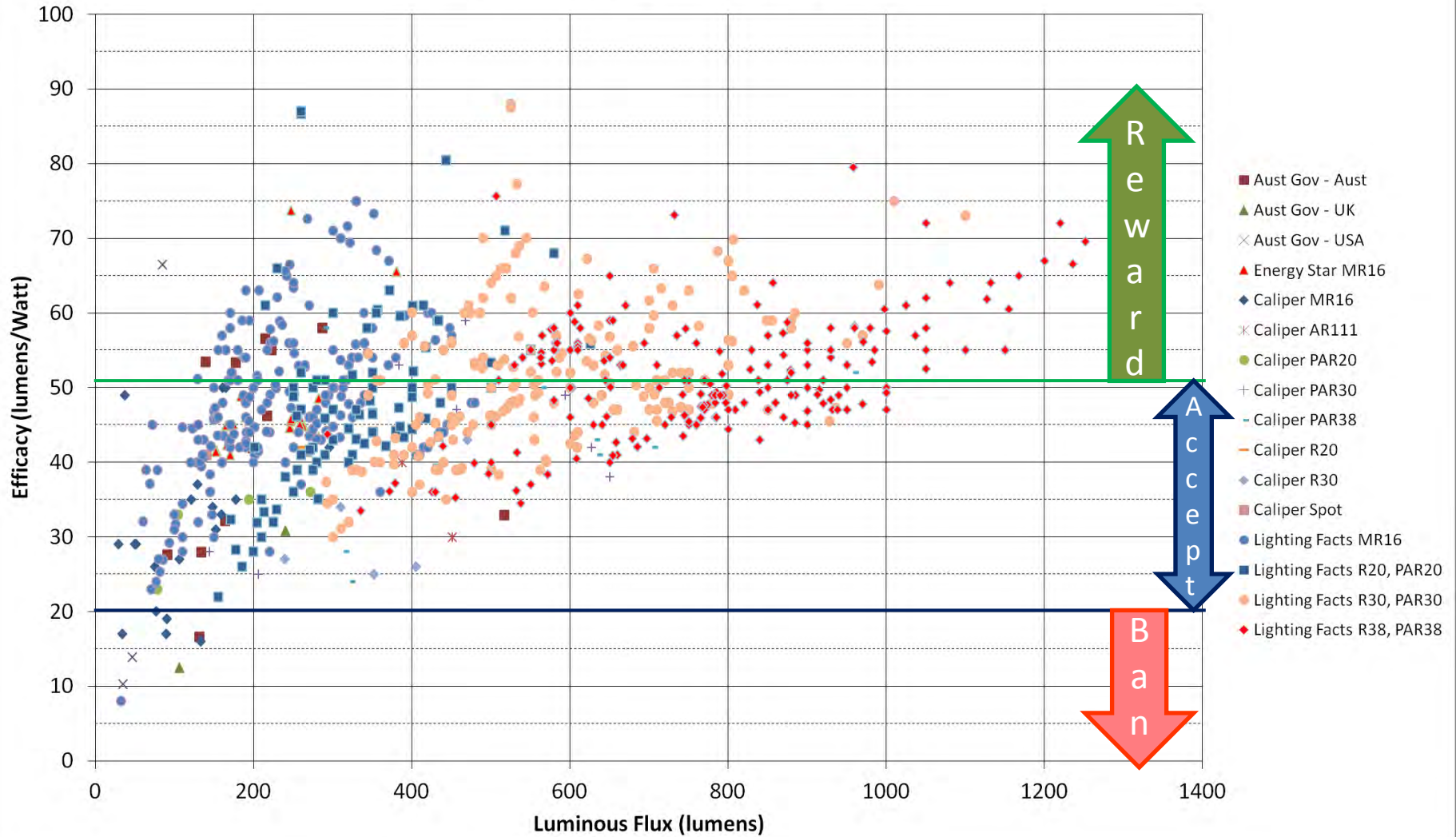
- Economic situations of different countries and the affordability of a LED products by consumers
- Governments wanting:
  - a Minimum Energy Performance level (MEPS), and
  - a Higher Energy Performance label (HEPS)

Investigate this idea for efficacy

### Directional LED replacement lamps



### Directional LED replacement lamps



**IT'S TIME TO HARMONISE !**

**PAPER FROM:**

**APEC LED WORKSHOP: *POLICIES TO PROTECT AND  
EDUCATE CONSUMERS***

**APEC#212-RE-04.1**

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