







## What is Human Centric Lighting (HCL)

- Throughout evolution, the human visual system has evolved under the natural light of sun and fire.
- Human-centric lighting by definition encompasses the effects of lighting on the physical and emotional being of people.
- As part of the HCL initiative, there is a drive to develop "natural" sources of lighting. The human species has been conditioned to function in daylight hours by the light of the sun, and after dusk, of the warm glow of fire. Thus, we define natural light sources as those which match the spectral distribution of sunlight and firelight.

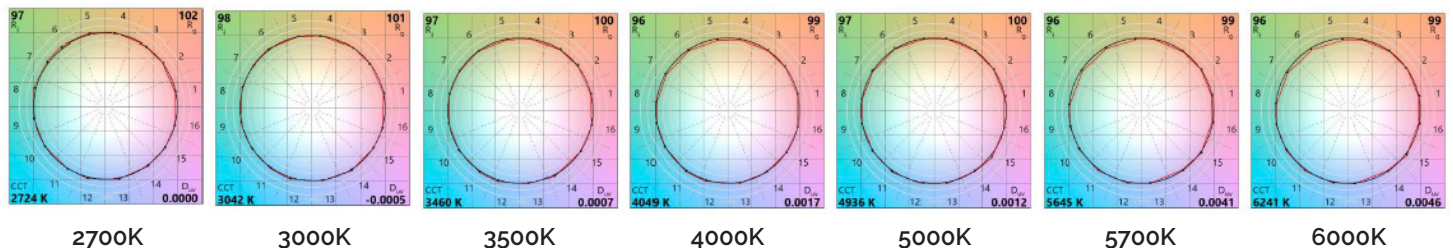
## Human Centric Light Spectrum

FEATURES	BENEFITS
Spectrum engineered to closely emulate natural light with reduced short blue wavelength intensity	Full, consistent light spectrum with fewer spectral spikes, the closest match to natural light available
Natural and vivid color rendering	Typical 97 CRI with R1-R15 values ranging from 91 to 99 Excellent TM-30 metrics; Rf ranging from 94-97 and Rg from 98-104
High efficacy human-centric spectra	Greater energy savings, lower utility and environment costs
Affordable spectra optimized for humans	Accelerate adoption of full spectrum natural lighting

## Excellent Color Rendering and TM-30 Metrics

CCT	Rf	Rg	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
2700K	95	103	97	99	94	94	97	98	97	98	99	97	91	98	98	95	98
3000K	95	104	98	99	93	94	97	98	96	96	97	96	92	95	98	95	97
3500K	95	98	98	98	97	98	98	98	98	97	93	97	97	95	98	97	98
4000K	97	100	99	99	97	99	99	99	99	98	94	97	99	96	99	98	98
5000K	97	100	98	99	98	98	98	98	99	96	95	98	98	98	98	98	97
5700K	94	98	98	98	97	95	98	97	96	95	92	97	96	98	98	98	97
6000K	95	98	98	98	97	96	98	98	96	96	93	97	96	98	98	98	97

Note: Typical 85C hot values shown, slight differences may exist

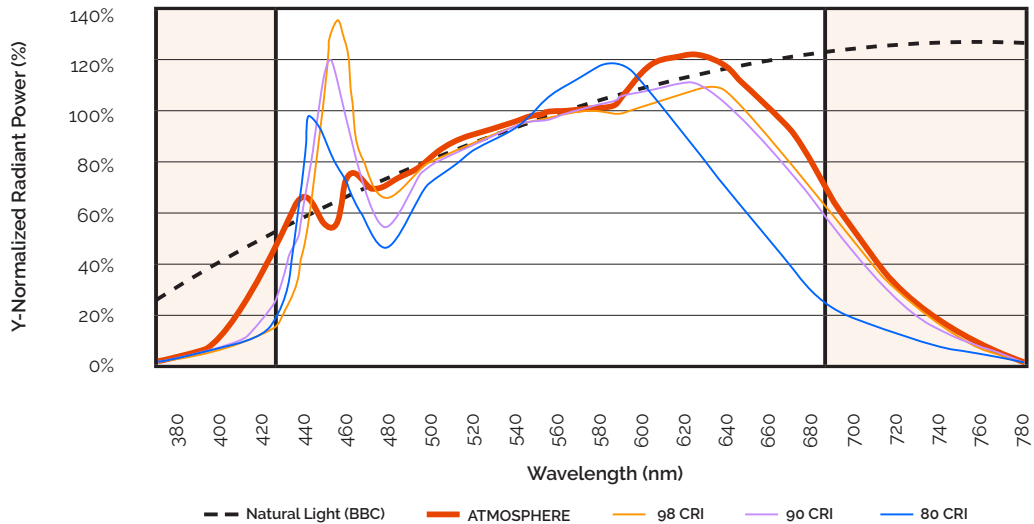




## Spectral Matching to Natural Light

- As close of a spectral match as possible to natural light
- Standard LED light sources spectral distribution (SPD) have larger deviations from the Blackbody Curve (BBC)
- ATMOSPHERE significantly reduces the blue spike and cyan valley to deliver a closer match to natural light

**4000K Spectral Comparison BBC vs LED**



*SPD's of LED light sources at 4000K against the blackbody curve.*

These examples deviate from the natural light that humans have evolved under for millions of years. It is recommended to work within the realm of natural light to avoid tweaking circadian rhythms until the effects on humans are understood.