



Energy Efficiency Through Latest Technologies for **Lighting Applications**

Presenter
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About us

We provide **Energy Management Services** and **products** to reduce the energy cost faced by organizations.

We are at the forefront of Energy Management, targeting **significant reductions** in **client energy consumption** and cost, without inhibiting performance.



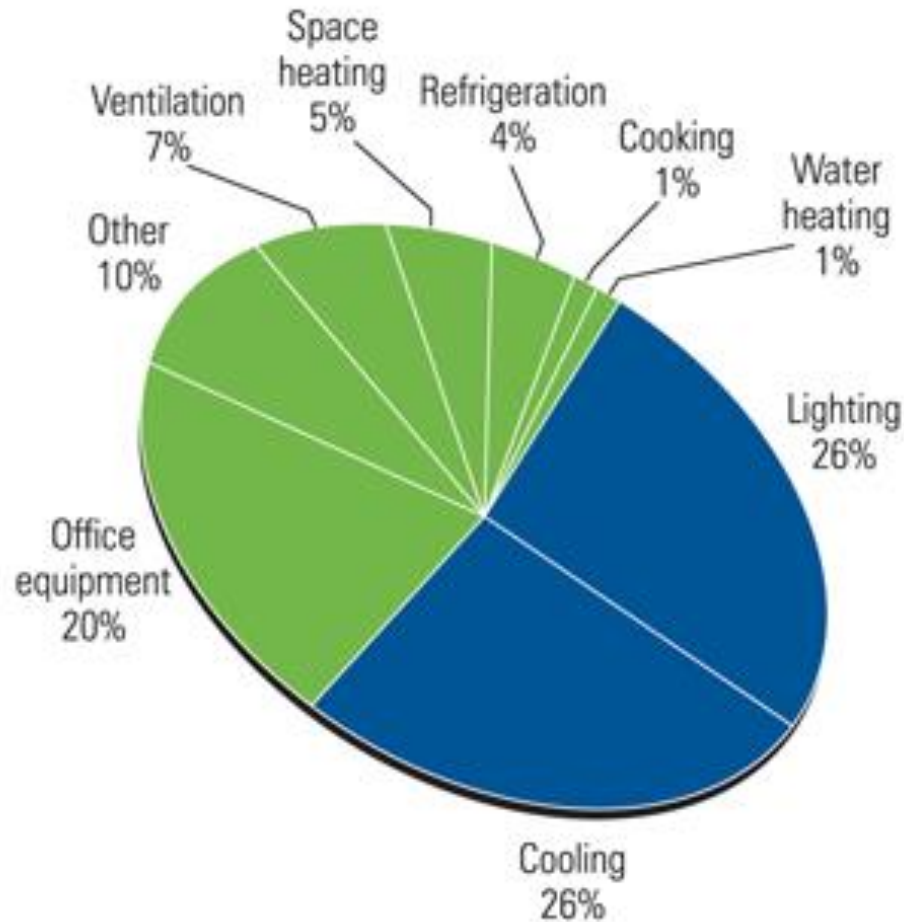
Our Goal

Is to provide our customers with a **total**
energy saving solution

And to move consumers away from the
inefficient incandescent Lighting of the
past century and toward **more efficient**
lighting technologies.

Light Source

Typical Energy usage in an Organization

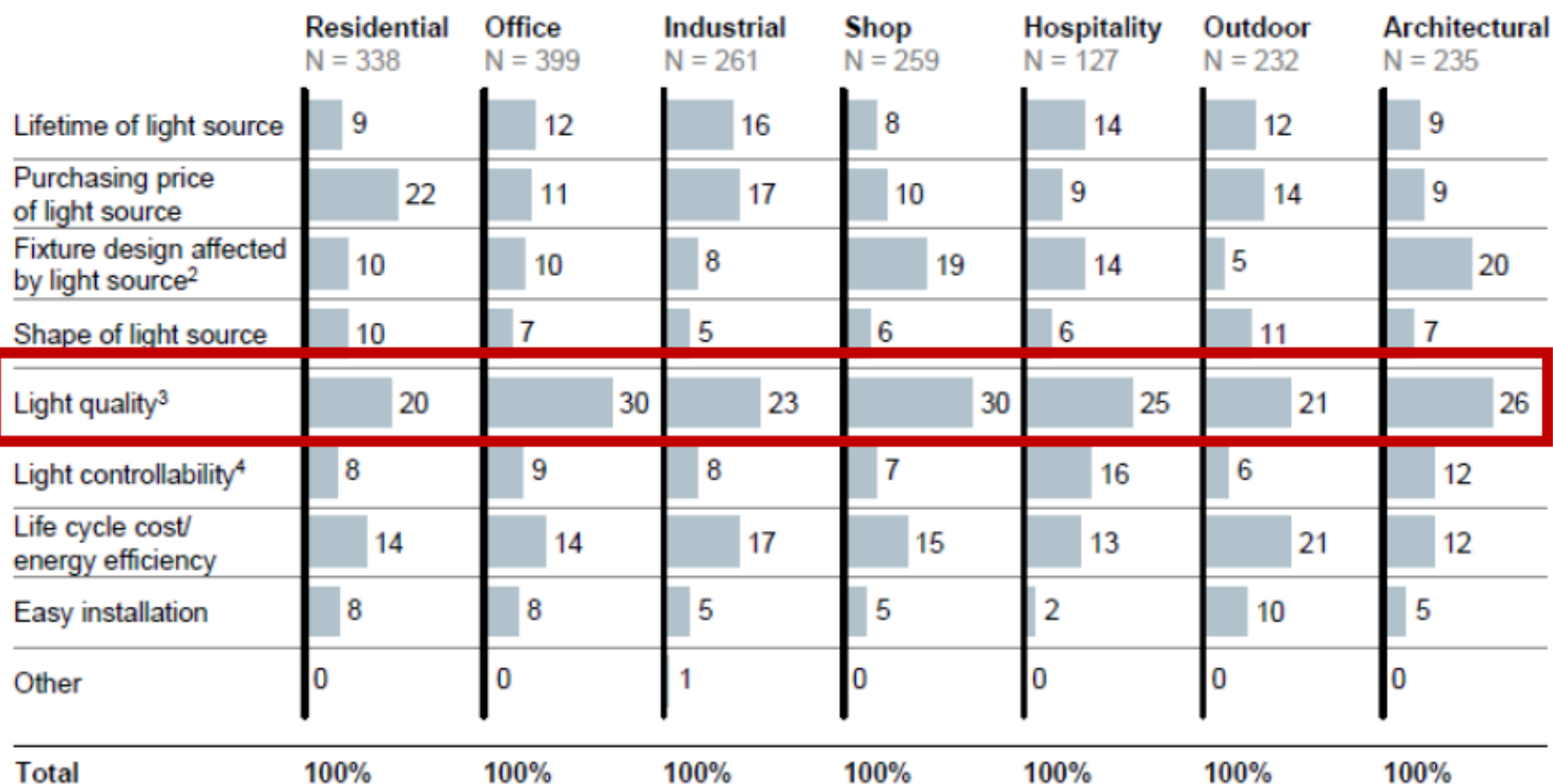


Energy Facts

- **Space heating, cooling, and lighting** together account for nearly **70%** of an organization total energy use.
- Plug loads constitute one of the top three electric energy end uses, after lighting and cooling.
- The cost of energy is one of the few things that can be reduced without negatively affecting the operations of an organization.

Decision criteria for fixture installation in new buildings/structures

What are the most important criteria when deciding on the type of light source technology in a new fixture installation?
Percent; No. of respondents¹ who selected this response as their 1st decision criterion



1 1 respondent could answer up to 3 applications in the survey

2 Incl. design flexibility

3 CRI, color temperature, color consistency, and light distribution

4 Dimmability, color controllability, etc.

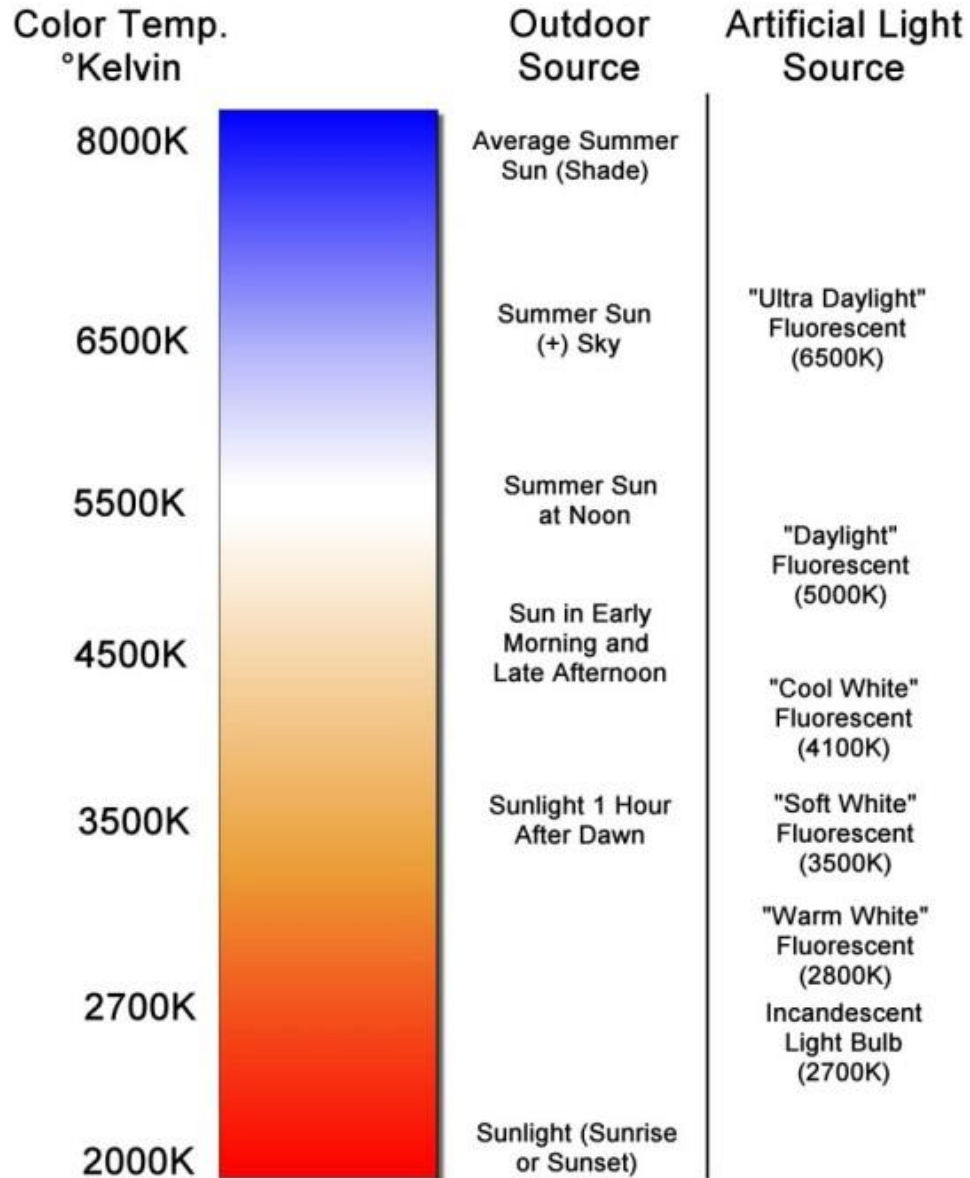
Source: McKinsey Global Lighting Professionals & Consumer Survey

Light Source – Quality Criteria

In order for a light source to be considered "**full spectrum**" or "**color-balanced**" it must meet or exceed the following three criteria:

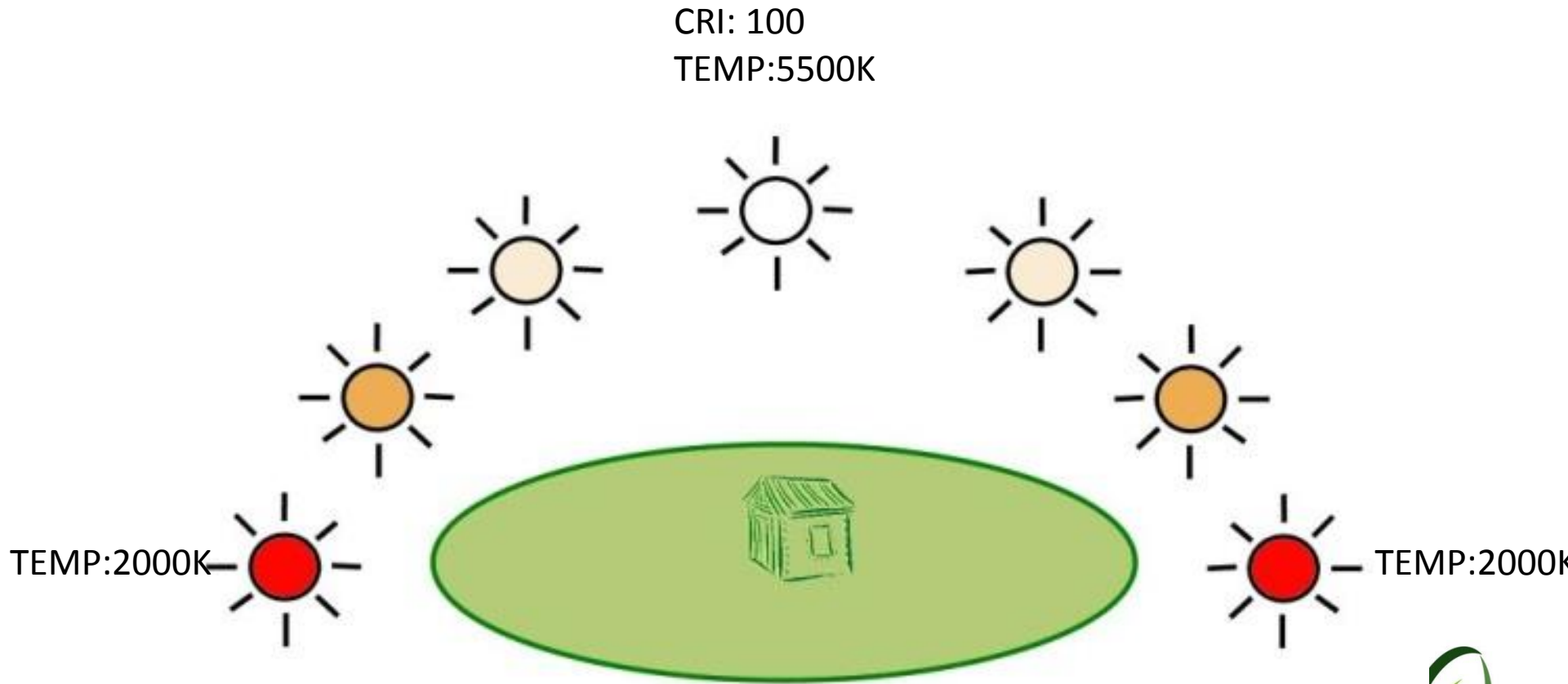
1. The **Color Temperature** of the light source must be **greater than 5000K**
2. The **Color Rendering Index (CRI)** value for the light source must be **> 80**
3. The **Chromaticity Values** (x and y coordinates) must reside in the **central white portion of the Black Body Locus**

Color Temperature



Color Rendering Index & Temperature

how *accurately* a color is perceived **at a *given color temperature*** of light.



CRI:0



CRI:10



CRI:20



CRI:30



CRI:40



CRI:50



CRI:60



CRI:70



CRI:80



CRI:90



CRI:100



CRI



CRI



CRI



CRI=90



CRI=70



CRI=50

CRI



COMPACT FLUORESCENT

CRI = 51



LED COMPETITORS

CRI = 80



BRIGHTGREEN D900

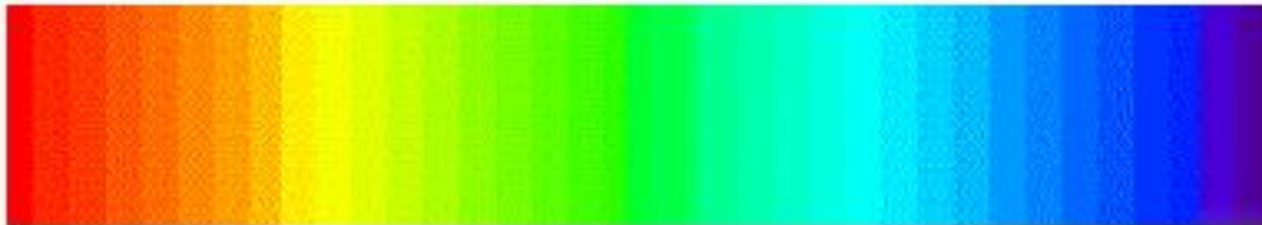
CRI = 90

CRI

CRI 85

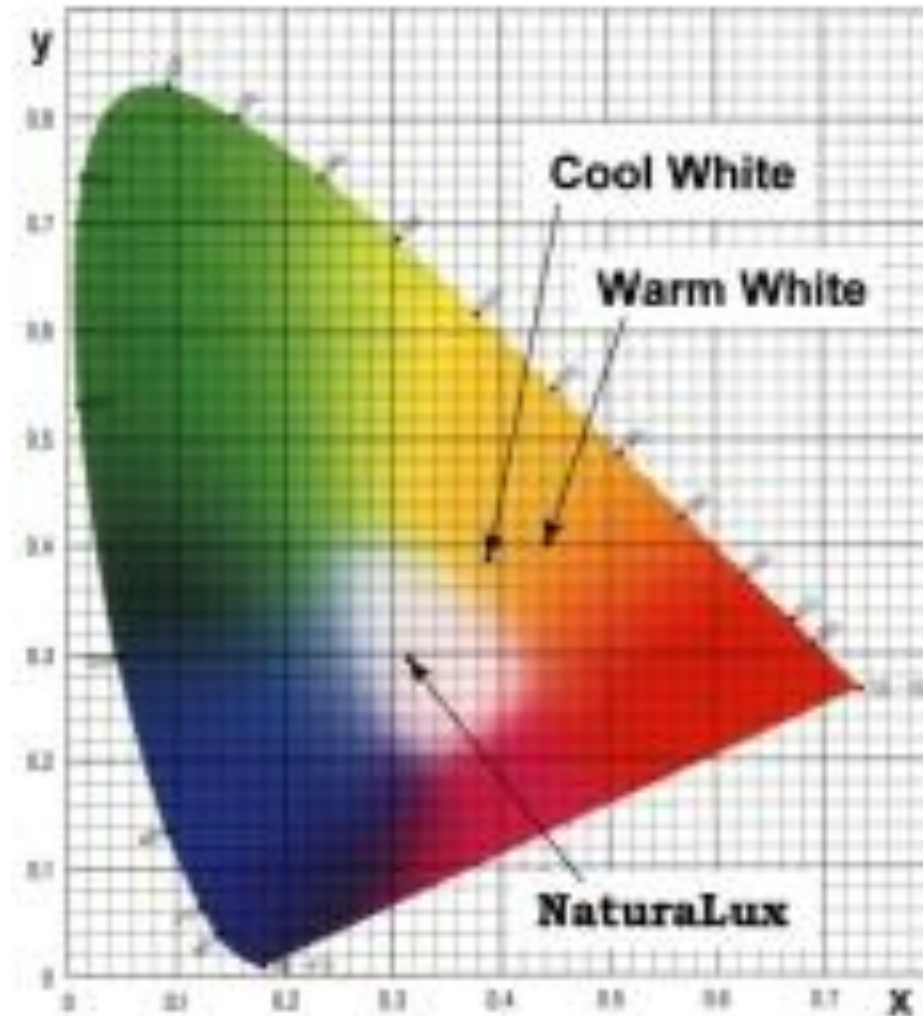


CRI 50



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Chromaticity Values



Light Source

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The Challenge



Other Cheap options besides LED

Our Target



- **Achieve 50% reduction** in energy usage
- **Re-use** existing mechanical fixtures
- Lamp life span comparable or better than LED i.e. **20,000 hrs or more**
- **Price 50% less** than LED



Energy Saving Tubelights

Based on Nano-Reflectors Technology

Trends in Tube light Technology

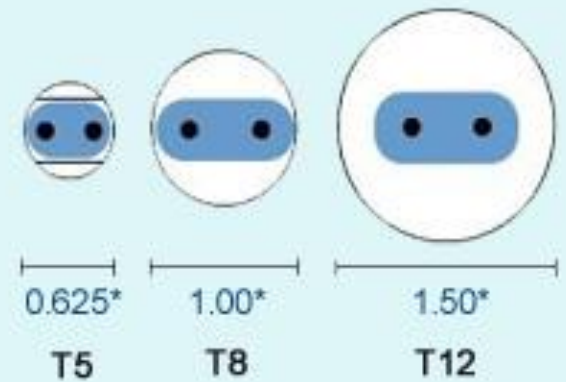


T12

T10

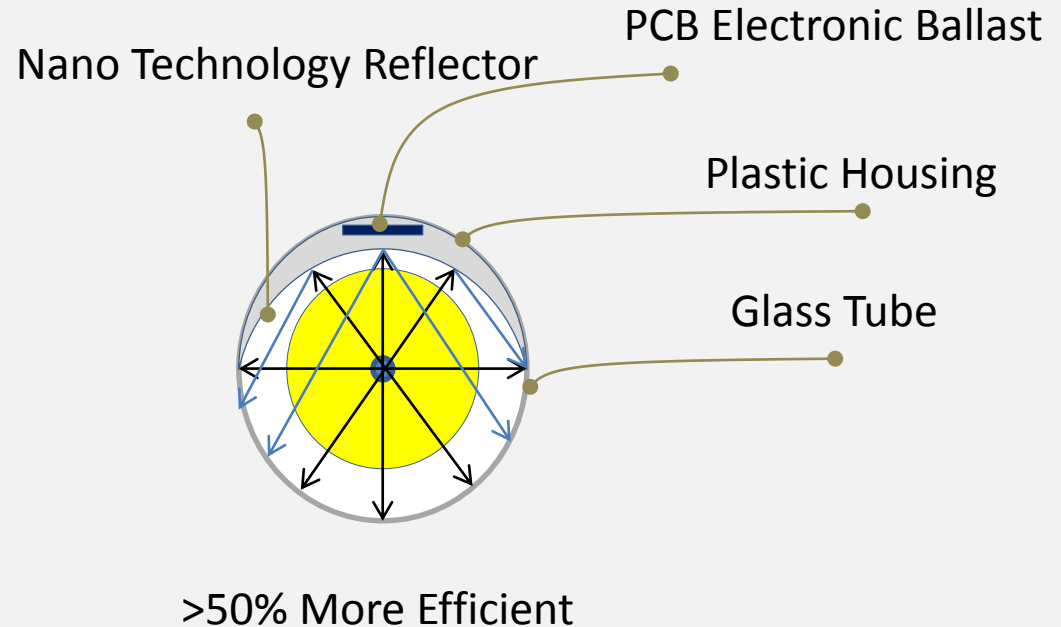
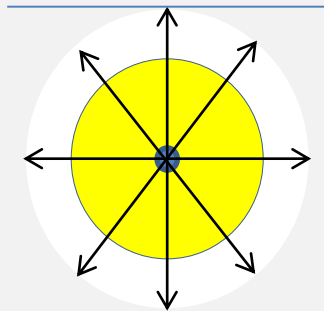
T8

T5



Energy Saving Tube light

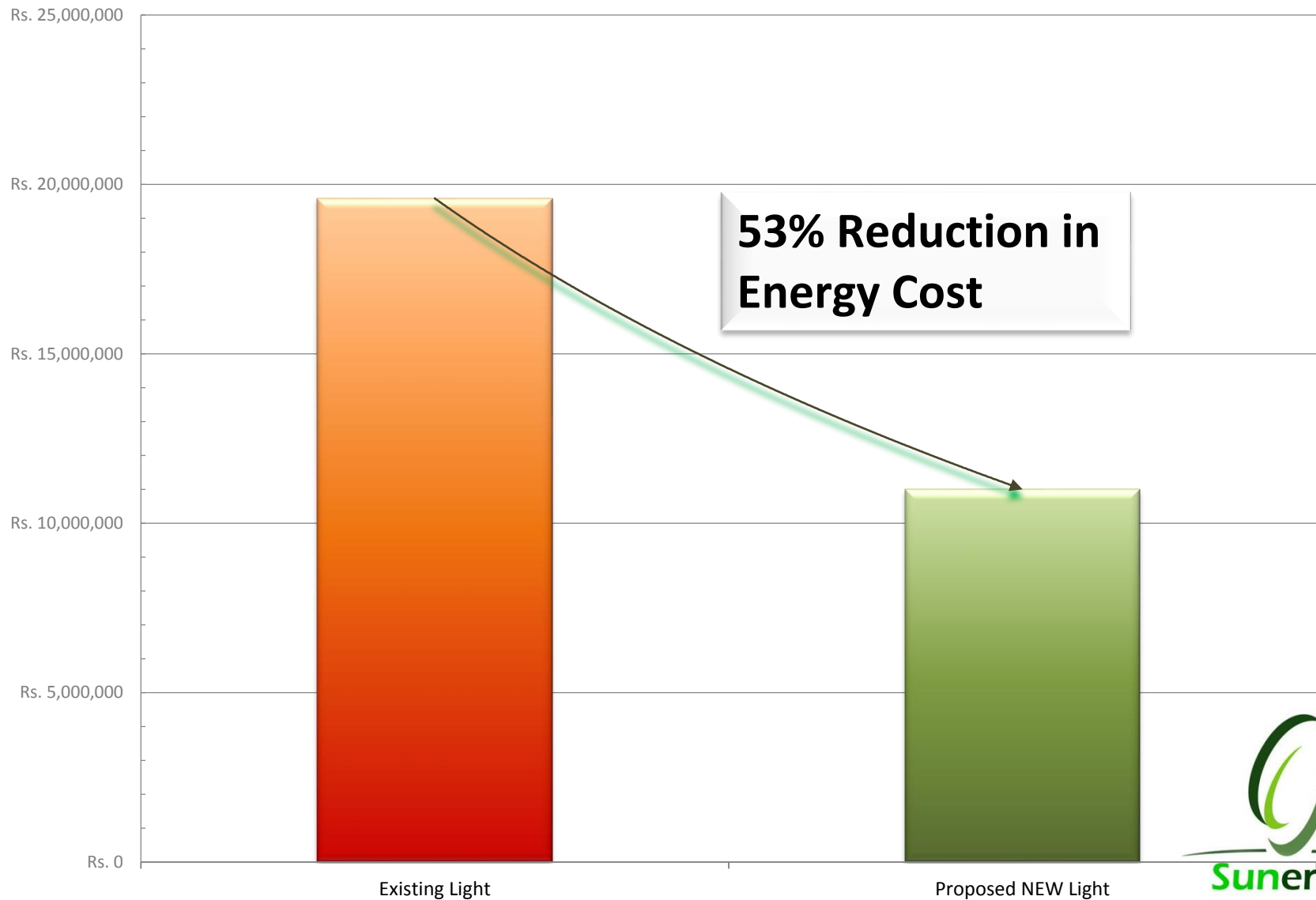
Ordinary Tube light



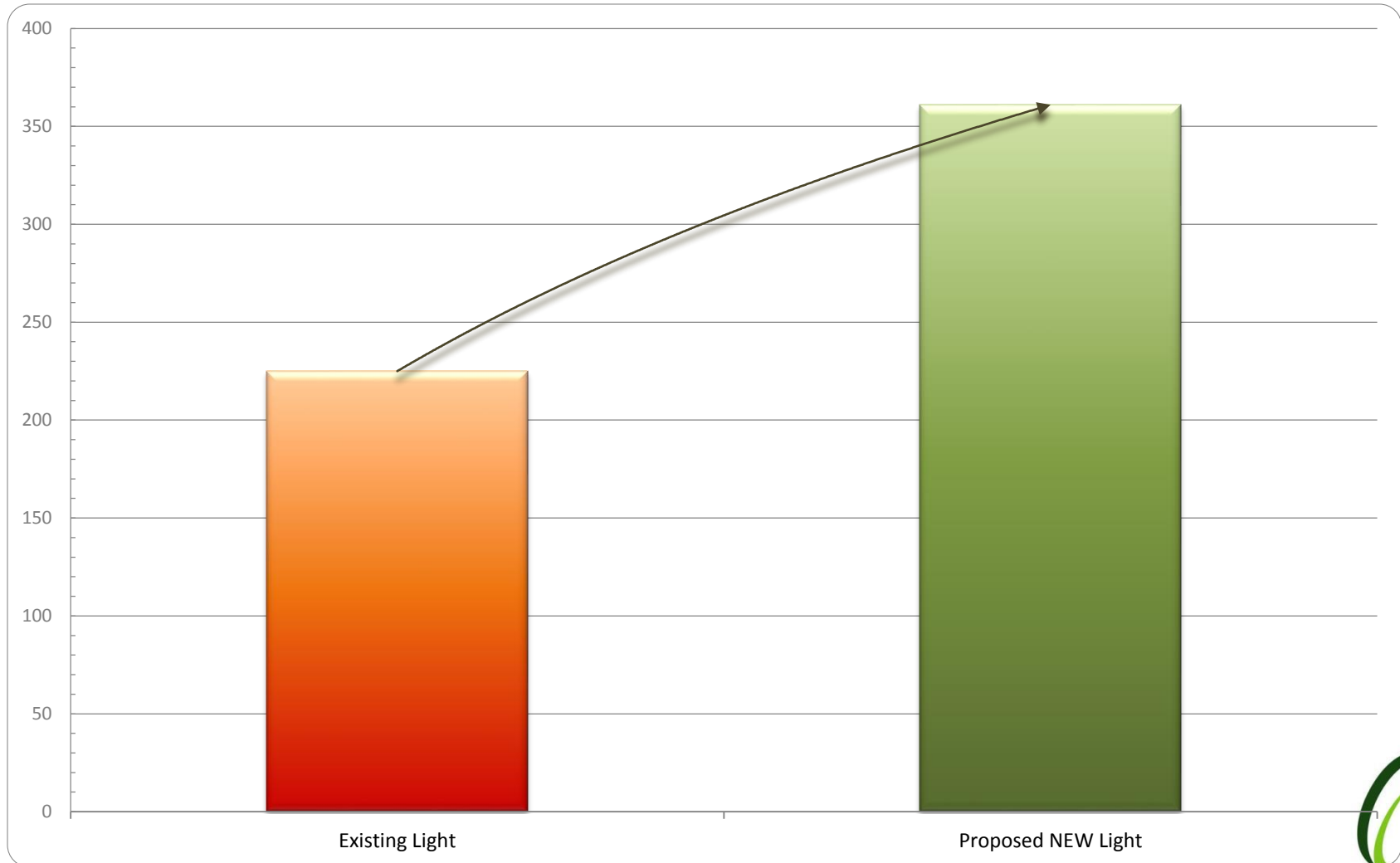
36W – 65W  **21W**

	NanoTechnology based Energy Saving Tube Lamps	Conventional Tube (T12)
Power	21W	47W
Current	0.09A	0.40A
Brightness @ 6ft	146 LUX	104 LUX
Power Factor	> 0.95	> 0.45
Harmonics	THD < 15%	THD >15%
Flash Frequency	30,000 Hz	50 Hz - 60Hz
Surface Temperature	~31 °c	~ 40.2° c
Use Voltage	160V - 260V/50Hz	190V ~ 240V
Start up Voltage Range	110-280V	190V ~ 260V
Ballast Type	Precision Electronic type	Pure Inductance
Start up	Instant	Flash
Color-Rendering Index	Ra ≥ 85 High	Ra ≥ 56 Low
Light Efficiency	High	Low
Sound Pollution	No	30 ~ 70 (db)
Lifespan-Ballast	> 50,000 hrs	30,000 hrs
Lifespan-Tube	> 20,000 hrs	5,000 hrs
Certification	CE and RoHS	CE

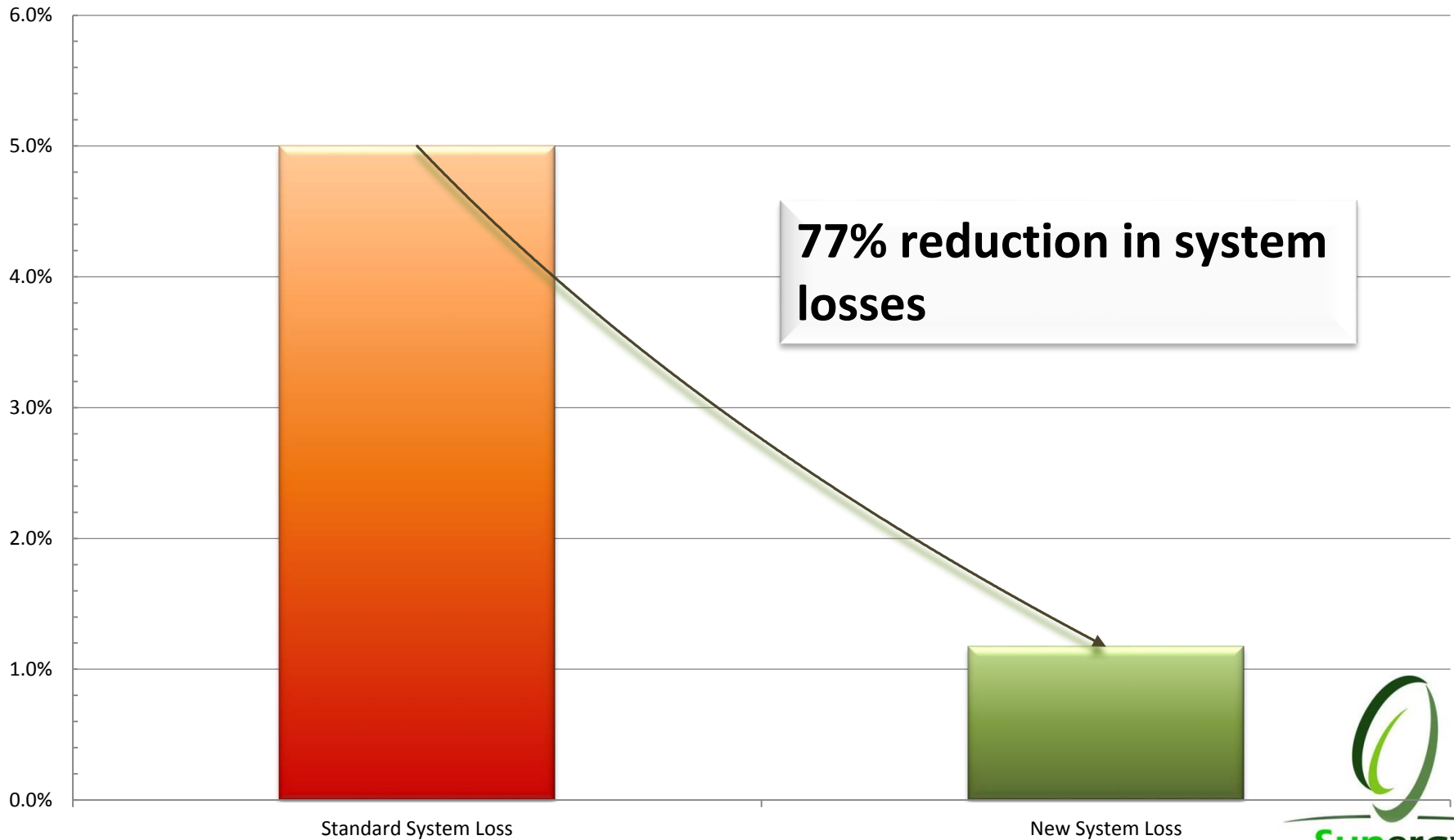
Annual Energy Cost Saving



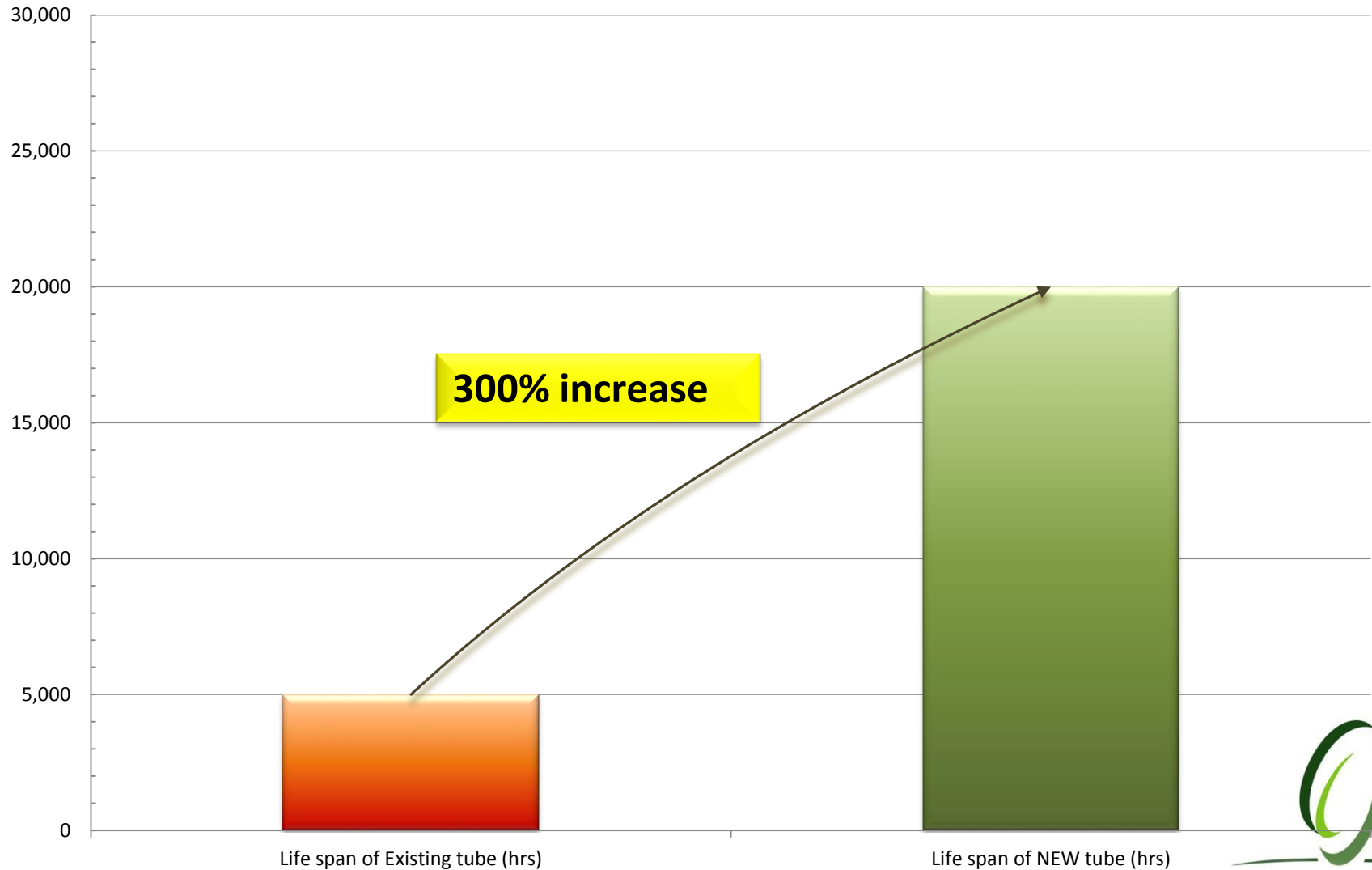
Increase in Illuminance



Reduction in System Losses



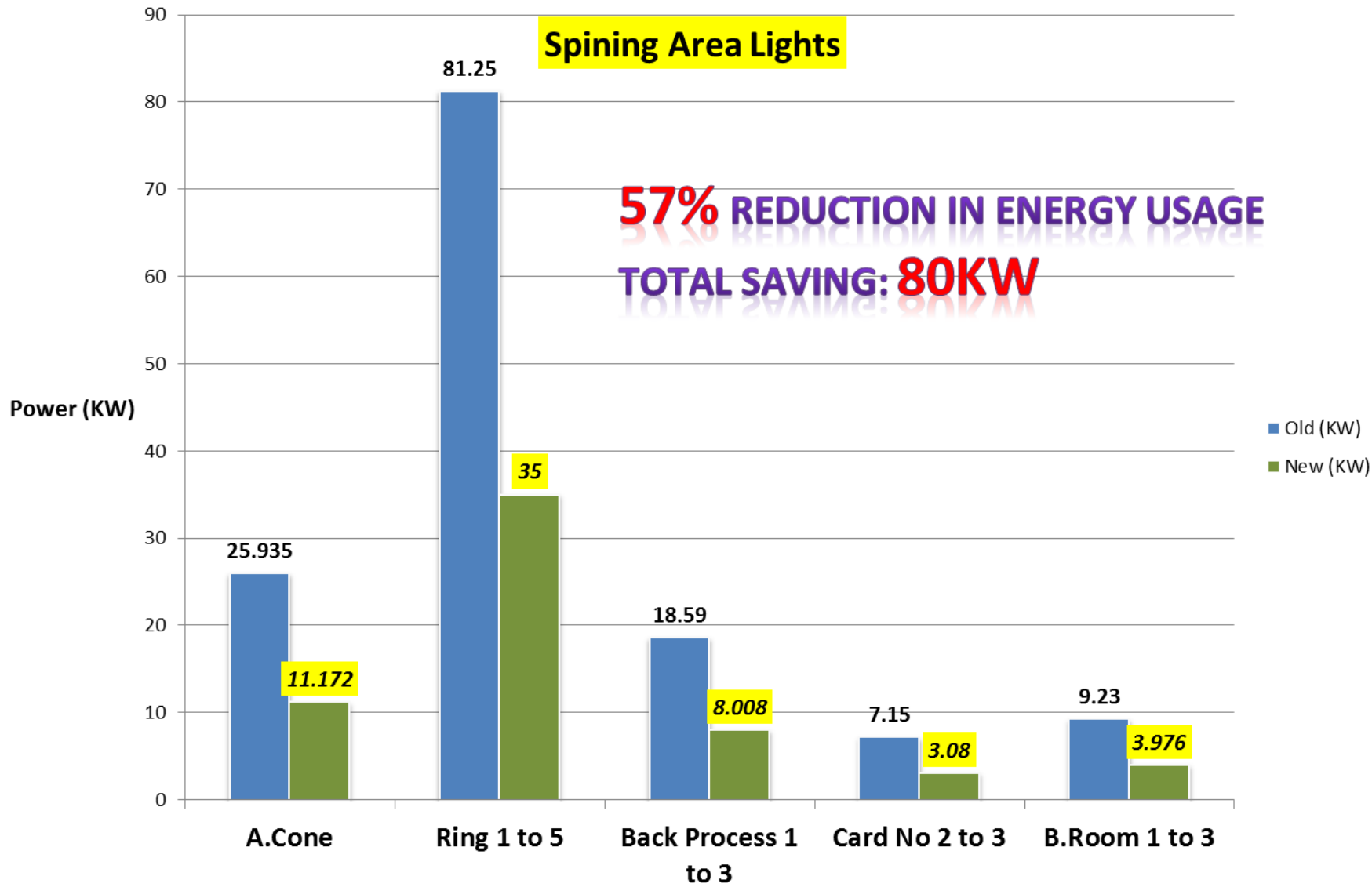
Increase in Lifespan of Tubelights



Case Study

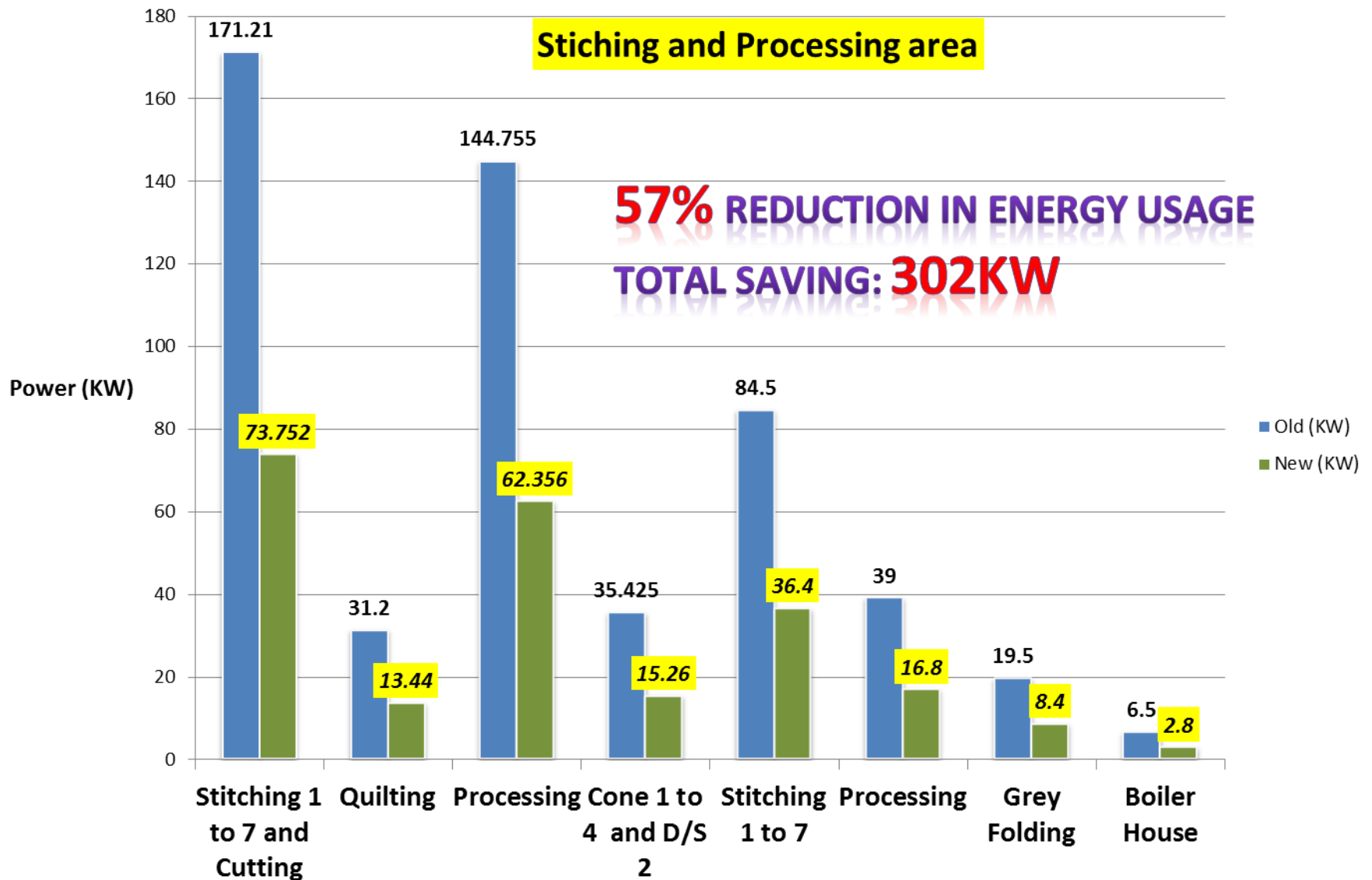
Spining Area Lights

57% REDUCTION IN ENERGY USAGE
TOTAL SAVING: 80KW



Stiching and Processing area

57% REDUCTION IN ENERGY USAGE
TOTAL SAVING: 302KW



Summary

Total Saving (KW)	383.801
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Total Tubelights Replaced	10,373
Price of one Tubelight	Rs. 1,325
Total Price	Rs. 13,744,225
Annual Saving at Rs.11 24x 7	Rs. 36,983,064
ROI (months)	4.46

Savings

<i>12 Hrs Ops</i>		
Number of Tube Lights to be replaced	Annual Energy Saving (MWHr)	Annual Savings
1	0.114	Rs. 2,560
2	0.228	Rs. 5,120
50	5.7	Rs. 128,000
100	11.4	Rs. 256,000
500	57	Rs. 1,280,000
1000	114	Rs. 2,560,000
2000	228	Rs. 5,120,000

Summary on Sunergy Tubelights

BENEFITS

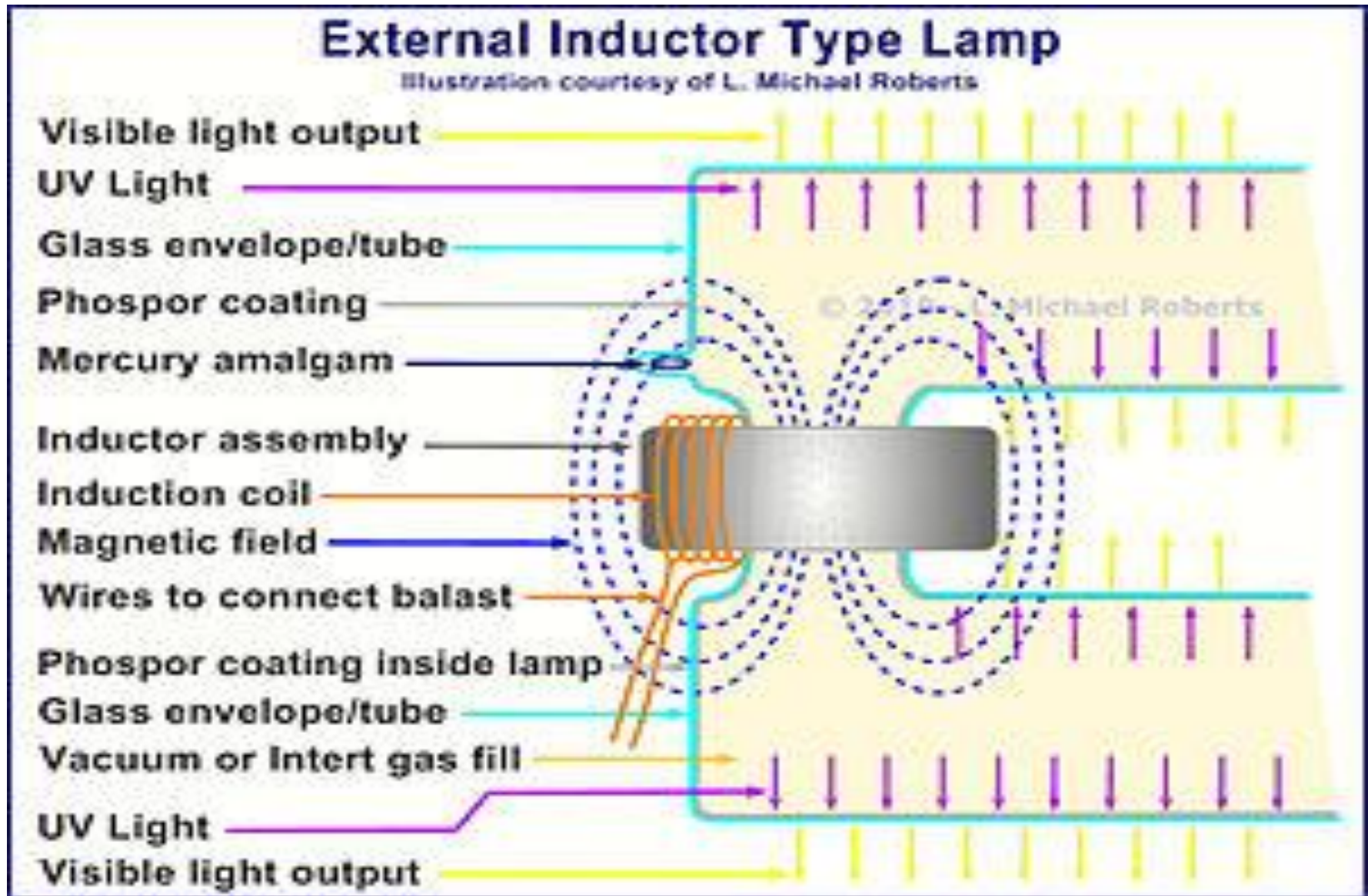
- 1 **Direct Replacement** - Existing mechanical fixtures will be used
- 2 No Mercury Product - Environmentally clean product
- 3 Power Factor improvement from 0.45 to 0.97
- 4 Capital Investment recovered in 4 to 7 months
- 5 **2 Years Warranty on Product**
- 6 Free Replacement
- 8 European design/technology with Japanese reflectors
- 9 Electronic Start/no flickering
- 10 Long tube life > 20,000hrs



Induction Lamps

Or Electrodeless Lamps

Induction Lamps Introduction

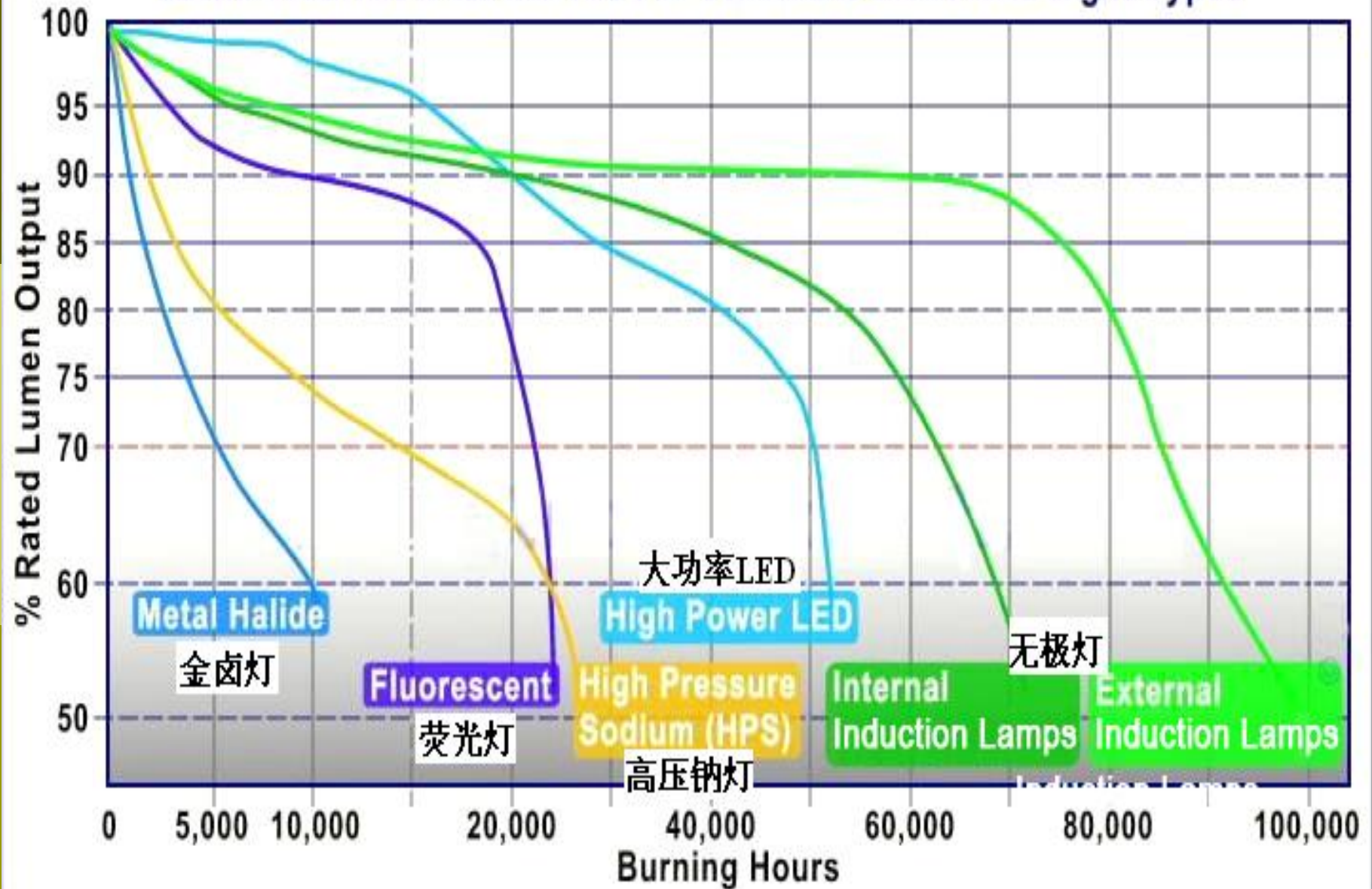


Induction Lamps Introduction

■ Advantages

- Long lifespan due to the lack of electrodes – Strictly speaking almost indefinite on the lamp itself but between **50,000 and 100,000 hours** depending on lamp model and quality of electronics used;
- Very high energy conversion efficiency of between **62 and 90 Lumens/Watt** [higher power lamps are more energy efficient];
- High power factor due to the low loss of the high frequency electronic ballasts which are typically between **95% and 98%** efficient;
- Minimal Lumen depreciation (declining light output with age) compared to other lamp types as filament evaporation and depletion is absent;
- **"Instant-on"** and hot re-strike, unlike most HID lamps used in commercial-industrial lighting applications (such as mercury-vapor lamp, sodium-vapor lamp and metal halide lamp);
- Environmentally friendly as induction lamps use less energy, and use less mercury per hour of operation than conventional lighting due to their long lifespan. The mercury is in a solid form and can be easily recovered if the lamp is broken, or for recycling at end-of-life.
- These benefits offer considerable **cost savings of between 35% and 55%** in energy and maintenance costs for induction lamps compared to other types of commercial and industrial lamps which they replace.

Lumen Maintenance Curves For Various Commercial Light Types



Induction lamps and other light source comparison

Specifications	Induction Lamp	Metal halide Lamp	High - Pressure Sodium Lamp	High Pressure Mercury Lamp
Lifetime	60,000-100,000 hrs	6,000-15,000 hrs	15,000 hrs	3,000-6,000 hrs
Power saving performance	Excellent	good	good	poor
Lumen efficacy	70-85 lm/W	70-90 lm/W	>90 lm/W	43 lm/W
light - declining(%)	Low, 5%(5000h)	High, 30%(5000h)	High, 20%(5000h)	very High 45%(5000h)
CRI	>80 , Excellent	65-90 , Good	23 , Very poor	45 , Poor
Instant-on and hot restrike	Instant restart	no	no	no
Flicker	No	yes	yes	yes
glare	No	yes	yes	yes
Environmental protection	No waste lamp recycling, no mercury pollution	waste lamp recycling	waste lamp recycling	waste lamp recycling, mercury pollution

Induction lamps and other light source comparison

Specifications	Induction Lamps	Compact Fluorescent Lamp (CFL)	The straight tube fluorescent lamp (FL)
Lifetime	60,000 – 100,000 hrs	8,000-10,000 hrs	8,000-12,000 hrs
Power saving performance	Excellent	good	good
Lumen efficacy	70-85 lm/W	85 lm/W	70 lm/W
Optimization of lamp tube structure	Simple structure, the vast majority of luminous flux can be irradiated on the work surface.	3U or spiral structure is too close and complex, resulting in the luminous flux of 20%- 40% cannot be radiated to the working surface.	Simple structure, the vast majority of luminous flux can be irradiated on the work surface.
light - declining(%)	small, <5%(2000hrs)	big, 20%(2000hrs)	very big, 25%(2000hrs)
flicker and glare	no	yes	yes
Environmental protection	No waste lamp recycling, no mercury pollution	waste lamp recycling, mercury pollution	waste lamp recycling, mercury pollution

Induction lamps and other light source comparison

Specifications	Electrodeless lamp	LED
Lifetime	Long life span	Long life span
Power saving performance	Excellent	good
Lumen efficacy	70-85 lm/W	>80 lm/W
color rendering	>80, Excellent	>80
light - declining(%)	very small, 5%(2000hrs)	small
flicker and glare	no	no flicker , glare
Dissipate heat	good	Application to air flow conditions of the occasion, the long-term use lead to dust accumulation of the radiator decrease the heat diffusion efficiency, and influence the life of lamp.
Cost	Electrodeless lamp cost is 1/3 of LED Cost	

INDUCTION LAMPS vs. LED

LAMP TYPE	INDUCTION LAMPS	LED
Technology	Up to 100,000 hours. No electrode or filament will be damaged. Therefore, no maintenance cost & minimizes re-lamping costs.	The first red light LED was developed in 1968. But the first white light LED was in 1996. It's developing & is one of the hottest light technologies in the market in recent years. But still not technologically mature & problems like sensitive to heat & inconsistent color output have to be solved
Light Characteristics	Traditional efficacy: 80-90 Lm/W ; Photopic efficacy: 150 pupil lumen/W CRI: >80Ra Color temperature: 2100k – 6500k; easy to control Light Depreciation: 5% @ 2000hrs No glare, no flicker, comfortable light source Disperse, wide light beam	Traditional efficacy: 15-80 Lm/W (Common); 80-100 Lm/W (High Power) CRI > 80Ra Color temperature: full range. But strict QC control has to be adopted to guarantee accurate CCT Light attenuation: 20-30% @ 2000hrs Serious glare, no flicker Directional, narrow light beam
Pay Back Period	For retrofit project, in average 1.7yr. The cost is 1/3 of LED lamps.	
Engery Saving	Replace HID lamps by saving around 50% of the energy	Replace florescent lamps & CFL lamps. Save energy by 30-70% but the cost is 4-5 times higher.
Application	Industrial & commercial buildings, street, tunnel, bridge, garden, advertising board, warehouse, car park, petrol station, supermarket, sports station, swimming pool	Automotive lights, consumer electronics, traffic signal, mobile phone/PDA/TV display screen, torch, stage lighting. Good for design & signaling purposes. Not recommended for outdoor lightings because of it's directional light beam, and probably causing blue hazard or blue pollution if without proper shielding
Technical Comparison	Power: 15~300W Service Life: >100,000hrs Power factor > 0.98 Operation temperature: around 80C Instant on/off & re-strike: yes Dimmable: yes Recycling: very few solid state mercury; easy to recycle & do it only 100,000hr a time Replace-ability: the tube & ballast can be replaced separately Fixture: lamp is easy to accommodate Excellent temperature tolerance: work properly from -40C to 80C, reliable ignition Wide voltage range: With input voltage fluctuates up to $\pm 10\%$, output wattage deviates within 3%	Each LED bulb provides 0.5~1W. Array of bulbs are needed for large wattage. Service life: >50,000hours Power factor > 0.8-0.95 Operating temperature: Over 100C, requires heat sink as a cooling device. Instant on/of & re-strike: yes Dimmable: yes Recycling: no mercury. Replace-ability: the LED bulb & the circuit board are integrated & are not replaceable. Fixture: Many led bulbs assembled in the same circuit board, it is difficult to design the right reflector & light angle Temperature sensitive: Over-heating will cause light attenuation & shorten the service life Voltage sensitive: voltage drops may lead to high operating current & damage the LED

Induction lights project cases

Road lighting

- ▣ Coca Cola factory road lighting renovation project



Factory road lighting



Road lighting



Badminton and Basketball Gyms Lighting

▣ badminton hall



Factory lighting

▣ Oil factory

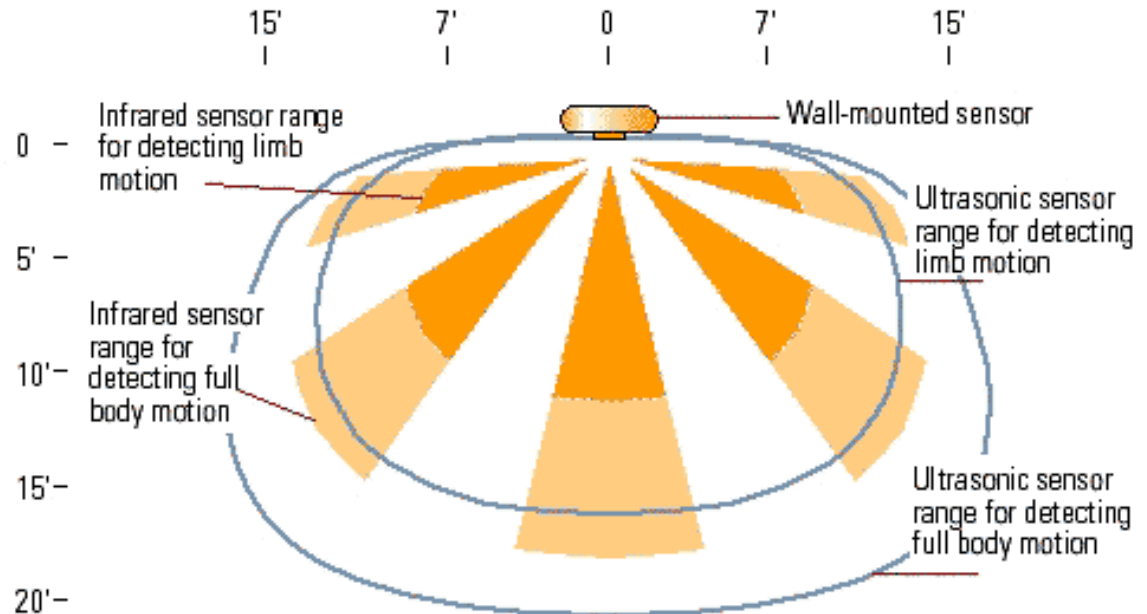




Other Products

Occupancy Sensor Systems

- **Classrooms**
- **Office Space**
- **Library Sections**
- **Corridors etc...**



Hologen Replacements

We Replace

450-500W Halogen Lights

with

250W Induction HIGH BAY LIGHTS



Street Lights Replacements

We can retrofit:

250-300W Halogen Street Lights

with

150W Induction LIGHTS



Street Lights Replacements



Flood Light Replacements

We Replace

150-250W Halogen Lights

with

100W Induction Flood LIGHTS



Summary

Summary

1. The **Quality Criteria** of the light source must be **considered (CRI, Temp, etc..)**
2. **LED** is the most efficient but the most expensive option and should be considered as the last resort or if investment is not an issue.
3. **Energy Saving Tubelights, Induction lamps, Occupancy sensors** and other **energy management options must be considered.**

The End