

To retrofit or not retrofit, that's the question

Points of attention wrt LED retrofit lamps

Henk Rotman, Tridonic SA



TRIDONIC

Introduction

_ Lighting's share in the global electricity use has substantially reduced over the years :

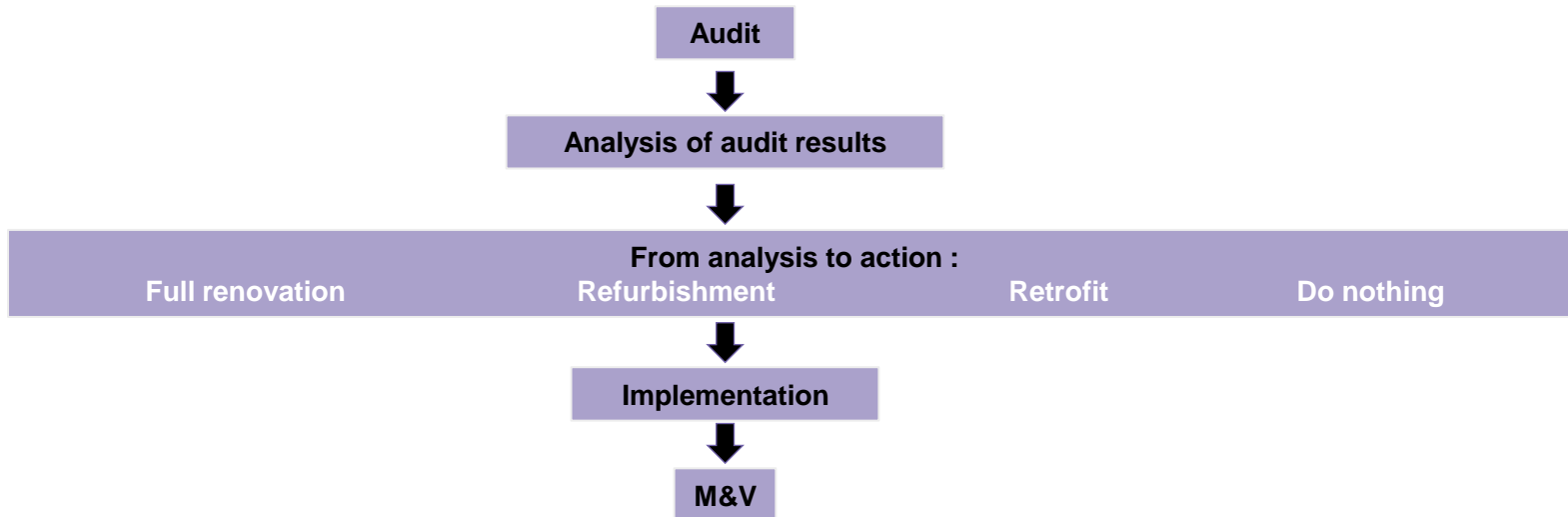
Year	Lighting share as % of global electricity consumption
2006	19%
2018	13%
2030	8% (target)

_ There is still a huge potential for further savings especially in existing installation where replacing conventional lighting with LED based lighting coupled with lighting controls is the preferred way of saving

How to achieve energy savings in an existing installation ?

_ Starting point : **don't compromise on light levels and quality !**

_ Flow diagram :



Common retrofit solution

_ Replace the existing traditional lamp with an LED retrofit lamp

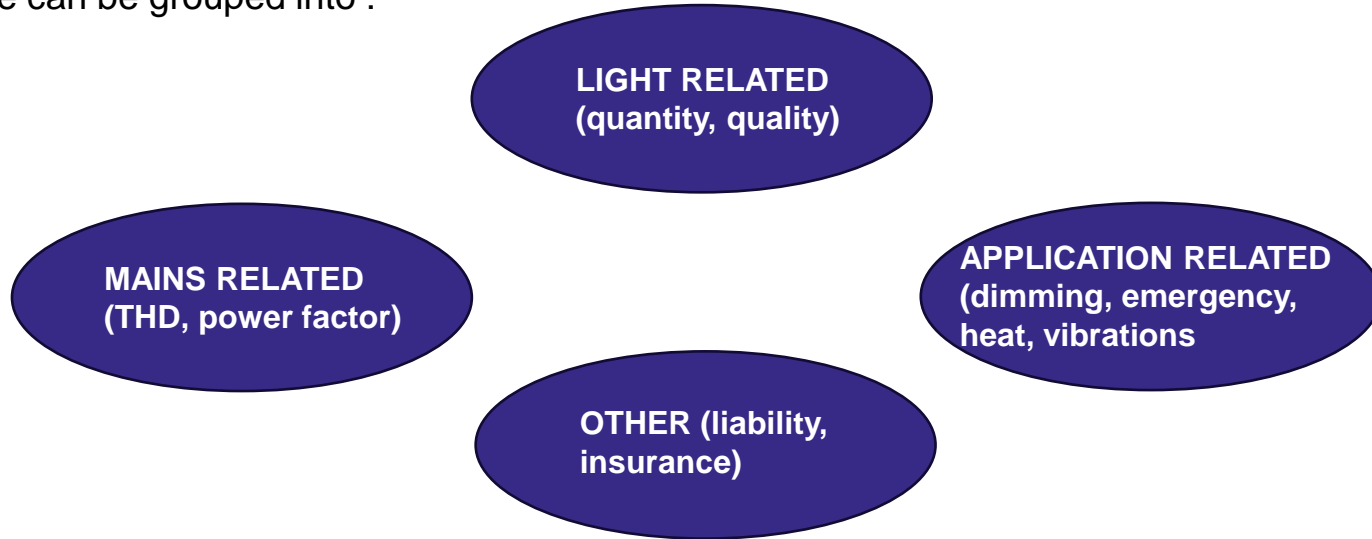


Retrofit seems a simple and cost effective way to save energy, but is it ?

Points of attention LED retrofit lamps

_ A closer look at LED retrofit lamps reveals a multitude of points-of-attention which require careful consideration

_ These can be grouped into :

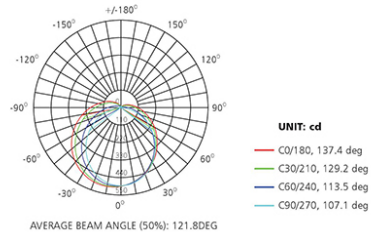


Points of attention : LIGHT RELATED

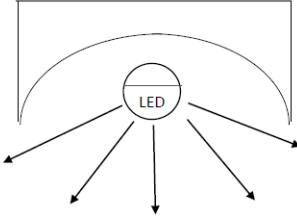
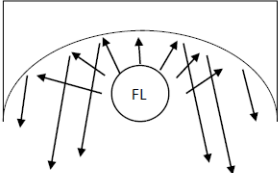
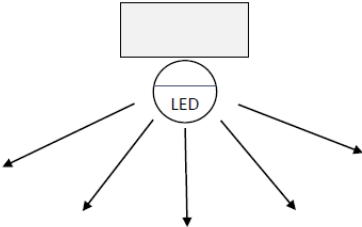
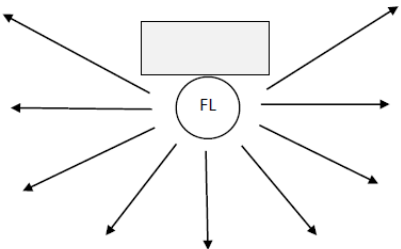
_ A fundamental difference between conventional lamps and it's LED alternative is the difference in light distribution :

- _ Most conventional lamps are omni-directional (with exception of reflector lamps)
- _ LED's (chips/die's) give directional light enabling LED retrofit lamps providing more directional light

Polar Diagram Comparison



Points of attention : LIGHT RELATED (2)



Impact on light levels and uniformity ?

Points of attention : LIGHT RELATED (3)

_ Option 1 :

- _ High wattage 'corn' lamp : due to lamp construction the light distribution (close to MV), hence still reflector losses,



_ Option 2 :

- _ High wattage downlight : due to lamp construction the light-distribution is directional, hence no losses in reflector



Points of attention : LIGHT RELATED (4)



PRODUCT DATASHEET
ST8-EM 20 W/6500 K 1500 mm

SubstiTURE Entry EM LED tubes for electromagnetic control gears



TECHNICAL DATA

Electrical data	
Rated power	20 W
Connection voltage	230 V AC
Rated voltage	220-240 V AC
Type of control	AC
Starting frequency	50, 60 Hz
Power factor	0.99
Power factor $P_{0.95}$	0.99
Photometric data	
Rated flux	2130 lm
Rated flux at 20°C and 50% RH	2100 lm
Lighting efficacy	105 lm/W
Light distribution angle of emitting area	220°
Beam diameter	26 mm
Beam diameter at 2 m	0.43 m
Beam diameter at 3 m	0.64 m
Beam diameter at 4 m	0.85 m
Beam diameter at 5 m	1.06 m
Beam diameter at 6 m	1.27 m
Beam diameter at 7 m	1.48 m
Beam diameter at 8 m	1.69 m
Beam diameter at 9 m	1.90 m
Beam diameter at 10 m	2.11 m
Beam diameter at 11 m	2.32 m
Beam diameter at 12 m	2.53 m
Beam diameter at 13 m	2.74 m
Beam diameter at 14 m	2.95 m
Beam diameter at 15 m	3.16 m
Beam diameter at 16 m	3.37 m
Beam diameter at 17 m	3.58 m
Beam diameter at 18 m	3.79 m
Beam diameter at 19 m	4.00 m
Beam diameter at 20 m	4.21 m

Product benefits

- No heating thanks to glass technology
- Quick, simple and safe replacement
- Energy savings of up to 65 % (comp. to incandescent)
- Instant on light (start-up delay-free)
- Also suitable for operation at low temp

Product features

- T8 LED tube made of glass with G23
- Mercury free and RoHS compliant
- Type of protection: IP20



September 16, 2015, Version 1.00
File no. 65306226 1/20



LED T8 Tube Light 9W - 22W

Dimensions

SKU: SATU04 Categories: Basic Lamps, LED T8 Tube Lights

T8 LED lights are usually used for office lighting and can replace fluorescent lights in both parabolic and indirect light fixtures. They work best in climate-controlled areas with standard ceiling heights, including storage areas, fabrication floors, and mechanic garages. LED tubes are an energy-efficient replacement for fluorescent tubes. They also boast better color rendering, require less maintenance, and burn out less frequently with up to 100,000 lifetime hours.

Share this entry



	SATU0410	SATU0418	SATU0422
Power	9W	18W	22W
Dimensions	560mm	1160mm	1460mm
Light Source	LED T8 Tube	LED T8 Tube	LED T8 Tube
Color Temperature	3000K / 4000K / 6000K	3000K / 4000K / 6000K	3000K / 4000K / 6000K
Input	Single-endinput	Single-endinput	Single-endinput
Material	Glass + PC Cap	Glass + PC Cap	Glass + PC Cap

Essential LEDtube

LEDtube HO 1200mm 20W 765 T8 AP I G

Essential LEDtube is an affordable LED tube that is suitable for replacing T8 fluorescent lamps. The product provides a natural lighting effect for use in general lighting applications, as well as instant energy savings - an environmentally friendly solution.

Product data

General information	
Light type	LED tube
Rated power	20 W
Rated voltage	230 V AC
Rated current	0.087 A
Rated frequency	50, 60 Hz
Power factor	0.99
Power factor $P_{0.95}$	0.99
Rated length	1200 mm
Rated diameter	26 mm
Rated diameter at 2 m	0.43 m
Rated diameter at 3 m	0.64 m
Rated diameter at 4 m	0.85 m
Rated diameter at 5 m	1.06 m
Rated diameter at 6 m	1.27 m
Rated diameter at 7 m	1.48 m
Rated diameter at 8 m	1.69 m
Rated diameter at 9 m	1.90 m
Rated diameter at 10 m	2.11 m
Rated diameter at 11 m	2.32 m
Rated diameter at 12 m	2.53 m
Rated diameter at 13 m	2.74 m
Rated diameter at 14 m	2.95 m
Rated diameter at 15 m	3.16 m
Rated diameter at 16 m	3.37 m
Rated diameter at 17 m	3.58 m
Rated diameter at 18 m	3.79 m
Rated diameter at 19 m	4.00 m
Rated diameter at 20 m	4.21 m

Document: 0625 August 2

Light output ? Lumen maintenance ? TLA (flicker), color consistency ? Etc etc

Points of attention : MAINS RELATED (5)



PRODUCT DATASHEET ST8-EM 20 W/6500 K 1500 mm

SubstiTUBE Entry EM LED tubes for electromagnetic control gears

Essential LEDtube

LEDtube HO 1200mm 20W 765 T8 AP I G

Essential LEDtube is an affordable LED tube that is suitable for replacing T8 fluorescent lamps. The product provides a neutral lighting effect for use in general lighting applications, as well as instant energy savings → an environmentally friendly solution.

Product data

Color class	6500 K
Color temperature	6500 K
Power (max)	20 W/20 W
Power (typ)	20 W/20 W
Lighting technology	LED
Light beam (typ)	180°
Light distribution	U
Beam angle (max)	180°
Beam angle (typ)	180°
Color temperature (max)	6500 K
Color temperature (typ)	6500 K
Color rendering index (CRI)	90
Color rendering index (Ra)	90

Essential LEDtube

Product features

- T8 LED tube made of glass with G23
- Mercury free and RoHS compliant
- Type of protection: IP20

Light technical data

Beam angle	180°
Half beam angle (HBM)	180°
Beam diameter	26 mm
Beam diameter (HBM)	26 mm

TECHNICAL DATA

Rated voltage	230 V
Rated power	20 W
Rated power factor	0.99
Rated power (max)	20 W
Rated power (typ)	20 W
Rated power (min)	20 W
Rated power (max)	20 W
Rated power (typ)	20 W
Rated power (min)	20 W
Rated power (max)	20 W
Rated power (typ)	20 W
Rated power (min)	20 W

Product benefits

- No heating thanks to glass technology
- Quick, simple and safe replacement
- Energy savings of up to 65 % (compared to standard T8 fluorescent lamps)
- Instant-on light, flicker-free light
- Also suitable for operation at low temp.

Product features

- T8 LED tube made of glass with G23
- Mercury free and RoHS compliant
- Type of protection: IP20

Light technical data

Beam angle	180°
Half beam angle (HBM)	180°
Beam diameter	26 mm
Beam diameter (HBM)	26 mm



LED T8 Tube Light 9W - 22W

Dimensions

SKU: SATU04 Categories: Basic Lamps, LED T8 Tube Lights

T8 LED lights are usually used for office lighting and can replace fluorescent lights in both parabolic and indirect light fixtures. They work best in climate-controlled areas with standard ceiling heights, including storage areas, fabrication floors, and mezzanine garages. LED tubes are an energy-efficient replacement for fluorescent tubes. They also boast better color rendering, require less maintenance, and burn out less frequently with up to 100,000 lifetime hours.

SKU: SATU04 Categories: Basic Lamps, LED T8 Tube Lights

Share this entry

	SATU0410	SATU0418	SATU0422
Power	9W	18W	22W
Dimensions	568mm	1168mm	1468mm
Light Source	LED T8 Tube	LED T8 Tube	LED T8 Tube
Color Temperature	3000K / 4000K / 6000K	3000K / 4000K / 6000K	3000K / 4000K / 6000K
Input	Single-endinput	Single-endinput	Single-endinput
Material	Glass + PC Cap	Glass + PC Cap	Glass + PC Cap

Power factor, Total Harmonic Distortion ?

Points of attention : APPLICATION RELATED

DIMMING

- _ Dimming artificial lighting via a concept like daylight harvesting is a powerful extra when it comes to reducing energy use : 30% extra savings are possible
- _ Although dimmable LED tubes do exist using them in daylight harvesting applications is very challenging

HEAT

- _ In temperature critical luminaires (e.g. vapourproof luminaires) LED tubes might run too hot and hence have a reduced lifetime

Conclusion

- _ LED retrofit lamps seem an easy and affordable way of reducing energy use for lighting one

- _ A large scale implementation in professional applications must however be carefully considered and might in many cases not to be the preferred solution. Careful consideration should be based on available information.

- _ Points of attention are :
 - _ Light related
 - _ Mains related
 - _ Application related
 - _ Other

- _ LED retrofit lamps might be a solution for residential use and as a short term solution to reduce energy use

Thanks

Light you want to follow.



TRIDONIC