ENERGY EFFICIENCY IN STREET LIGHTING

PRESENT AND FUTURE

OCTOBER 2020

1- OBJECTIVES OF STREET LIGHTING

Provides safety lighting for pedestrians and vehicles at night

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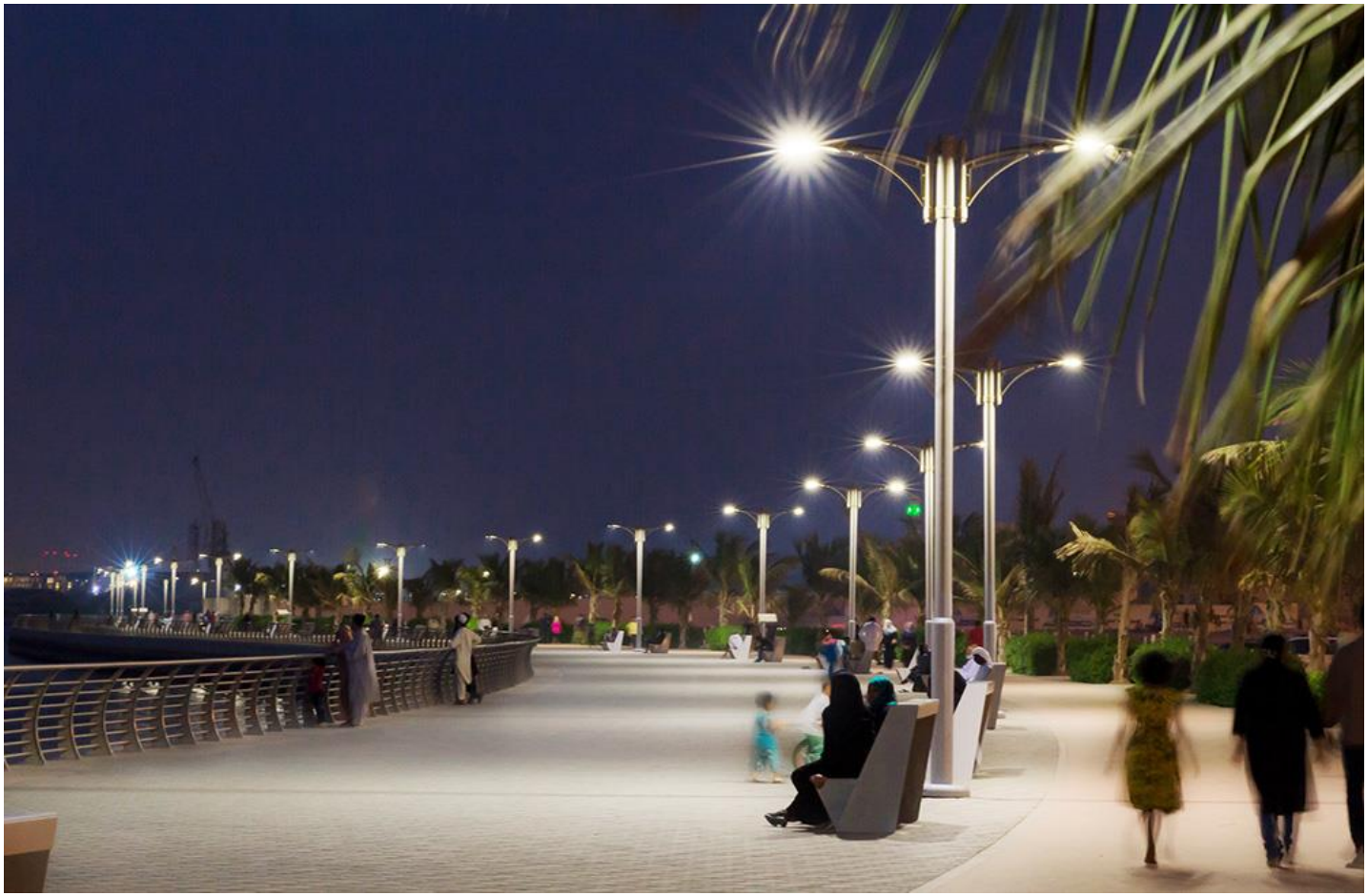
1- OBJECTIVES OF STREET LIGHTING

Works as an element of social interaction



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1 - OBJECTIVES OF STREET LIGHTING

Works as visual language

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1- OBJECTIVES OF STREET LIGHTING

Promotes symbolic and psychological environments

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1- OBJECTIVES OF STREET LIGHTING

Interact and respect the nighttime urban landscape

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1- OBJECTIVES OF STREET LIGHTING

In conclusion, street lighting is an instrument of comfort, safety and attractiveness in a city while enhancing environmental perception and influencing human behavior

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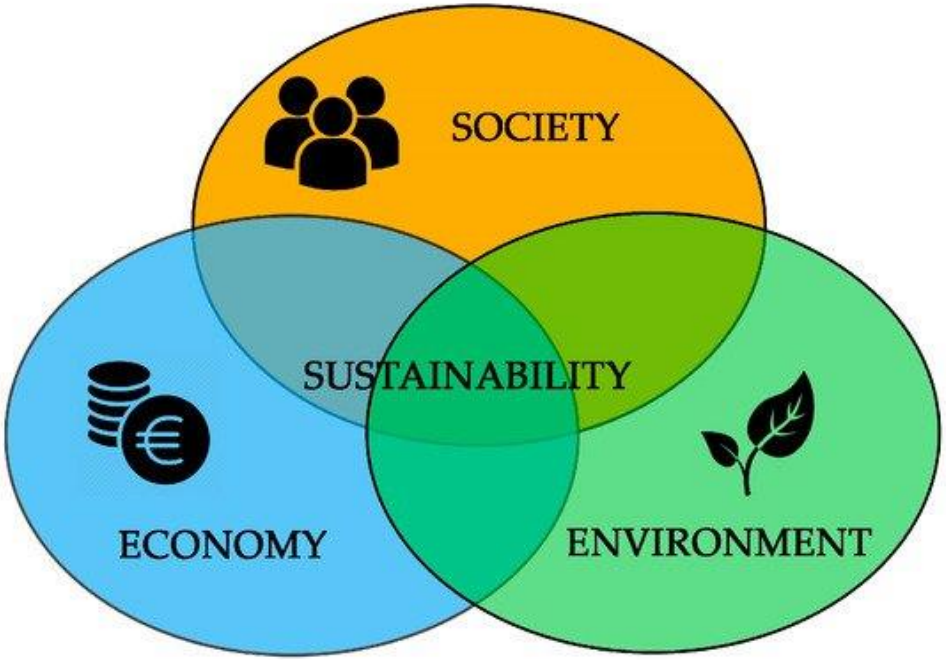
2 - BASES FOR EFFICIENT STREET LIGHTING

Energy efficiency at street lighting is not savings, restrictions or austerity, but an exercise in satiety, technological rationality and social responsibility where there is no room for mercantilist view or “Gadgetic” vision of turnkey technology.

IT HAS TO BE SUSTAINABLE



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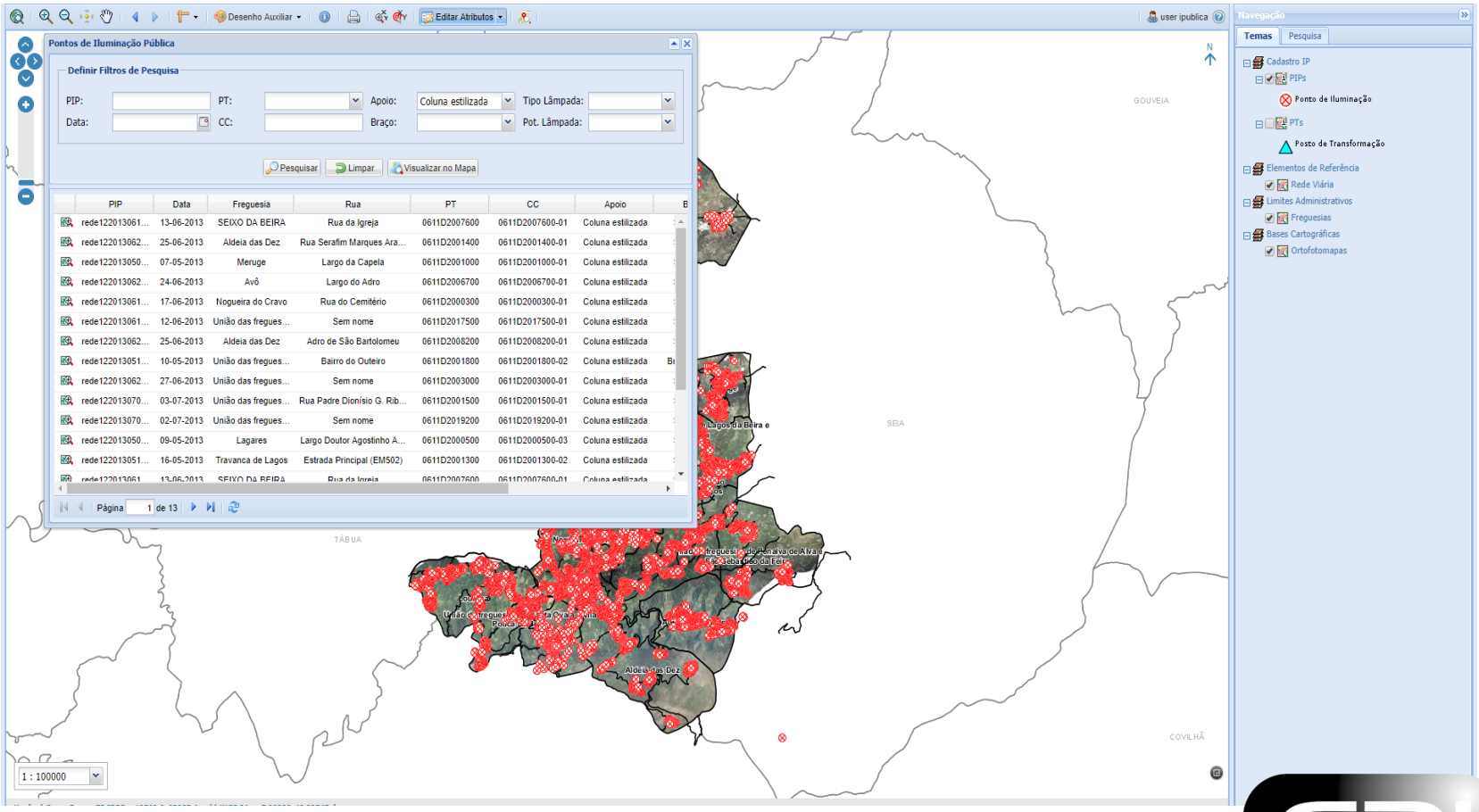
2 - BASES FOR EFFICIENT STREET LIGHTING

REGISTRATION AND CHARACTERIZATION OF THE STREET LIGHTING NETWORK



2 - BASES FOR EFFICIENT STREET LIGHTING

CREATE A MASTER PLAN FOR STREET LIGHTING

- It is necessary to diagnose and evaluate the entire street lighting system.
- Planning the master plan from life cycle analyses perspective
- Apply the ALARA (As Low As Reasonably Achievable)

concept in accordance with European standard 13201.DEC. 2015

- The master plan should promote the attractiveness of the city or region.

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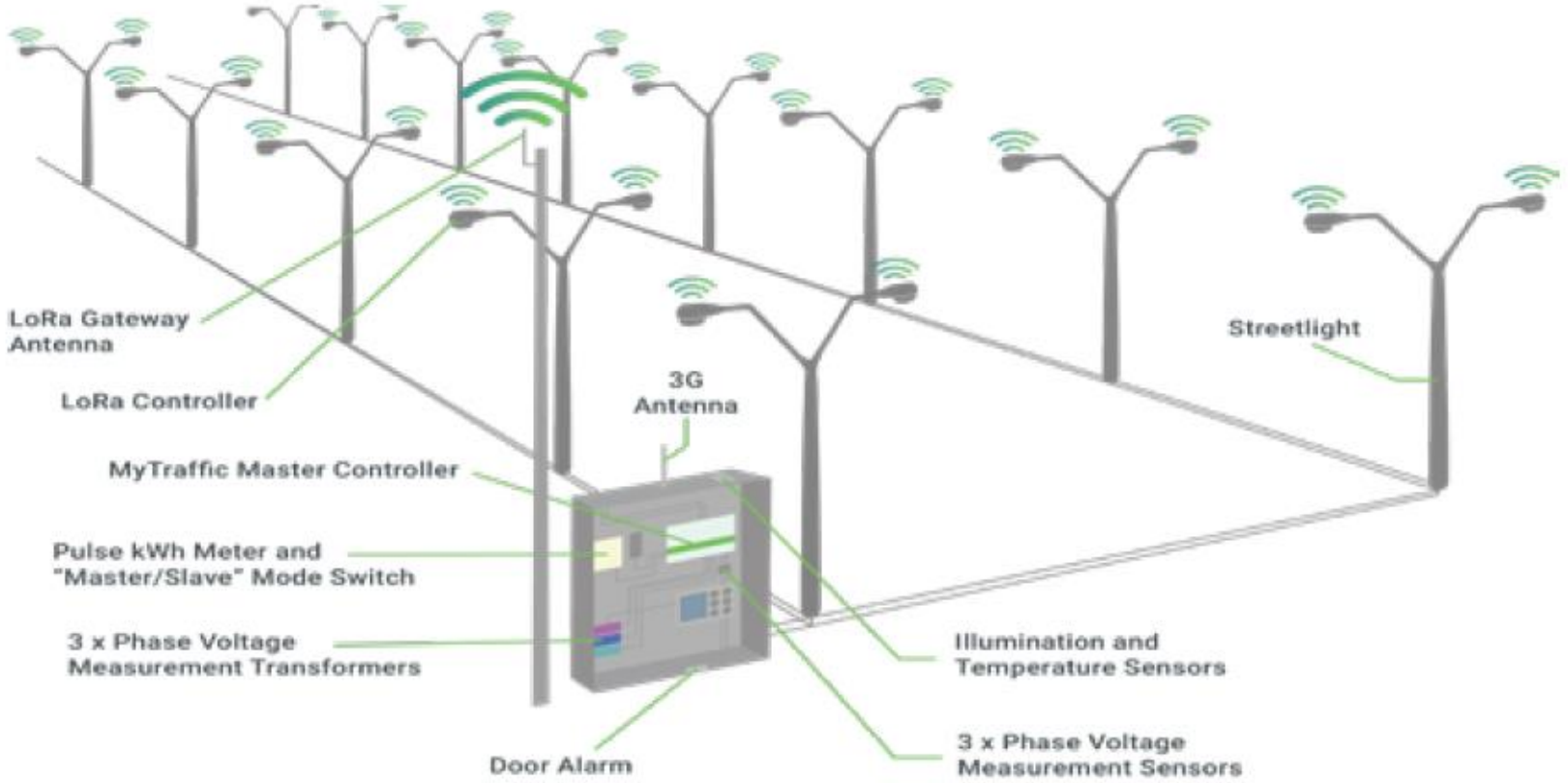
2 - BASES FOR EFFICIENT STREET LIGHTING

INSTALL A REMOTE MANAGEMENT SYSTEM OR AT LEAST PRE-INSTALL



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2 - BASES FOR EFFICIENT STREET LIGHTING

LIGHT POLLUTION CONTROL

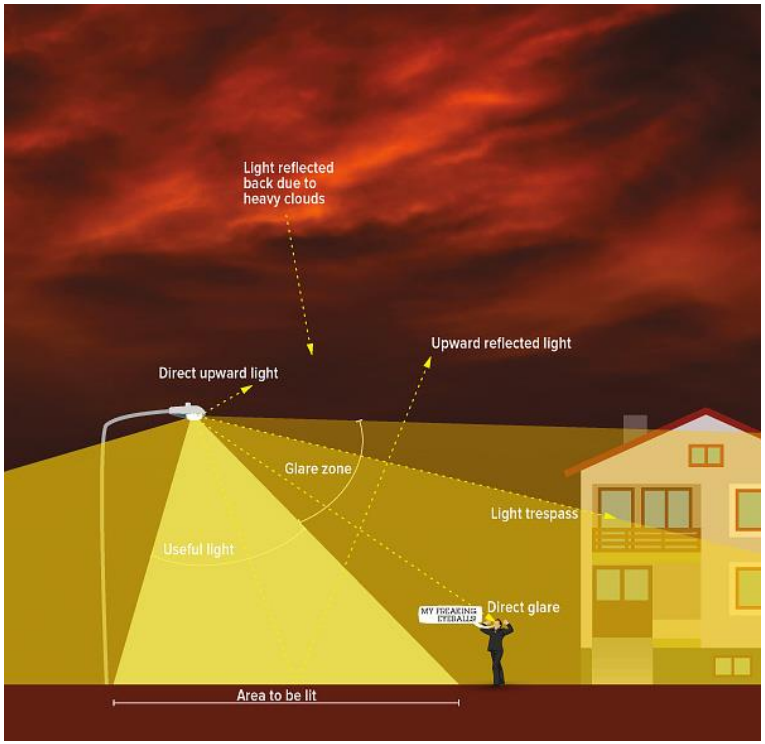
- impacts on energy costs
- Impacts on visual Comfort
- Impacts on biodiversitY
- Probable health impacts

How to reduce light pollution?

- Choose a correct photometry with zero ULOR and that guarantees the highest performance of the installation
- Mounting heights up to 6 meters, shield the leds with a diffuser.
- Use of lenses with backshield to avoid intrusive light
- Choice of color temperatures below 3000K,

in special protection zones, such as hospitals, airports, astrophysical institutes, nature protection zones, etc. use light sources with a spectral (G) index, greater than 1.5

- Apply the ALARA concept



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2 - BASES FOR EFFICIENT STREET LIGHTING

APPOINT A MANAGER FOR STREET LIGHTING OR HIRE A CONSULTANT

- He will be responsible for the application and management of the master plan
- Controlling the remote management system
- Keep inventory updated
- Ensure that the maintenance plan is applied

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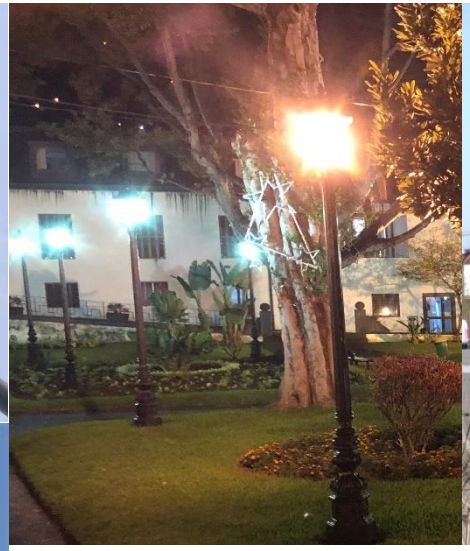
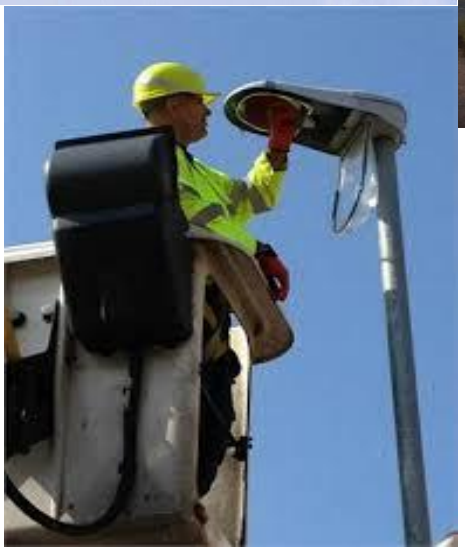
2 - BASES FOR EFFICIENT STREET LIGHTING

MAINTENANCE PLAN

The plan should provide for all procedures for preventive and corrective maintenance of all system components





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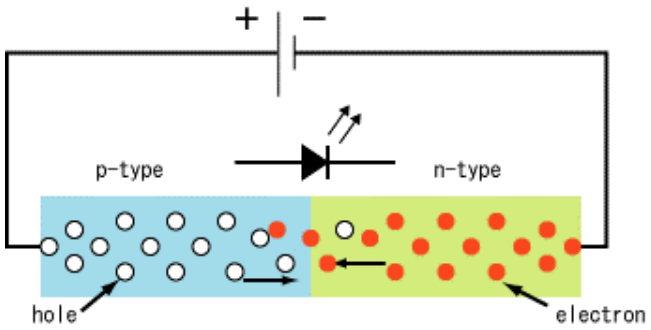
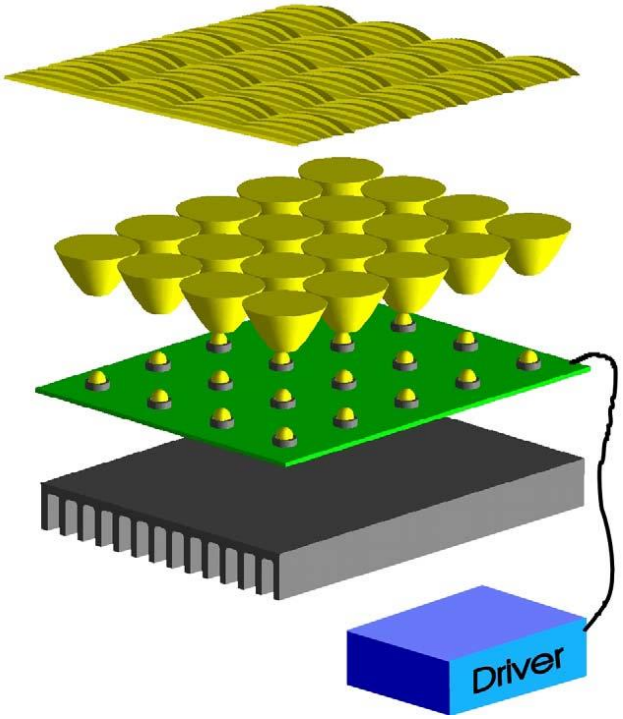
2 - BASES FOR EFFICIENT STREET LIGHTING

TECHNOLOGICAL SOLUTION: **LED, an ocean of opportunities for humanity.**



Light is emitted from a solid body, not a gas, through a filament bright

A diode is a device which allows current to flow in one direction.



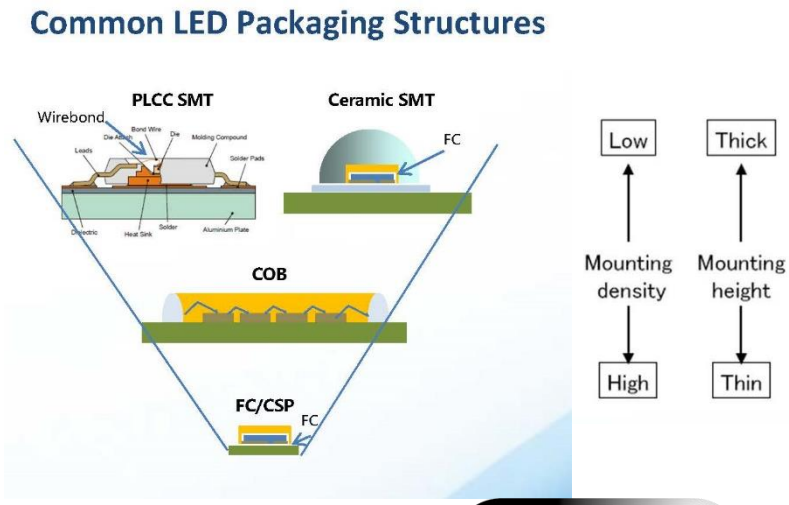
Protective / diffuser glass

Primary lenses

PCB + LED

Heatsink

Driver / DALI / 0-10V



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3 - LED TECHNOLOGY CHALLENGES

As the migratory flow of wildebeests

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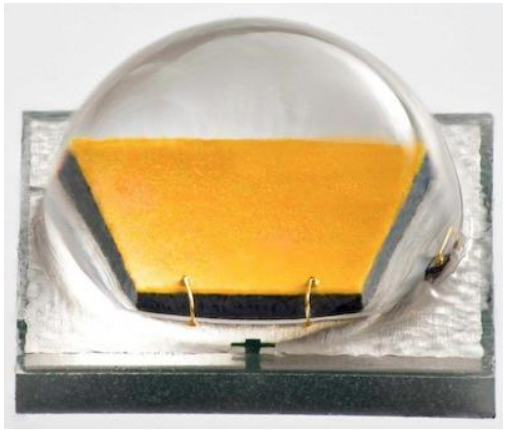
3 - LED TECHNOLOGY CHALLENGES

Some experts say it is the last migration

19lm/W



200lm/W

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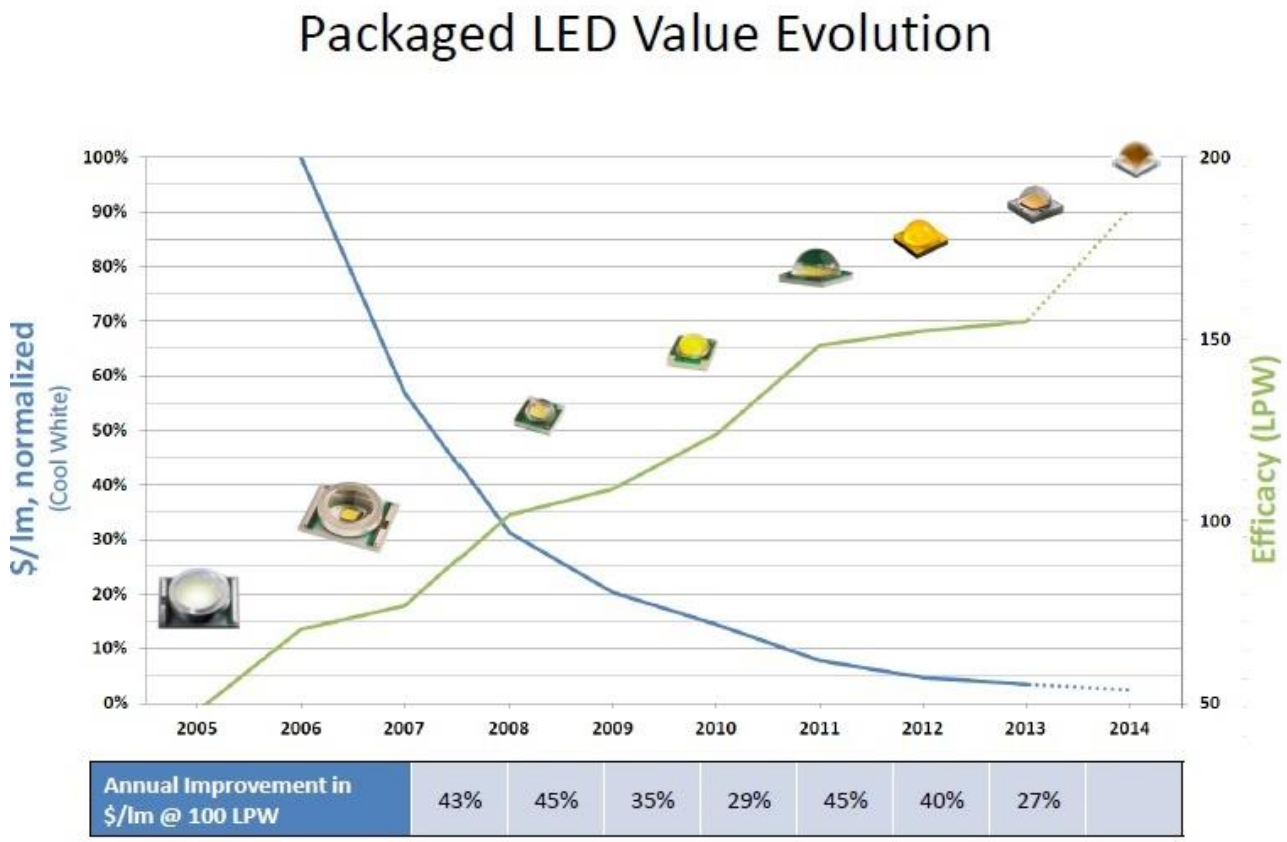
3 - LED TECHNOLOGY CHALLENGES

Take into account the risk of obsolescence



3 - LED TECHNOLOGY CHALLENGES

Quality is not seen

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3 - LED TECHNOLOGY CHALLENGES

Like the human being, there is no led like another

Tolerances:

All electrical and flux values are typical values at 25°C ambient.

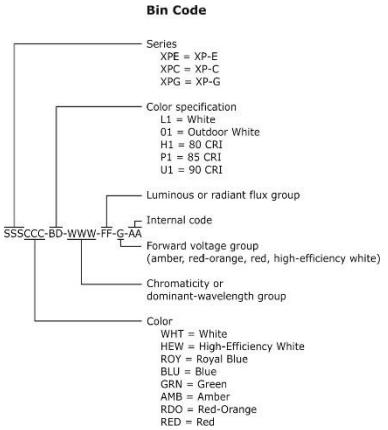
	Flux	W
LED	+/- 7%	-
Vf LED	-	+7% / -12%
I-driver	+/- 5%	+/- 5%
	+/- 12%	+12% / -17%

Temperature protection:

Both LED and Driver have a temperature protection.
When for any reason the temperature of LED is too high the system first dims back to 50%, if it is still too hot it will switch off. If the driver is too warm it switches off. Power will return automaticaly when the temperature has dropped again.

T_c max. of PCB:

T_c max. = 85°C
Measurement in LED D7.



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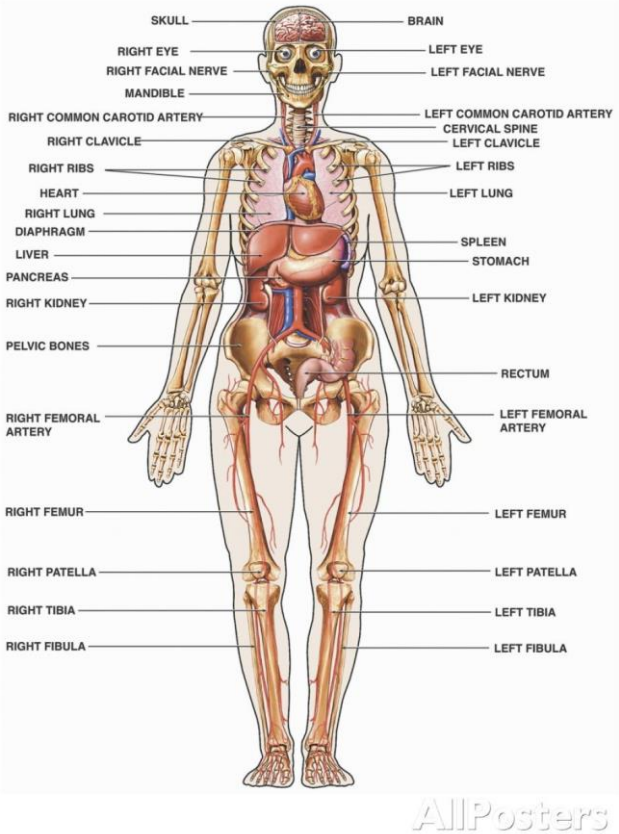
3 - LED TECHNOLOGY CHALLENGES

The wrong concept of durability

The magic number L80B10@100,000 Hours

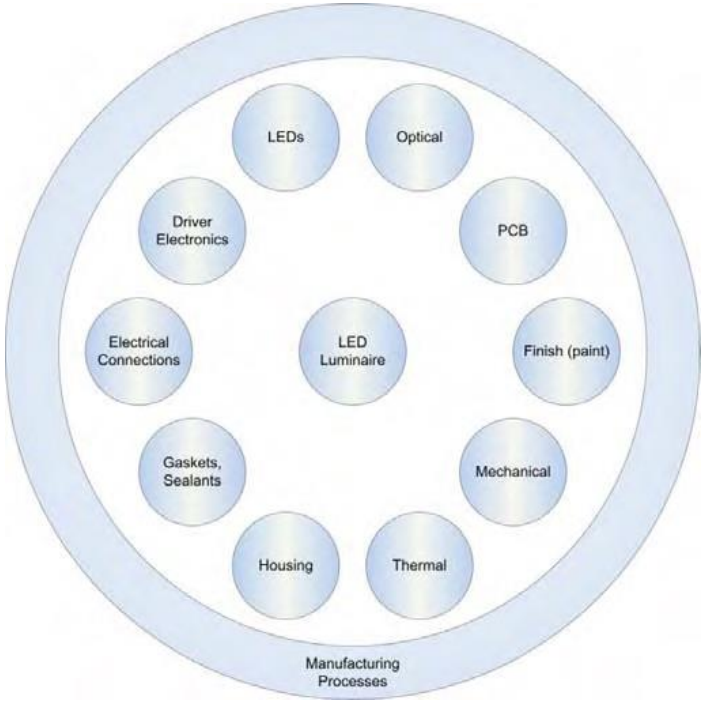
Luminaire life has to do with the reliability of the components of an LED luminaire as a system, the entire system lasts as long as the critical component with the shortest life. From this point of view LED light sources are simply one critical component among many.



Parametrics failures

And

Abrut failures



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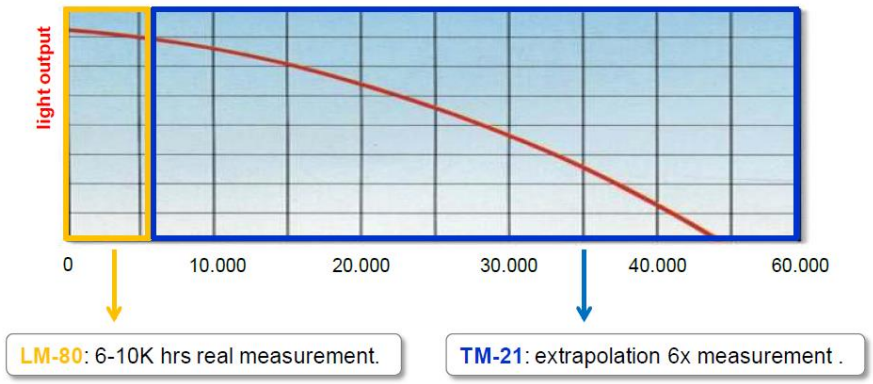
4 - CHALLENGES FOR EFFICIENT STREET LIGHTING

The wrong concept of durability

where does this magic number, L80B10@100,000 Hours, come?



- this is about lumen maintenance of LED's used in a LED luminaire;
- lumen maintenance LED's ≠ lumen maintenance LED luminaire!.

LED luminaire life according to the EN 62722 should always be published as a combination of life at lumen maintenance (Lx) and failure fraction (Fy). The failure fraction expresses the combined effect of gradual and abrupt failure of all components of a luminaire, including mechanical, as far as the light output is concerned. This means that the LED luminaire could either emit less light than claimed or no light at all.

The key question is: When is the end of life for a led luminaire

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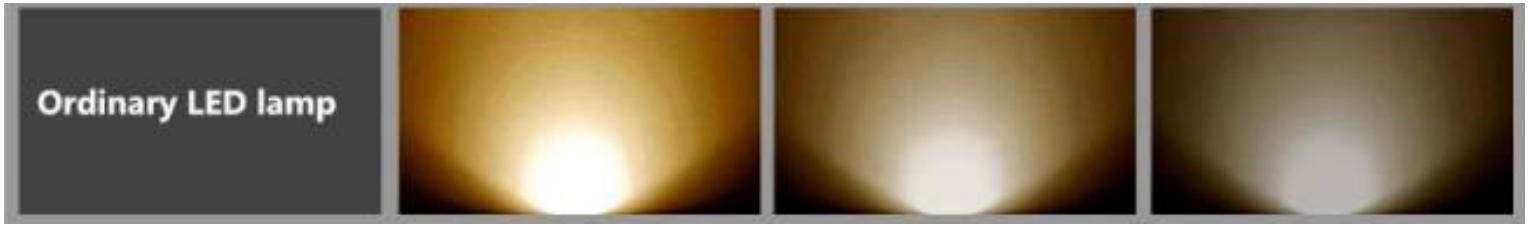
3 - LED TECHNOLOGY CHALLENGES

The wrong concept of durability

Examples

inconstancy of luminous flux



color inconstancy

abrupt failure

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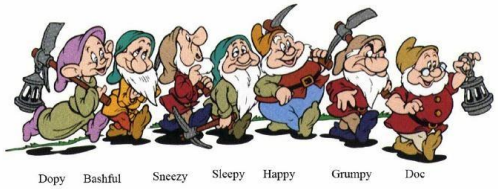
3 - LED TECHNOLOGY CHALLENGES

The misconception that the led does not need maintenance
Where we've read this: Zero maintenance

Luminaire is an electromechanical system and needs preventive maintenance

Which studies prove that an LED luminaire can increase cleaning intervals to twice the time or or it doesn't even need to be cleaned?



Group of cleaning dwarfs

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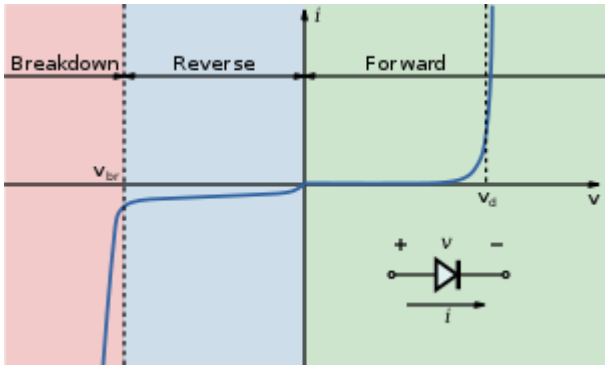
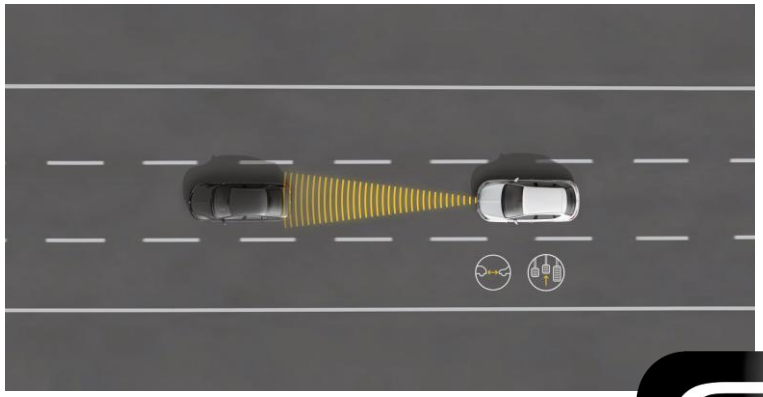
3 - LED TECHNOLOGY CHALLENGES

Driver: The most common is constant current





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3 - LED TECHNOLOGY CHALLENGES

Glare

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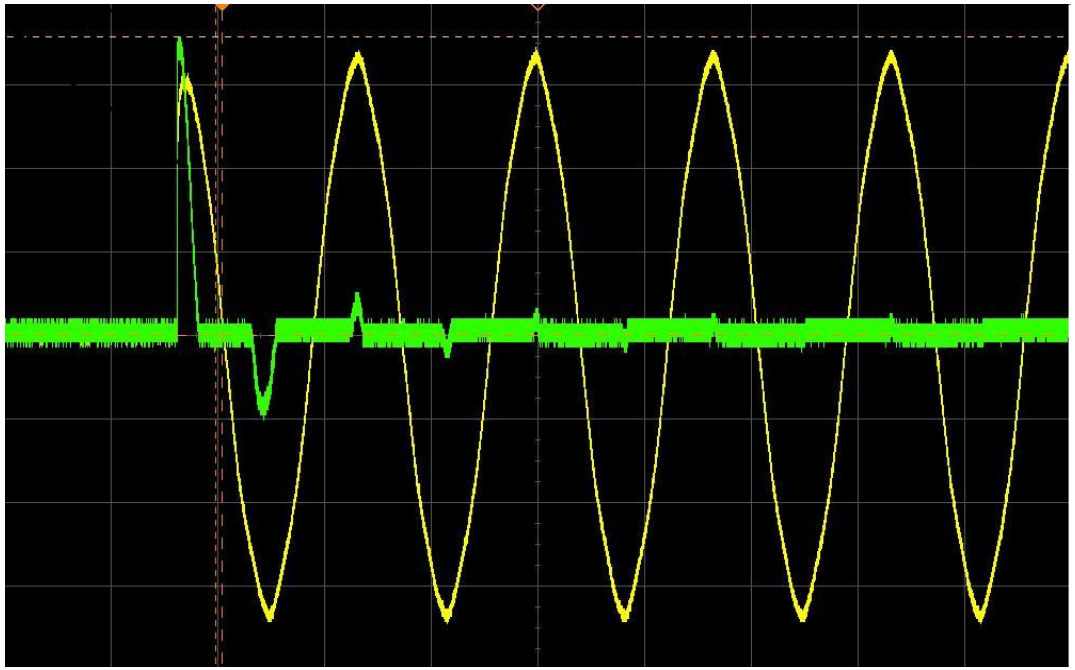
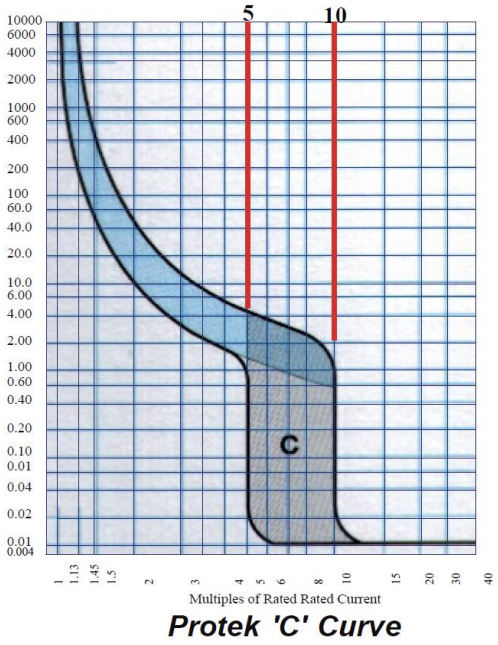
3 - LED TECHNOLOGY CHALLENGES

Inrush currents





Protek 'C' Curve

Fone: ETC Connected

For an LED driver, Philips Model 9137012116, 150W, 0.7A, used in various lighting fixtures, the peak current at startup is 130Amp for 165 Micro seconds.

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4 - CHALLENGES FOR EFFICIENT STREET LIGHTING

Lighting as a service (LaaS)? Acquisition and direct management?

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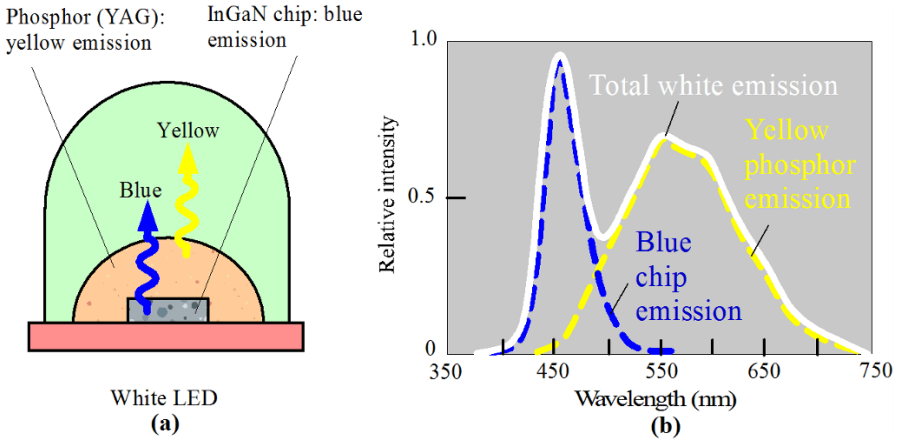
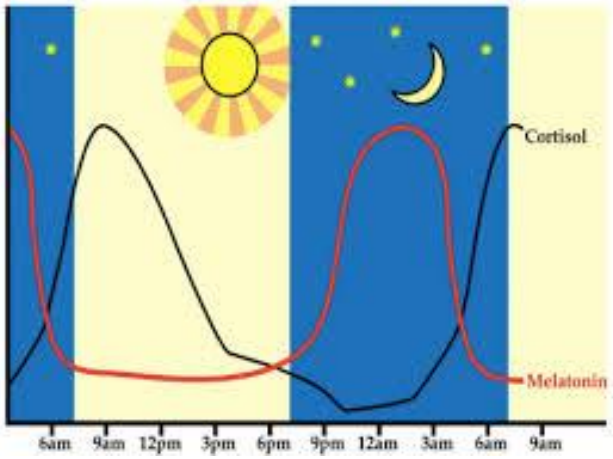
4 - CHALLENGES FOR EFFICIENT STREET LIGHTING

Street Lighting and Blue Light

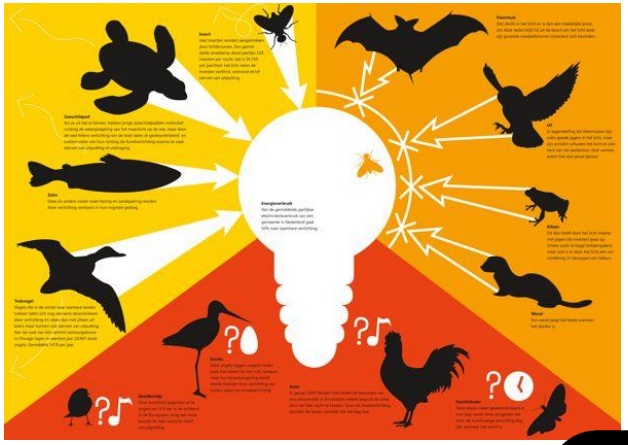


Phosphor-converted LED -white light

Sky Glow



Circadian rhythm



impacts on biodiversity

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4 - CHALLENGES FOR EFFICIENT STREET LIGHTING

Midia

CNN Health » Diet + Fitness | Living Well | Parenting + Family Live TV U.S. Edition + menu

Doctors issue warning about LED streetlights

THE CONVERSATION By Richard G. "Bugs" Stevens, The Conversation
Updated 2:00 PM ET, Tue June 21, 2016

Photos: Los Angeles LED streetlights

The Sixth Street bridge over the Los Angeles River looks a bit different with old, left, and new streetlights.

Romance of Rome under assault from ugly LED lighting

•Save

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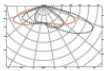
3 - LED TECHNOLOGY CHALLENGES

Greater complexity for the project team

ORW


Installations Class M1-M2 w=1,4h; Sa3,5h.
installations Class M in urban areas, with nigh speed motorized traffic.

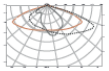
Width (w) / Height (h): 1-1,4
Class (Installation): M1 - M2



ORS


Installations Class M1-M2 w=0,7-1h; Sa3,5h.
installations Class M in urban areas with nigh intensity and speed.

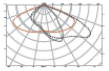
Width (w) / Height (h): 0,7-1
Class (Installation): M1 - M2



ORW2


Installations Class "M1-M2" w=1,4h; Sa3,5h; for tilted lighting points or fittings with optical axis over the edge of the road.
installation Class M in urban areas with nigh speed motorized.

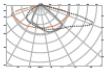
Width (w) / Height (h): 0,7-1
Class (Installation): M1 - M2



ORSH


Installations Class M3 with w=1,4h; Sa5h.
installations in city centers Class P1-P6 w=1,4h; Sa9h.

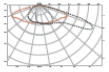
Width (w) / Height (h): 0,7-1
Class (Installation): M3 - M4



ORSX


Installations Class M3 w=1,4h; Sa4,5h.
Installations Class M4 w=1,4h; Sa5h. Installations Class M in urban areas with motorized traffic.

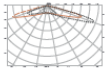
Width (w) / Height (h): 1-1,4
Class (Installation): M3 - M4



ORWY


Installations "M3-M6" w=0,7- 1h; Sa4h; Specially devoted for Smart Poles and Columns & Lighting Columns.
Installations "P1-P6" w=0,7-1h; Sa5h;
Perfect solution for Bollards (lower height).

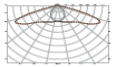
Width (w) / Height (h): 0,7-1
Class (Installation): P1 - P6



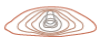
ORN


Layouts with w=0,7- 1h, with lighting pole place in the center of the transversal section. Single-side lighting layouts with transversal w=0,7h with tilted. Installations Class C2-C5 with w=0,7h; S=5h.
Walking and cycling paths.

Width (w) / Height (h): 0,7-1
Class (Installation): P1 - P6

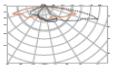


ORNW

Installations Class M4 with w=0,7h; Sa5h.
Installations Class M4 with w=0,7h; Sa5h.
Installations Class P1 to P6 w=0,7- 1h; Sa8h.
Installations Class M in urban areas with motorized traffic.

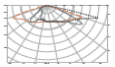
Width (w) / Height (h): 0,7
Class (Installation): M5 - M6; P1 - P6



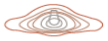
ORWW


Installations Class "C0-C5" w=0,7- 1,4h; Sa3,5h.
City center urban areas.

Width (w) / Height (h): 0,7-1,4
Class (Installation): C0 - C5

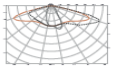


ORSY

Installations Class C3 w=0,7- 1h; Sa5h. City center.

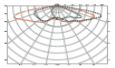
Width (w) / Height (h): 0,7-1
Class (Installation): P1 - P6



ORWX


Installations "P1-P6" w=0,7- 1,4h; Sa3,5h; complying with semi-cylindrical or vertical illuminances values. Specially designed for areas where recognition of faces and vertical surfaces takes on considerable importance. City center urban areas.

Width (w) / Height (h): 0,7-1,4
Class (Installation): P1 - P6



- Counterbeams

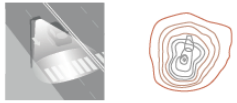
CB1 / CB2

Specific application: for using in wide spaces where it is necessary to spread the light away from the luminaire in a non-regular arrangement, according to the environment.

- Pedestrian crosses optics

Specific designed, developed and manufactured person-centred optical systems aiming to light spaces where the well-being and safety of people are critical.

PCR

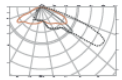


PCL

ORWA


Installations Class "C2 to C5" w=1,4h; Sa3,5h.
City center urban areas.
Smart Poles and Lighting Columns.

Width (w) / Height (h): -
Class (Installation): C0 - C5



OP

Quadrangular public lighting point installations.
Public lightingswide layouts with lighting points in the middle of the surface, with special consideration for transversal sections. Installations Class C.
City center and pedestrian zones.

Width (w) / Height (h): -
Class (Installation): C0 - C5

OPB

Installations Class C. City center and pedestrian zones.
Specially devoted for Smart Poles and Columns & Lighting Columns.
Perfect solution for bollards (lower height).
Guidance Lighting Optical Systems.

Width (w) / Height (h): -
Class (Installation): C0 - C5

- Squares and roundabouts

A45

Installations Class "C" of roundabouts with lighting points in the center of the roundabout island.
Urban andextra-urban roundabouts.

Class (Installation): C0 - C5

A45W

Installation Class "C" of roundabouts with lighting points in the external roundabout ring. Urban & extra-urban roundabouts.

Class (Installation): C0 - C5

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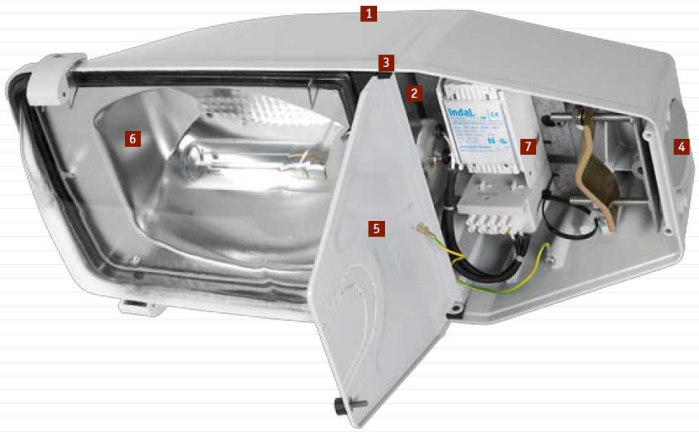
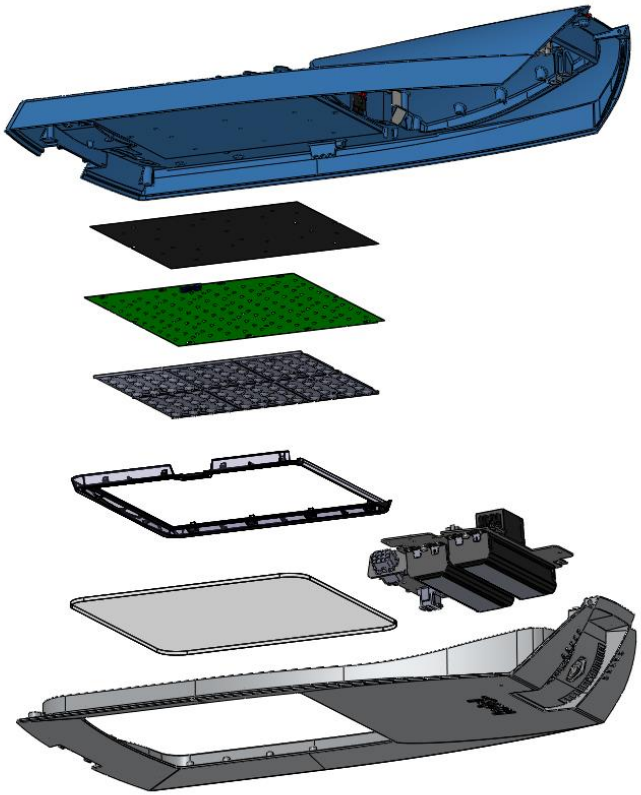
4 - CHALLENGES FOR EFFICIENT STREET LIGHTING

Unpreparedness and ignorance of those who install and maintain





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4 - CHALLENGES FOR EFFICIENT STREET LIGHTING

Population feeling of belonging

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4 - CHALLENGES FOR EFFICIENT STREET LIGHTING

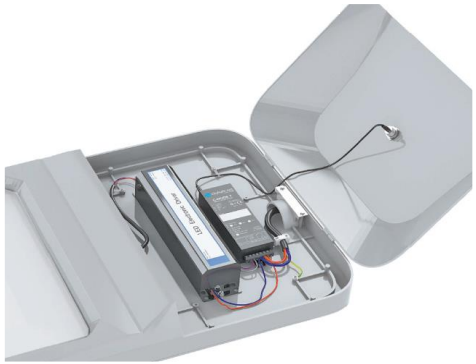
Choose the most sustainable remote management system for your project

- Mesh network
- Star network
- PLC

Note- Be careful of hidden costs

Wireless System

Antenna



ZHAGA

NEMA

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4 - CHALLENGES FOR EFFICIENT STREET LIGHTING

Read the warranty terms carefully

Ten years is the normal period

- Have you registered your products online?
- Date of installation?
- Normal operating conditions. What does that mean?
- Does the activation of a guarantee after 5 or 6 years guarantee the same product?

2010

2017

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The future

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5 - WHERE ARE WE GOING

- Street lighting will be adaptable through an invasion of sensors and controls. SMARTLIGHTING
- - Lighting levels will drop, standards will be revised downwards.
- Color temperatures tend to be less than 3,000 K, in some areas they will be in the order of 2,200 K, such as special protection areas, astrophysical institutes, etc. The trend wil be Improve environments, improve health.
- The fixtures will be a commodity, the value will be in the software and connectivity
- A lighting system will serve 10% to light and the rest will be associated services

We are here!!!

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5 - WHERE ARE WE GOING

Street lighting is a capillary network of excellence

Street lighting its ubiquitous

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5 - WHERE ARE WE GOING

There's a new friend in the room

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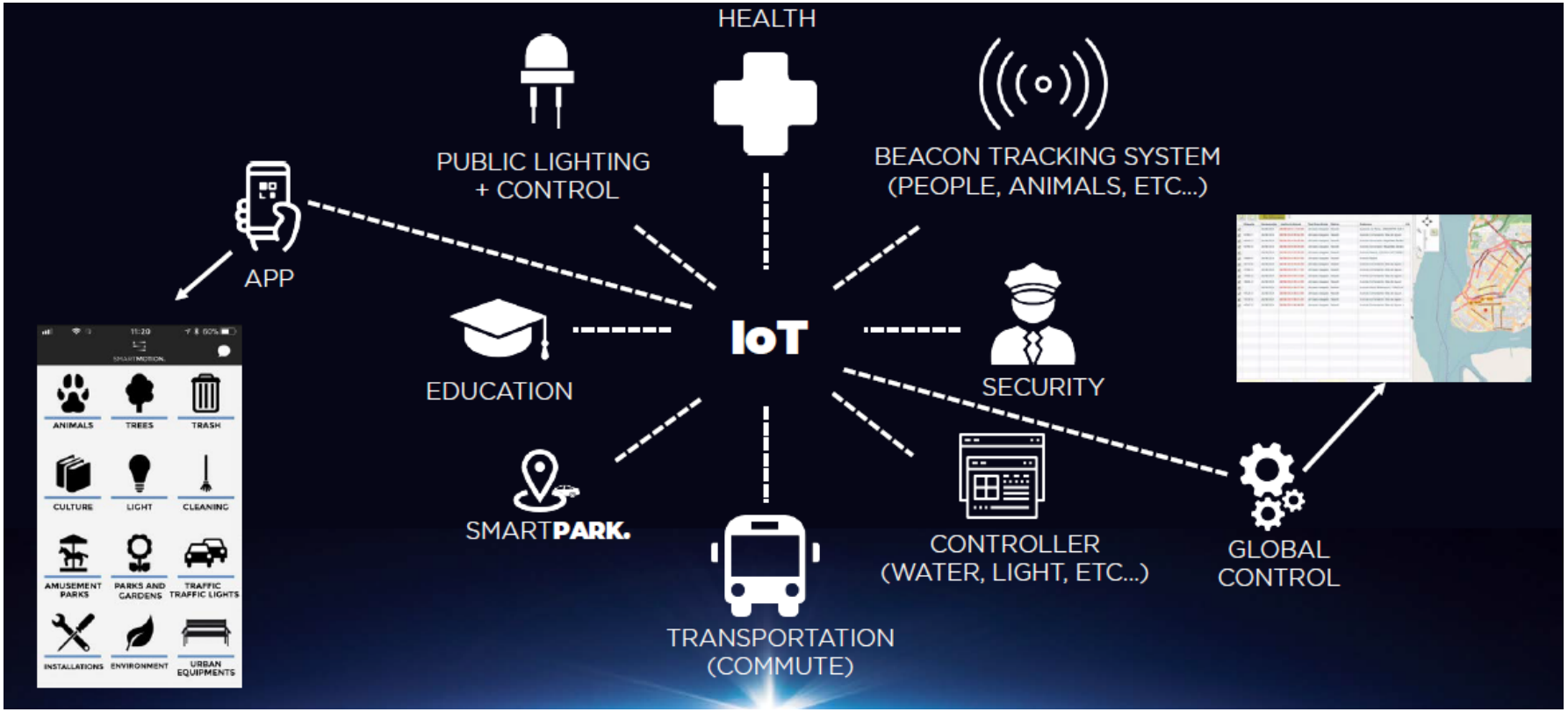
5 - WHERE ARE WE GOING

Street lighting will play a major role in the construction of a smartcity / IOT



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5 - WHERE ARE WE GOING

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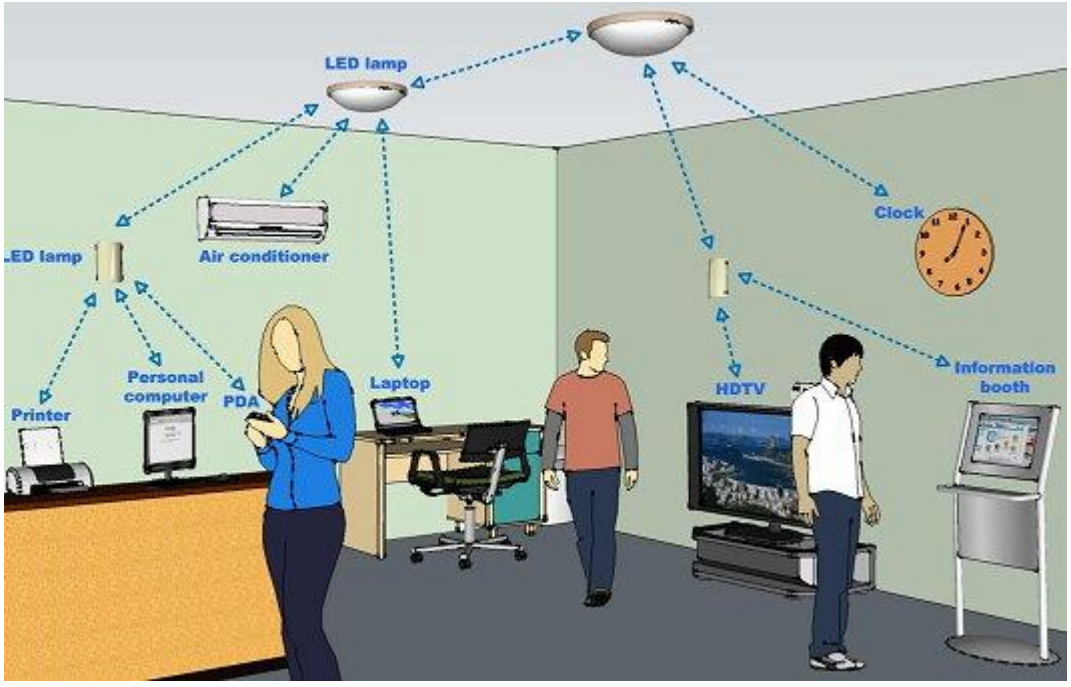
5 - WHERE ARE WE GOING

LIFI/VLC/IOE

- The radiofrequency spectrum is walking to saturation
- ‘Electro-smog’ or electromagnetic pollution from WIFI radiation
- Visible light spectrum is 10,000 bigger than RF, non-licensed and 100 times faster, 224 GB/S
- Much higher energy efficiency
- Cybersecurity

DISADVANTAGES

- Limited range
- Limited compatibility
- Non-functionality with slow internet



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3 - LED TECHNOLOGY CHALLENGES

LASER

"The light output is about 1000 times higher than conventional LEDs with the same chip-size. (…) This technology will be ready in 5 to 10 years because we see existing applications in the automotive industry right now."

Prof. Shuji Nakamura, Nobel Prize 2015

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END

Thank you for your attention

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