

<b>LED EVENT 2015</b> Design en engineering trends voor LED applicaties	BE WOENSDAG 2 december 2015 ELEWIJT CENTER, ELEWIJT-ZEMST
	NL DONDERDAG 3 december 2015 1931 CONGRESCENTRUM BRABANTHALLEN, DEN BOSCH



In cooperation with



***Giacomo Mazzullo***  
*Key Account Manager*  
*Mean Well Europe B.V.*

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# *Programmable LED drivers*

## *“the impact on current and future lighting design”*

FHI LED Event - Dec 2015

- *2nd Dec – Belgium*
- *3rd Dec - the Netherlands*

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## AGENDA

- Industrial And Commercial LED Lighting Market
- Applications
- Actual Technology
- Dimmable Vs Programmable
- Evolution
  - Digital Protocols
  - Scalability
  - Wireless
  - Functions
- Street Lighting Future
  - Light Pollution
  - Centralized Control
  - Smart Dimming
  - Los Angeles (USA) – Case Study
- Mean Well – Elg Series
  - ELG SERIES – Smart Dimming
  - ELG SERIES - New Technology – New Price
- Conclusions
- Q&A

## INDUSTRIAL AND COMMERCIAL LED LIGHTING MARKET



Global industrial and commercial LED lighting market had a value of **13 Bln USD in 2012** and is expected to reach **86 Bln USD by 2019** with an estimated **CAGR of 30.8% (6Y 2013 – 2019)**.

### **CAGR (Compound Annual Growth Rate)**

.. is the mean annual growth rate of an investment over a specified period of time longer than one year.

## APPLICATIONS

- Indoor
- Outdoor
- Industrial
- Street Lighting

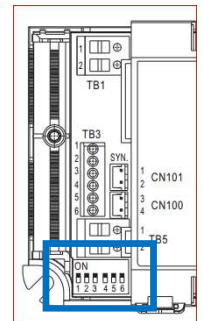
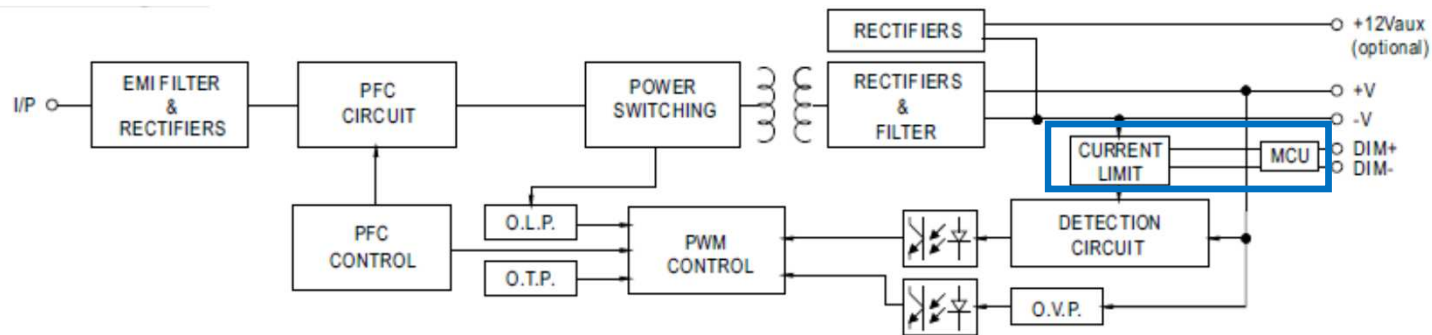
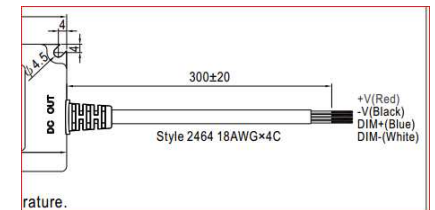
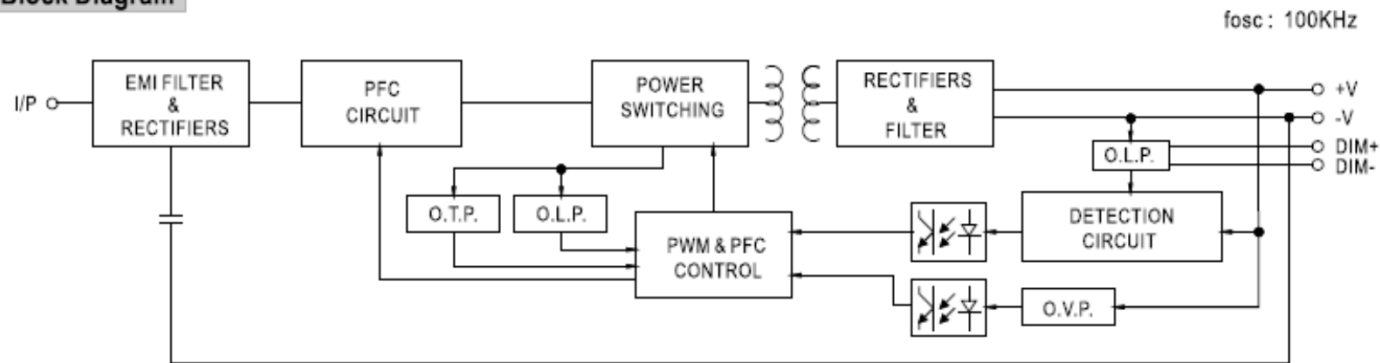


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# ACTUAL TECHNOLOGY



## ■ Block Diagram



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## DIMMABLE vs PROGRAMMABLE



MODEL		LCM-60					
OUTPUT	SELECTABLE CURRENT <small>Note.3</small>	500mA	600mA	700mA	900mA	1050mA	1400mA
	DC VOLTAGE RANGE	2 ~ 90V	2 ~ 90V	2 ~ 86V	2 ~ 67V	2 ~ 57V	2 ~ 42V
	RATED POWER	60.3W					
	RIPPLE CURRENT	±5%					
	RIPPLE & NOISE (max.) <small>Note.2</small>	700mVp-p					
	NO LOAD OUTPUT VOLTAGE (max.)	95V				73V	
	CURRENT ACCURACY	±5.0%					
	SETUP, RISE TIME <small>Note.5</small>	500ms, 80ms / 230VAC at rated power					
INPUT	HOLD UP TIME (Typ.)	16ms/230VAC at rated power					
	VOLTAGE RANGE <small>Note.4</small>	180 ~ 295VAC		254 ~ 417VDC			
	FREQUENCY RANGE	47 ~ 63Hz					
	POWER FACTOR (Typ.)	PF ≥ 0.975/230VAC, PF ≥ 0.96/277VAC at rated power (Please refer to "Power Factor Characteristic" curve)					
	TOTAL HARMONIC DISTORTION	Total harmonic distortion will be lower than 20% when output loading is 75% or higher					
	EFFICIENCY (Typ.) <small>Note.6</small>	92%					
	AC CURRENT (Typ.)	0.32A/230VAC		0.27A/277VAC			
	INRUSH CURRENT(Typ.)	COLD START 20A(t <sub>width</sub> =270μs measured at 50% I <sub>peak</sub> ) at 230VAC					
MAX. No. of PSUs on 16A CIRCUIT BREAKER		25 units (circuit breaker of type B) / 32 units (circuit breaker of type C) at 230VAC					
LEAKAGE CURRENT		<0.5mA / 240VAC					

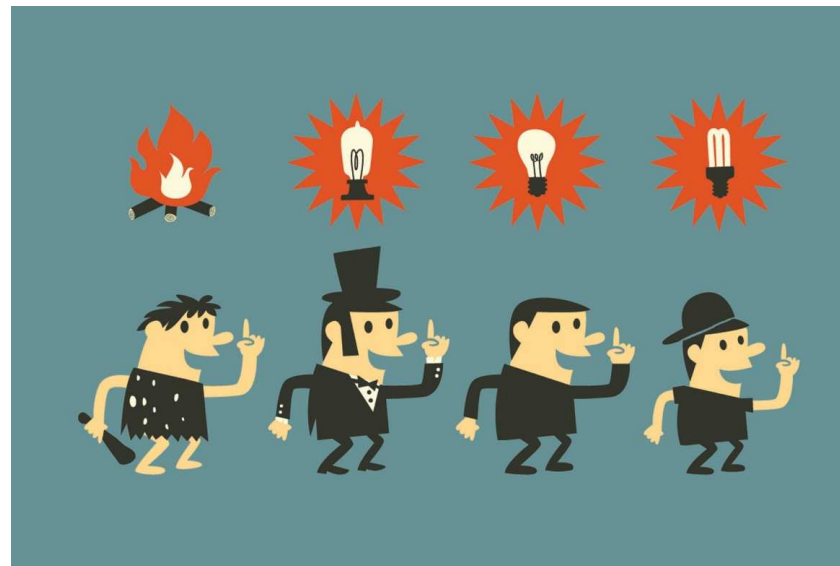


MODEL		LPF-60D-12	LPF-60D-15	LPF-60D-20	LPF-60D-24	LPF-60D-30	LPF-60D-36	LPF-60D-42	LPF-60D-48	LPF-60D-54
OUTPUT	DC VOLTAGE	12V	15V	20V	24V	30V	36V	42V	48V	54V
	CONSTANT CURRENT REGION <small>Note.4</small>	7.2 ~ 12V	9 ~ 15V	12 ~ 20V	14.4 ~ 24V	18 ~ 30V	21.6 ~ 36V	25.2 ~ 42V	28.8 ~ 48V	32.4 ~ 54V
	RATED CURRENT	5A	4A	3A	2.5A	2A	1.67A	1.43A	1.25A	1.12A
	RATED POWER	60W	60W	60W	60W	60W	60.12W	60.06W	60W	60.48W
	RIPPLE & NOISE (max.) <small>Note.2</small>	150mVp-p	150mVp-p	150mVp-p	150mVp-p	200mVp-p	250mVp-p	250mVp-p	250mVp-p	350mVp-p
	VOLTAGE TOLERANCE <small>Note.3</small>	±4.0%	±4.0%	±4.0%	±4.0%	±4.0%	±4.0%	±4.0%	±4.0%	±4.0%
	LINE REGULATION	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%
	LOAD REGULATION	±2.0%	±1.5%	±1.0%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%
INPUT	SETUP, RISE TIME <small>Note.7</small>	1000ms, 80ms / 115VAC at full load    500ms, 80ms / 230VAC								
	HOLD UP TIME (Typ.)	16ms/230VAC		16ms/115VAC at full load						
	VOLTAGE RANGE <small>Note.5</small>	90 ~ 305VAC		127 ~ 431VDC						
	FREQUENCY RANGE	47 ~ 63Hz								
	POWER FACTOR (Typ.)	PF>0.97/115VAC, PF>0.95/230VAC, PF>0.92/277VAC at full load (Please refer to "Power Factor Characteristic" curve)								
	TOTAL HARMONIC DISTORTION	THD< 20% when output loading≥60% at 115VAC/230VAC input and output loading≥75% at 277VAC input								
	EFFICIENCY (Typ.)	86%	87%	88%	89%	90%	90%	90%	90%	90%
	AC CURRENT (Typ.)	0.8A / 115VAC		0.4A / 230VAC		0.32A/277VAC				
INRUSH CURRENT (Typ.)		COLD START 55A(t <sub>width</sub> =270μs measured at 50% I <sub>peak</sub> ) at 230VAC								
MAX. No. of PSUs on 16A CIRCUIT BREAKER		8 units (circuit breaker of type B) / 14 units (circuit breaker of type C) at 230VAC								
LEAKAGE CURRENT		<0.75mA / 240VAC								

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# EVOLUTION



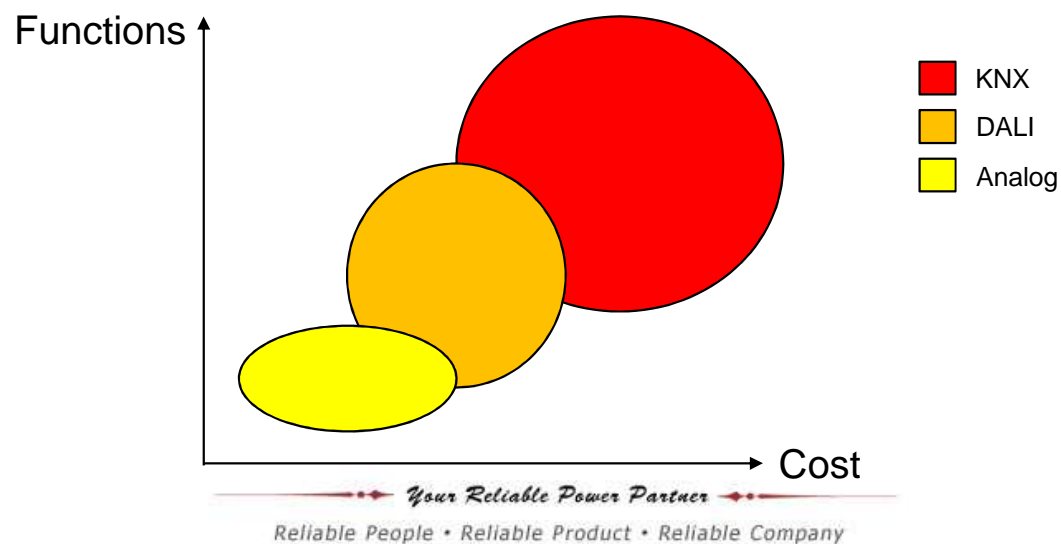
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## DIGITAL PROTOCOLS



	Floating control input, basic insulation	Two-wire line (polarity-free)	Addressing	Scene memory	Status messages	Individual dimming	Memory	Stby	Auto Dimming
DALI/KNX	yes	yes	yes	yes	yes	yes	yes	yes	yes
1-10	yes	no	no	no	no	no	no	no	no
0-10	yes	no	no	no	no	no	no	yes	no
PWM	yes	no	no	no	no	no	no	yes	no

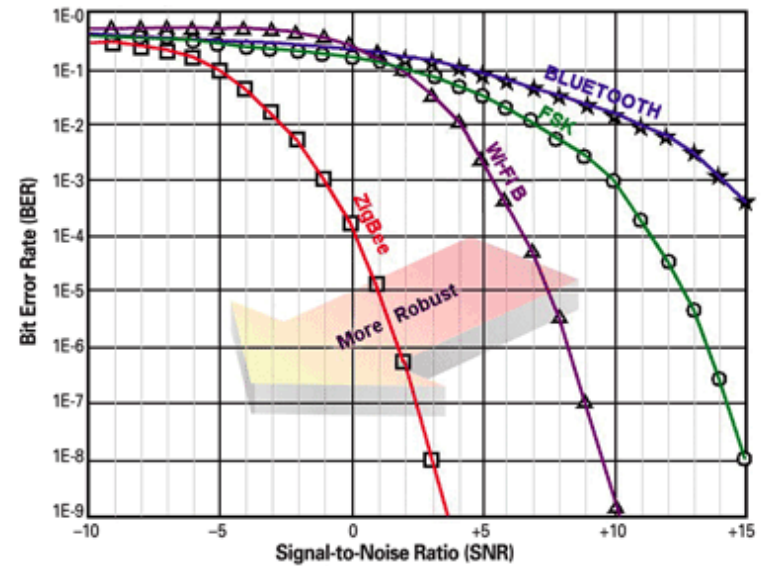
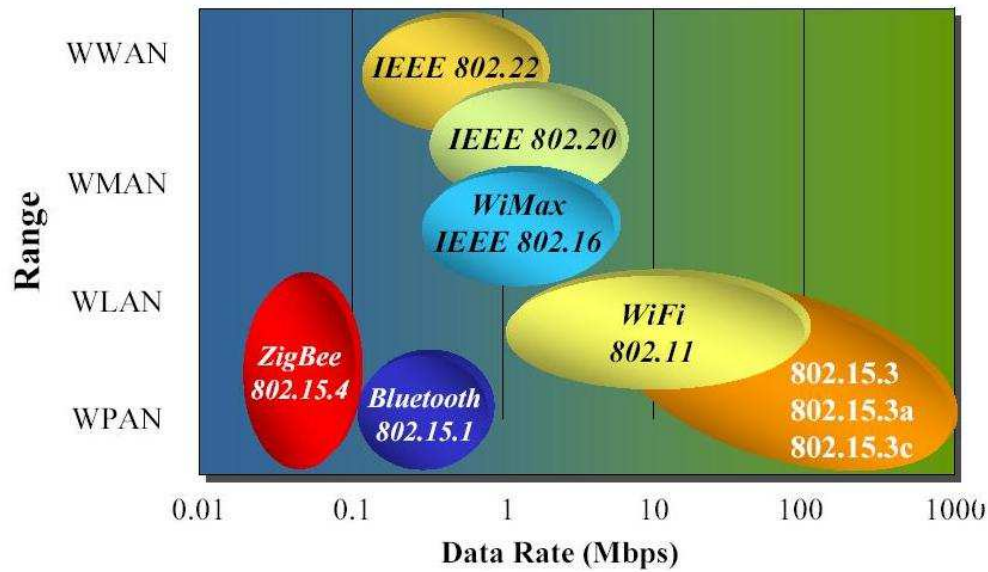


## SCALABILITY

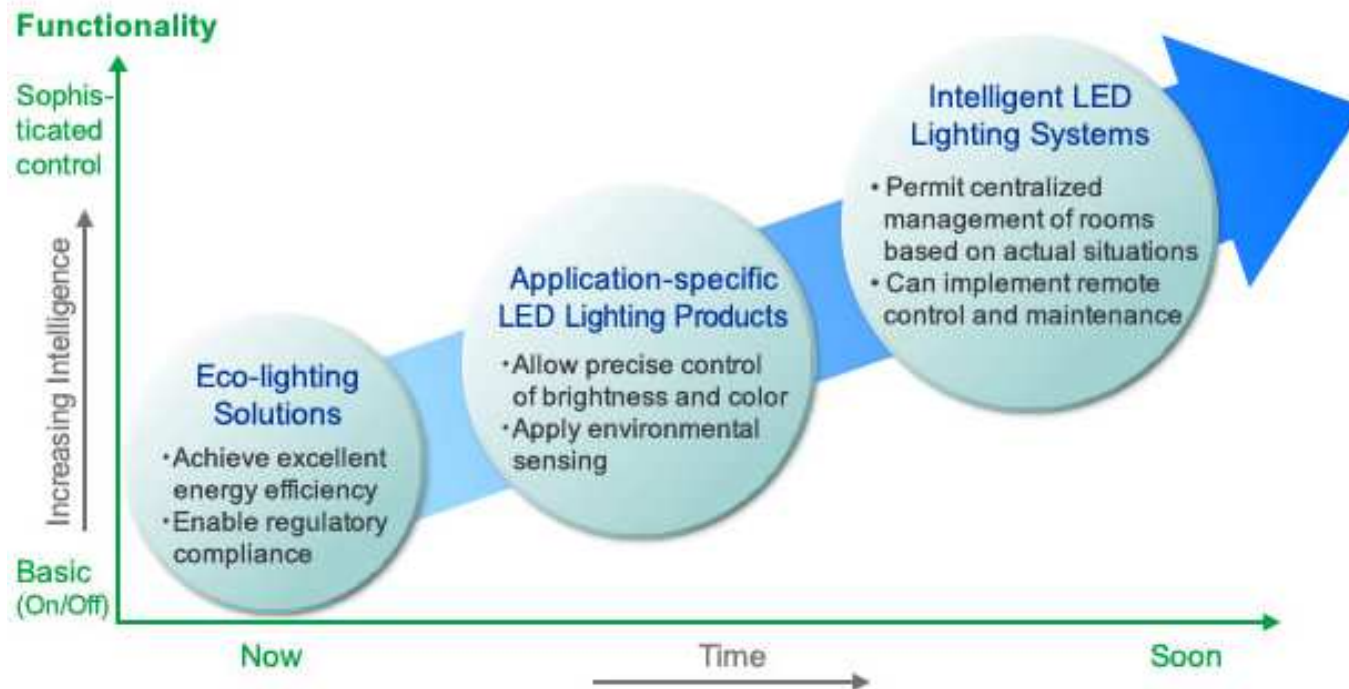


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# WIRELESS



# FUNCTIONS



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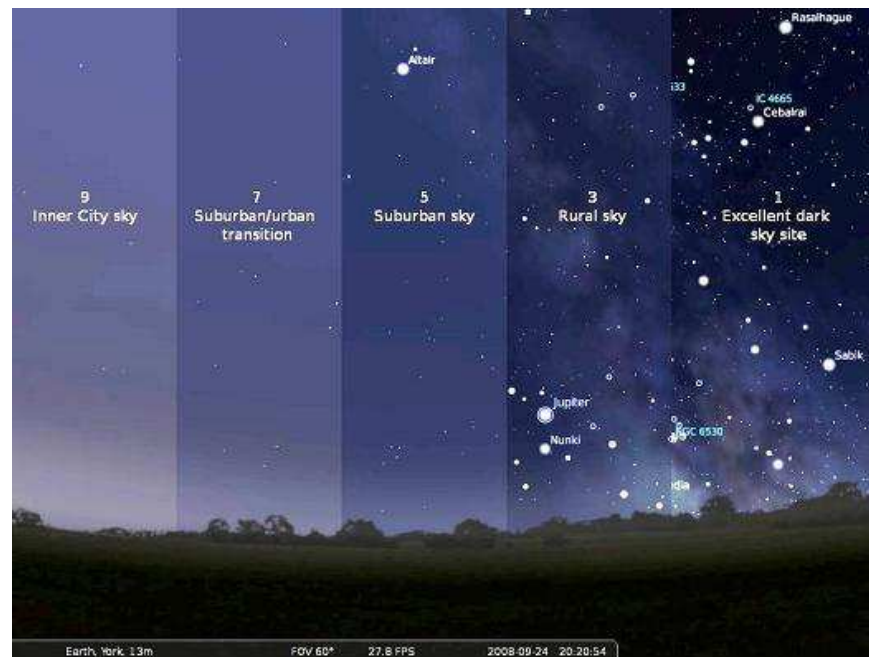
# STREET LIGHTING FUTURE



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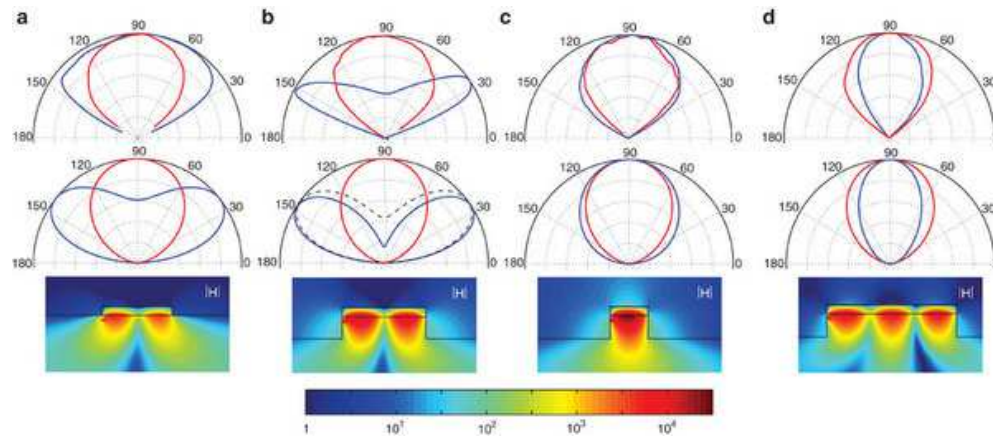
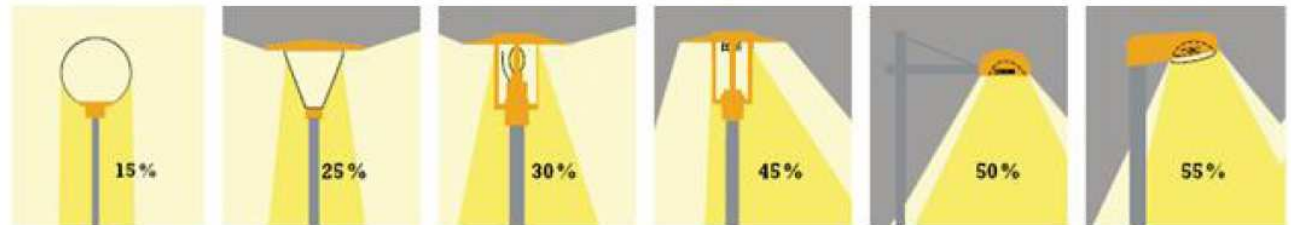
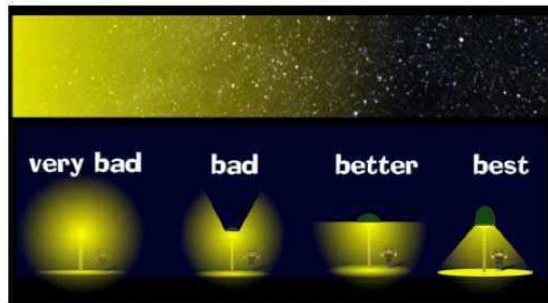
# LIGHT POLLUTION



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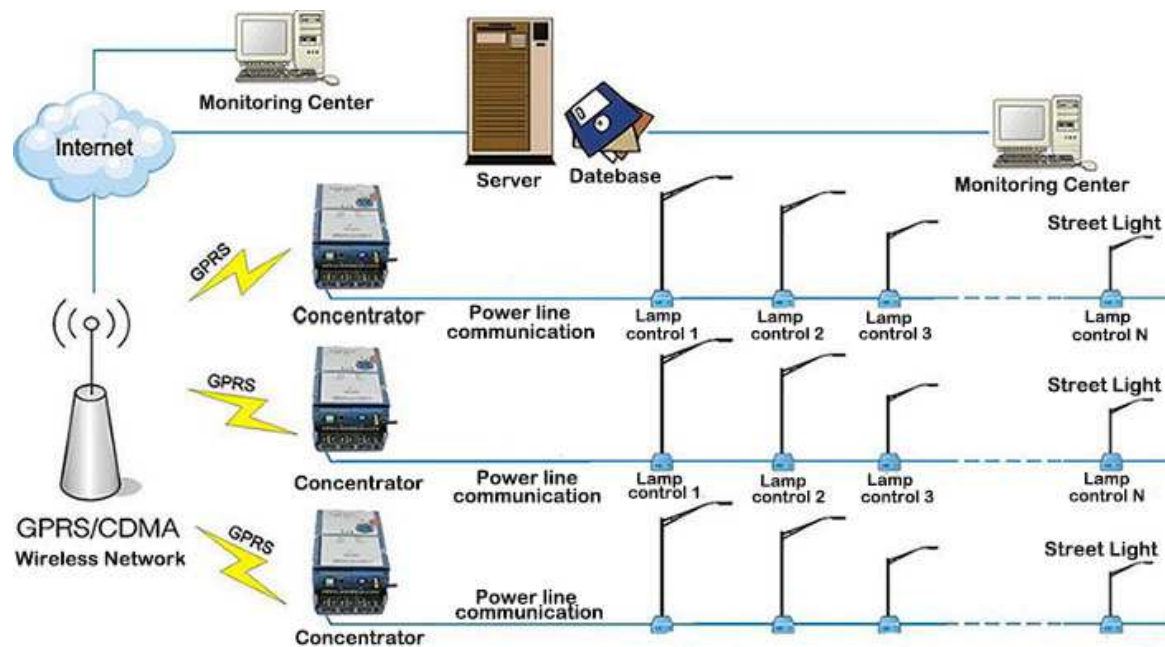


# LIGHT POLLUTION



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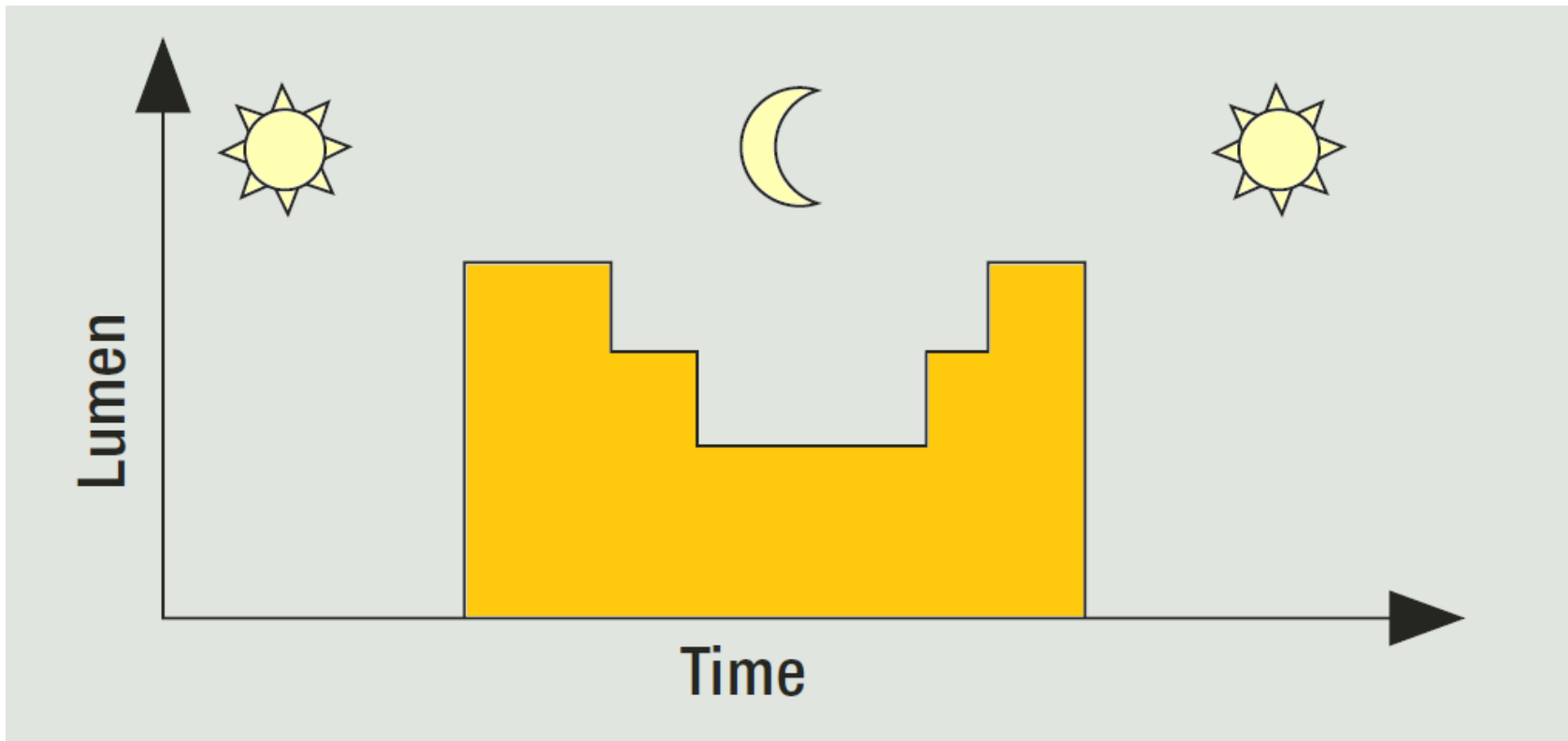
## CENTRALIZED CONTROL



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## SMART DIMMING



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## LOS ANGELES (USA) – CASE STUDY



Los Angeles has changed 140,000 street lights for highly efficient LEDs, a move that saves the city \$10 million annually.

The replacement program cost is estimated at \$57 million over the four years.



## MEAN WELL – ELG SERIES



Model	Category	IP Level	Input/Output Style	Introduction
Blank	Standard	IP67	Cable	Constant current level fixed.
A	Standard	IP65	Cable	Constant current level adjustable through internal potentiometer.
B	Standard	IP67	Cable	Constant current level adjustable with additive 0~10Vdc, 10V PWM signal and resistance (3 in 1 dimming function)
D2	Optional	IP67	Cable	Smart timer dimming function. Please contact MEAN WELL for details.
DA	Optional	IP67	Cable	DALI function. Please contact MEAN WELL for details.

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## ELG SERIES - SMART DIMMING

### ❖ PROGRAMMABLE output current

- Through a PC software, user can set the output current in percentage

### ❖ CONSTANT LIGHT OUTPUT

- To compensate the depreciation of LED module over life time

### ❖ PROGRAMMABLE DIMMING CURVE

- Through a PC software, user can program the dimming curve, no need TS or modifications, simple and fast to meet all customer needs.

### ❖ ADAPTIVE DIMMING CONTROL (SELF-LEARN MODE)

- According to usage, automatic determine and adjust the dimming curve

### ❖ TEST / DEMO MODE

- Quick test to check about the customized dimming curve



PC / Software



USB



SmartDim  
Programmer

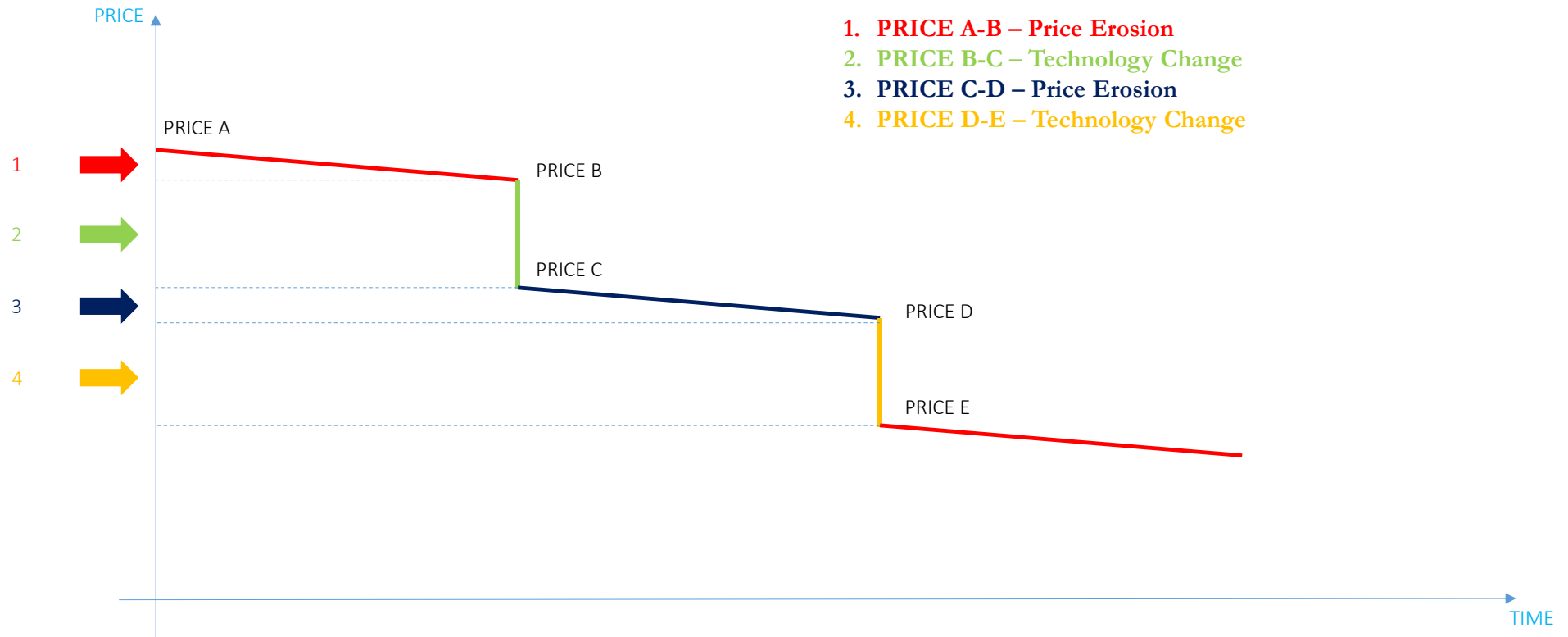


ELG D2 version

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## ELG SERIES – New Technology – New Price





## CONCLUSIONS

- LED high end market shows increasing demand for more complex solutions
- Simple dimming (i.e. 1-10V) is still the most economic solution
- DALI, KNX, Wireless Dimming solution will bring added value to our customers but also a price increase of the final solution
- Street Lighting is a High Potential Market
- The need to change current Street Lighting Solution comes from both energy saving demand and high level of light pollution in urban areas
- Los Angeles Case Study shows a short ROI cycle
- Mean Well Introduced ELG Series for your Street Lighting Solutions
- ELG series introduce new features integrated inside the driver (DALI – Smart Dimming - ...)



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## LED EVENT 2015

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ELEWIJT CENTER, ELEWIJT-ZEMST

NL DONDERDAG 3 december 2015  
1931 CONGRESCEENTRUM  
BRABANTHALLEN, DEN BOSCH



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