

# Sustainable Public Street Lighting with LEDs

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**1. Starting point:** Rising energy costs and continuously growing cities force many municipalities to find sustainable solutions for public street lighting.

Moreover, many street lights have to be replaced because of:



Corrosion (“*age-related weakness*”),  
yellowish-brown cover glasses,  
vandalism or  
accumulation of insects in the  
luminaire housing



**2. Institutional setting:** *Purchasing new street lights - what are the main points that should be considered ?*

The innovative approach shall bring a solution which fulfills following expectations:

- Energy as well as maintenance costs shall be significantly reduced
- Operational safety and life span shall be increased
- The lighting situation in conjunction with the road safety shall be improved
- Cleaning costs shall be minimized
- Avoiding accumulation of insects inside the luminaire
- The luminaires should be vandal-proof
- The criteria for sustainability shall be fulfilled
- Any replacement purchase shall be easy, fast and cost-effective
- The colour rendering index shall be high (80+)
- Glare shall be as low as possible
- The illuminated area shall preferably be the same as the public traffic area to avoid light pollution.



### ***3. Approach - Some homework has to be done first***

A multi-step procedure makes sure that all relevant data have been considered:

#### **Inventory check list:**

How many different types (design, lamps) of street lights actually exist?

Numbers and power consumption of each type?

Age of the luminaires / life span estimation?

#### **Payback calculation for each luminaire type:**

Old luminaire vs. innovative LED lighting concept => sample calculation

#### **Comparative field test:**

A side by side installation “Old vs. New” is better than any lighting calculation: “Nothing is more convincing than reality!”.

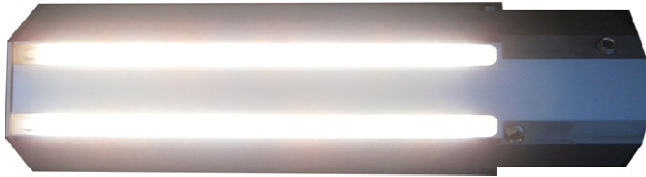
#### **Local presence:**

The local presence of the manufacturer means more safety & sustainability for the lifespan of the LED street lights.

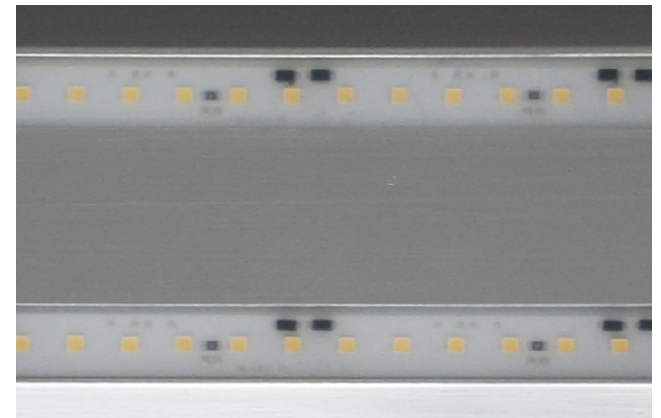


#### 4. **Outputs:** Have all goals been achieved?

- Reduced energy costs: ultra high efficient LEDs sourced from premium manufacturers ✓
- Reduced maintenance costs: no exchange of the light engine necessary during its life span (about 15 years) - factory overhaul prolongs it by another 15 years! ✓
- Minimized cleaning costs: small shape => no big plastic cover ✓



- Operational safety I: increased life span due to optimum heat dissipation as the housing works as a heat sink ✓
- Operational safety II: easy access to the power supply which can be placed close to the inspection shaft (DC wire connection to the luminaire) ✓
- Corrosion & insects: special encapsulation of the LEDs means no space for water, air & insects ✓





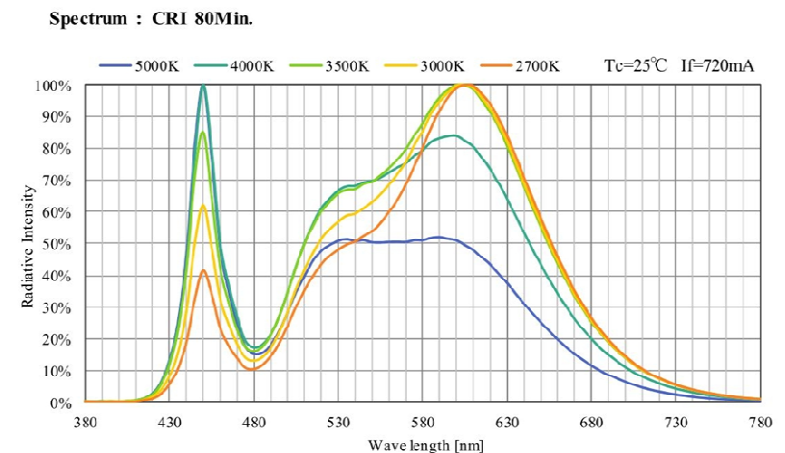
- Vandal-proof: stress test successfully completed ✓



- Sustainability : 90+ % aluminum and stainless steel ✓
- High public acceptance: each street light is individually dimmable ✓
- Any replacement purchase shall be easy, fast and cost-effective:  
local production is possible ✓



- The Colour Rendering Index (80+):  
standard feature of Praeluce LED street lights ✓



**5. Lessons:** Multi-step procedures help a lot to find the best case-specific sustainable solution. A payback analysis is essential for the business management aspect:

Comparative analysis of the energy consumption and costs before and after the changing to LED street lighting				Annual savings	
<b>Situation before the conversion</b>		<b>Situation after the conversion</b>			
Number of luminaires	150	Number of luminaires	150		
Power consumption of the light source (HQL)	80 W	Power consumption of the light source (LED)	15 W	Savings	81 %
Power consumption of the luminaire	94 W	Power consumption of the luminaire	18 W	Savings	81 %
Total power consumption	14,040	Total power consumption	2,700	Savings	81 %
Total annual energy consumption (4.050 h/a)	<b>56,862 kWh</b>	Total annual energy consumption (4.050 h/a)	<b>10,935 kWh</b>	<b>Savings</b>	<b>81 %</b>
Energy price per kWh	\$0.16	Energy price per kWh	\$0.16		
<b>Total annual energy costs</b>	<b>\$9,097.92</b>	<b>Total annual energy costs</b>	<b>\$1,749.60</b>	<b>Savings</b>	<b>\$7,348.32</b>
		<b>Purchase price of the LED luminaires</b>		<b>Amortisation period</b>	<b>2.6 years</b>
		Chosen LED luminaire	"R2-15"		
		Luminaire price * (post not included)	\$120.00	* Made in Asia for local markets	
		Number of luminaires	150		
		<b>Total costs of the luminaires</b>	<b>\$18,000.00</b>		
<i>Praeluce GmbH can't estimate the changing costs of bulbs (HQL) during the whole life span of the LED street lights (about 15 years). Nevertheless these site specific costs have to be considered.</i>		<b>Labour costs of the changing</b>			
		Expected time to change one luminaire head	0.50 h		
		Expected time to change one power supply	0.25 h		
		Hourly labour costs	\$10.00		
		<b>Total labour costs</b>	<b>\$1,125.00</b>		
		<b>Total project costs</b>	<b>\$19,125.00</b>	© Praeluce GmbH 2014	

**6. Transfer:** What are the necessary preconditions to transfer this practice to another place? What would be the first steps to take?

A similar street lighting situation in your community can set the starting signal for a PPP initiative to produce sustainable LED street lights locally. As a pioneer in LED street lighting, Praeluce is ready for bringing in the advanced technology, setting up the production unit, training the staff, implementing a QM-system and designing a sales and marketing concept. If the local partners are looking for a greater financial investment, the production could be even export-oriented.