

LED STREET LIGHTING

GENERAL CONSIDERATIONS

LED (Light Emitting Diodes) street lighting systems are an emerging technology with a great margin of improvement in the close future. Due to their unique properties, even though they are in an early stage of development, they are extremely competitive when compared to previous street lighting technologies:

- Good CRI (Colour Rendering Index)
- High durability
- High energy efficiency
- Directionality of the light flux, therefore avoiding losses as light pollution
- No utilization of toxic substances (such as mercury)

However, the choice of a specific type of street lighting has to take into account the surrounding conditions where the system will have to perform as it depends on those whether the parameters are conveniently fulfilled or not; as a consequence, the satisfaction of the user will be also related to the quality and quantity of the light flux.

It is important to study every situation where a new installation is required to a case-to-case study as not all the applications might be suitable for LED lighting. This matter is particularly important when talking about already existent fixtures where only the bulb or another part of the lamp is substituted and it is not intended to alter the location of the posts, or even in places where environmental conditions are associated to some kind of particularity (high temperature, moisture, salinity, etc.). Previous lighting technologies should not be discarded right from the start as some of them reach very good levels of energy efficacy, reasonable durability and very good reliability values under severe conditions.

There are some matters that should be taken into consideration during the elaboration of the luminotechnic study to determine the suitability of the alternatives, either if it is a modification of an installation or a new one:

- Total Life-Cycle Costs (installation, maintenance and energy consumption).
- Light colour, light temperature, quantity and quality of light flux adapted to the area conditions and to the purpose of the installation (higher light temperatures involve higher efficacy but might cause user's discontent).
- Proper photometric distribution maximizing visual comfort at the illuminated areas and at the same time minimizing the light pollution, ensuring that safety levels are satisfied in the cases that this might be applicable.
- Ability to replace lamps or other components and ensure their availability
- Ability to eventually convert the system to other lighting technologies or other management systems.



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In this document you can find some criteria for the selection of LED street lighting systems and try to make the best environmental choice in terms of impacts along its life-cycle. These criteria are not exhaustive as few data are already available and almost no Life-Cycle Assessment studies about LEDs or LED fixtures have been carried out.

LEGAL CRITERIA

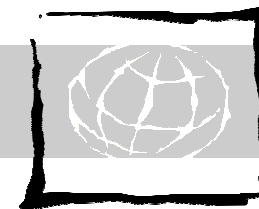
In this document were not considered as criteria what is required in the laws that compete in each territory, since they are of compulsory accomplishment. These are:

DIPLOMA	SCOPE
Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003 and further amendments	Waste electrical and electronic equipment (WEEE)
Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003	Restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)
National / regional legislation about electric installations	

Note: The legislation referred in this document may not be exhaustive so we suggest to proceed to deeper searches for the elaboration of a tendering procedure.

ECONOMICAL CRITERIA

The method for evaluating the economical aspects of the tenders will be SMART-SPP’s LCC-CO₂ tool. It allows the calculation of the ownership costs, among which are considered, not only the purchase price, but also the costs of operation, maintenance and end-of-life. The tool along with its user’s guide can be downloaded at the SMART-SPP’s website: <http://www.smart-spp.eu/>.



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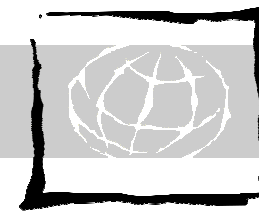
TECHNICAL/ENVIRONMENTAL CRITERIA

The technical and environmental criteria below can be used as technical specifications as well as awarding/bonus criteria. **As these criteria have not yet been tested in a real tendering process, the values presented here for each parameter should be checked by the public lighting technical department and suppliers, considering the characteristics of the space/road to illuminate.** The most important criteria are shaded.

ISSUE	CRITERIA	VERIFICATION
Luminaire features and performance		
LUMINOUS EFFICACY	≥ 90 lumen/watt	Product data sheet
LIFETIME	≥ 50.000 hours	Product data sheet
	Equipment must have an effective heat dissipation mechanism.	Product data sheet
COLOUR RENDERING INDEX	CRI ≥ 90	Product data sheet
COLOUR TEMPERATURE	Between 3500 K and 5000 K	Product data sheet stating available colour temperatures
INGRESS PROTECTION RATING (IP)	≥ IP65	Product data sheet
SHOCK RESISTANCE CLASS (IK)	≥ IK08	Product data sheet



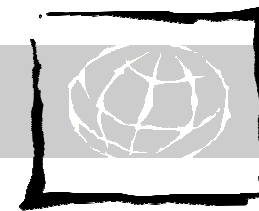
ISSUE	CRITERIA	VERIFICATION
POWER FACTOR	$\text{COS } \varphi \geq 0,95$	Product data sheet
TOXIC SUBSTANCES	Equipment must comply with Directive 2002/95/CE of the European Parliament and of the Council of 27 January 2003, regarding restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)	Supplier statement of compliance with this legislation
	Equipment and its components may not contain any of the substances of high concern listed under EC Regulation n.º 1907/2006 of 18 December 2006, regarding the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)	
ECODESIGN	Equipment must be designed to facilitate dismantling and recovery for reuse and recycling of its components and materials.	Supplier statement of compliance with this criteria
		Supplier register as producer of EEE
LUMINAIRE CERTIFICATION	Quality and/or environmental labels and/or certifications	Product labels and/or certifications
Global performance		
ILLUMINATION PERFORMANCE	Installation design must ensure a minimum performance in accordance with the standard (DIN) EN 13201 - road lighting, considering road category.	Global installation luminotechnic study
	Note: Additional requirements should be defined by the contracting authority for parameters such as threshold increment (glare control), global uniformity, illuminance and others.	
INTELLIGENT ENERGY MANAGEMENT	Light intensity management/dimming system, energy management software and other features to be defined by the contracting authority.	Energy management system data sheets
CO2 EMISSIONS	Indirect emissions of CO2 (kg CO2/year)	SMART-SPP LCC-CO2 tool
RETROFIT	Fixtures should enable retrofit	Product data sheet
Supplier Selection Criteria (previous qualification of suppliers)		



ISSUE	CRITERIA	VERIFICATION
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ENVIRONMENTAL MANAGEMENT	Implementation of acknowledged Environmental Management Systems such as EMAS ¹ , ISO 14001 standard or equivalent measures, for the supplier and all the intervenients <u>along the whole supply chain</u> .	Certification of implementation of an Environmental Management System. Environmental Management Program identifying the main environmental aspects to be treated, goals and associated measures for the supplier and all the intervenients during the whole supply chain.
PRINCIPLES AND RIGHTS AT WORK	Main International Labour Organization (ILO) conventions must be respected <u>along the whole supply chain</u> . More specifically conventions number 100, 111, 87, 98, 138, 182, 29 and 105; related to basic labour principles and rights ² .	Declaration of compliance from the supplier and all the intervenients along the whole supply chain. Certification of compliance of SA 8000 standard for social corporate responsibility or equivalent, for the supplier and all the intervenients along the whole supply chain.
Contract Performance Clauses		
WASTE (WEEE)	Ensuring recovery of components to be replaced (in case of maintenance to be carried out by the supplier of the equipment) and equipment in end-of-life stage, for reuse or recycling, according to national/regional legislation.	Proof of adhesion to an integrated system of management of WEEE.

¹ REGULATION (EC) No 1221/2009 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 25 November 2009 on the voluntary participation by organisations in a Community eco-management and audit scheme (EMAS), repealing Regulation (EC) No 761/2001 and Commission Decisions 2001/681/EC and 2006/193/EC.

² Conventions: 100 and 111 – No discrimination, 87 and 98 – labour union freedom and right to organization and collective negotiation, 138 and 182 – Child labour eradication, 29 and 105 – forced labour abolition.



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MORE INFORMATION

SOURCE	LINK
Energy star - Solid State Lighting	www.energystar.gov/sslp partners
Organização Internacional do Trabalho (OIT)	http://www.ilo.org

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