

BUY SMART

Green Procurement for Smart Purchasing

Training module: Lighting

Content

- Technical Background
- Use of Energy Labels
- The Project "Buy smart"
- Standard tendering scheme
- Good-Practice Examples



Definitions



Definitions:

- **Lamps** - also known as bulbs, are defined as the bulb or tube portion of an electric lighting device
- **Luminaire** - a device or fixture that directs and controls the distribution of light from the source
- **Lumen** - a measure of the amount of light from a source typically equivalent to the light emitted by one candle
- **Ballast** - an electrical device required to operate electric-discharge lamps to obtain the necessary circuit conditions (voltage, current, and wave form) for starting and operating

Abbreviations

Frequently used abbreviations:

- **CFL** – Compact Fluorescent Lamps
- **HID** – High Intensity Discharge Lamps
- **Hg** – Mercury
- **HPS** – High-pressure sodium lamp
- **LED** – Light-Emitting-Diode
- **LPS** – Low-pressure sodium lamp
- **MHL** – Metal-halide discharge lamp



Legislation



- **Directive 2005/32/EC** (6.7.2005) establishing a framework for the setting of ecodesign requirements for energy-using products...
- **Commission Regulation (EC) No 244/2009** (18.3.2009) ...with regard to ecodesign requirements for non-directional household lamps
- **Commission Regulation (EC) No 245/2009** (18.3.2009) ...with regard to ecodesign requirements for fluorescent lamps without integrated ballasts, for high intensity discharge lamps and for ballasts and luminaires able to operate such lamps...

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Challenges

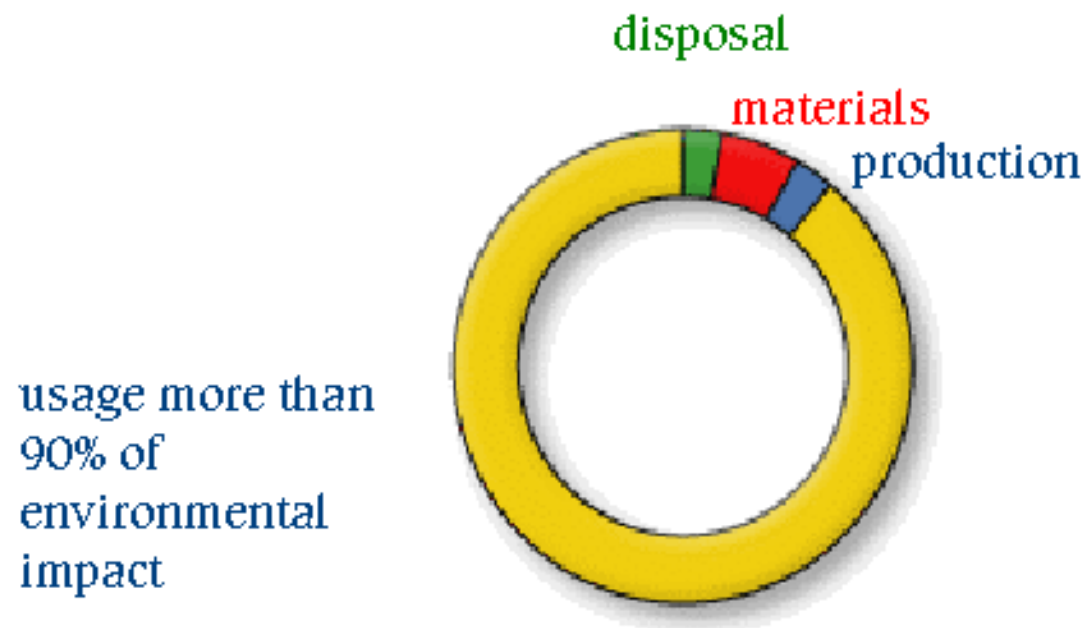


- Up to 40% of the electricity consumption in non-residential buildings is used for lighting
- In Europe, lighting accounts for about 14% of the total electricity consumption
- Potential electricity savings are between 30 and 50% by achieving a 15 times longer life-span
- By replacing incandescent lamps, up to 40 TWh (by 2016) can be saved in Europe (~ 11 mio households) and CO₂ emissions can be reduced by 15 mio t annually

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Environmental impact throughout a lamps life

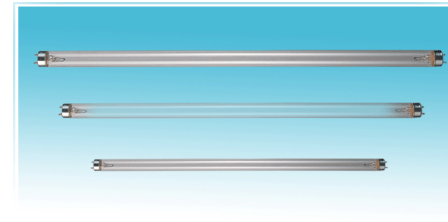


usage more than
90% of
environmental
impact

Source: European Lamp Companies Federation, www.elcfed.org

Product Groups

- Fluorescent lamps
- Compact Fluorescent Lamps (CFL)
- Halogen lamps
- High-pressure sodium lamps
- Metal halide lamps
- LEDs
- Ballasts



Not considered are:

- **Incandescent lamps** (because they will be phased out, see Regulation 244/2009)
- **Luminaries**
- for sodium lamps, **low pressure sodium lamps** were not considered because of their poor colour characteristics
- as there are so many different lamp types within the **HID lamps group**, **metal-halid lamps** were described in the guidelines but without performance sheet



Phasing out of incandescent light bulbs – detailed phase-out plan



Date	Non-clear lamps				Clear lamps							
	Requirement	Incandescent	All Halogen	CFL / LED	Requirement	Incandescent / Conventional halogen				Halogen C	Halogen B	LED ¹
						≥ 100 W	≥ 75 W	≥ 60 W	60 W >			
Today	None				None							
September 2009 ¹	A ²				C for ≥ 100W ³		≥ E ³	≥ E ³	≥ E ³			
September 2010	A ²				C for ≥ 75W ³			≥ E ³	≥ E ³			
September 2011	A ²				C for ≥ 60W ³				≥ E ³			
September 2012	A ²				C for all							
September 2013	Second level of functionality requirements ¹											
Review 2014	Review											
September 2016	A ²				B / C ⁴					+		

- 1 First level of functionality requirements introduced in first stage. LEDs are exempted from all functionality requirements.
- 2 Refers to lamp energy label class. Correction factors apply to certain lamps, allowing them to be B-class.
- 3 Minimum requirement for all lamps: E class. F and G lamps phased out.
- 4 Only special cap halogen lamps are allowed to be class C.

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Saving potential of a CFL compared to an incandescent bulb



	Incandescent Bulb	Compact Fluorescent Lamp
Power input	100 W	20 W
Average durability	1,000 h	10,000 h
Luminous flux	1,400 lm	1,400 lm
Relation heat to light	95 % to 5 %	75 % to 25 %
Necessary lamps in 8 years (3 h/day*365 days = 1095 h/year)	8	1
Energy consumption in 8 years with a burning time of 3 h/day	876 kWh	175.2 kWh
Energy costs (0.14 EUR/kWh)	122.64 EUR	24.53 EUR
Costs per lamp	0.50 EUR	10.00 EUR
Total costs in 8 years	126.64 EUR	34.53 EUR
Savings	--	92.11 EUR

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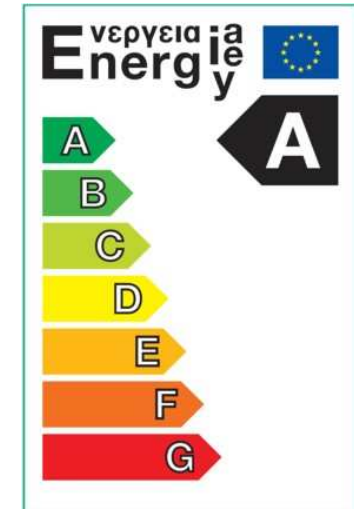
Lamp efficiencies

Lamp type	Conversion efficiency [Lumen per Watt]	Life [hours]
incandescent bulb	8-10	1,000
low voltage halogen	12-25	2,500
infra-red coated halogen	25-30	5,000
Compact fluorescent lamp	38-66	6,000 – 15,000
Fluorescent lamps (T8, conventional ballast)	47-83	8,000
Fluorescent lamps (T8, three-band-lamps, electronic ballast)	up to 100	19,000
Fluorescent lamps (T5, conventional ballast)	67-104	24,000
Metal-halid lamps	70 - 90	12,000 +
High pressure Sodium lamps	90 - 150	16,000 - 25,000
Low pressure Sodium lamps	120 - 200	12,000 - 20,000

General Tips for Procurement of Lamps



- check the energy efficiency class
- prefer high quality lamps with long durability (>10,000 h)
- replace light bulbs by CFLs
- replace halogen lamps by more efficient (infra-red coated) halogen lamps or CFLs (screw socket)
- switch from "T8"-fluorescent lamps (26 mm Ø) to "T5"-fluorescent lamps (16 mm Ø) - requires change of luminaires
- switch from Mercury lamps to Sodium or Metal-halide lamps
- use electronic instead of conventional ballasts



Energy Saving Tips for the office in everyday life



- Switch off light when not needed
- Motion detector / stairway automatic / time switch
- For low-voltage halogen use a switchable connexion plug board
- Regular cleaning
- Bright colours for floor, walls and furniture reflect up to 80 % of the light , dark colours absorb up to 80 % of the light

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Use of energy labels



The procurement legislation allows:

- The use of the criteria of every label – national or voluntary
- The choice of products which are more expensive in purchase but less expensive than other in the useful life
- The choice of products which are more expensive over the useful life but which have environmental impacts which meets the environmental aims of the institution

The procurement legislation prohibits:

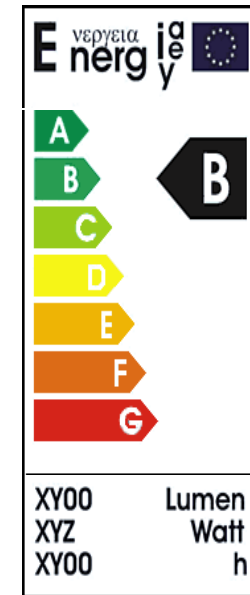
- ⚡ The use of randomized criteria which are not back grounded in the tendering institution
- ⚡ The use of national labels in international call for tenders
- ⚡ The use of voluntary labels in all call for tenders

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Overview of energy labels (1)

- **EU-Label:** household lamps
(except reflector lamps)
- **EU Eco-label (Eco flower):** CFLs
- **Energy Star:** CFLs, LEDs
- **Efficient Lighting Initiative (ELI):**
high quality energy efficiency lighting products



Overview of energy labels (2)



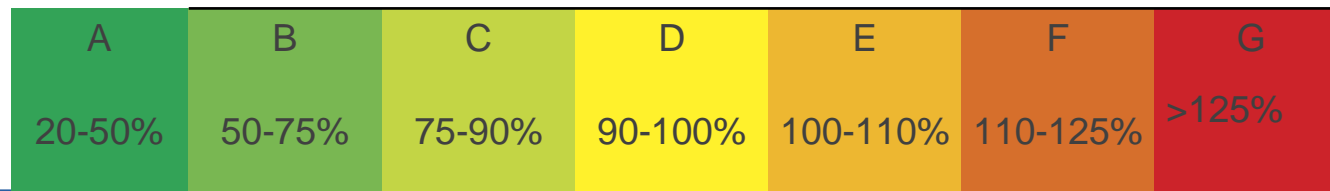
- **CE Marking:** product conformity to energy efficiency requirements
- **CFL Quality Charter:** CFL criteria
- **Blue Angel:** electronic ballasts for fluorescent lamps
- **The Nordic Eco-Label (The Swan)**



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Example: EU-Label

- Electric household lamps have to be labelled
- Excepted are reflector lamps and lamps with a luminous flux of more than 6,500 lumen (or input power < 4 Watt)
- The energy label indicates the energy efficiency class on a scale of A (more efficient) to G (less efficient)
- The following parameters have to be declared:
luminous flux (lm), power input (Watt), average rated life (hours)
- CFLs are usually classified in class A or B, whereas incandescent bulbs only fulfil the criteria for E to G.



Example: ENERGY STAR



- The EU ENERGY STAR programme follows an Agreement between the Government of the US and the EU to co-ordinate energy **labeling of office equipment**
- It is managed by the European Commission
- US partner is the Environmental Protection Agency (EPA), that started the scheme in the US in 1992
- The ENERGY STAR label is on major appliances, office equipment, lighting, home electronics and more. In the sector of lighting e.g. compact fluorescent light bulbs, LED lightings, decorative light strings and indoor and outdoor residential light fixtures are labelled
- www.eu-energystar.org



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Example: European Compact Fluorescent Lamps Quality Charter



- CFL Quality Charter with a voluntary set of criteria
- Established by the European Commission in collaboration with private and public organisations (1998, revised in 2002)
- it includes: self-ballasted, one and two part CFL's with Edison screw or bayonet cap, it excludes CFL's with a magnetic ballast



- The CFL Quality Charta Criteria (simplified description):
 - Safety (EN 60968 (or EN 61199 and EN 60598, CE Marking)
 - Energy efficiency class "A"
 - Luminous flux after 2,000 hours: not less than 88%
 - Stabilised light output: less than 60 seconds time to 80% of light output
 - Ignition requirement not less than the claimed lamp life in hours
 - Colour rendering: CRI > 80
 - Life: Minimum life cycle should be 6,000 hrs

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European Project to promote Green Procurement:

„Buy Smart - Green Procurement for Smart Purchasing“

www.buy-smart.info

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Project Summary



Objective:

- promote, implement and further develop the procurement of energy efficient products

Target groups:

- private and public institutions

Approach:

- collaboration with e-procurement platforms and trade associations

Output:

- information through guidelines, performance sheets and calculation tools
- consultations, in-house consultations, training events, pilot projects
- good practice database with at least 200 examples
- information about energy labels and new labelling schemes

Consortium:

- 8 well-experienced institutions in 7 EU member states

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Objective



The objective of Buy Smart is to promote, implement and further develop the procurement of energy efficient products (office equipment, household appliances, lighting, green power, building components, vehicles) in private and public institutions.

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Expected results



Buy Smart is expected to:

- promote green procurement among decision makers in private businesses and public administrations
- raise awareness and knowledge about energy and environmental labels
- provide easy access to green criteria and tools for professional purchasers
- improve the knowledge base for political decision makers to enable them to choose the right measures to make green procurement more successful

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Partners & Contact



8 partners from 7 European countries:

- Germany: Berliner Energieagentur B.&S.U. mbH
- Austria: O.Ö. Energiesparverband
- Italy: ENEA
- Slovenia: ZRMK
- Latvia: Ekodoma
- Czech Republic: SEVEn
- Sweden: Energikontor



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Standard tendering scheme

- Guidelines
- Performance Sheets
- Calculation Tools
- Consulting
- Good practice examples
- Pilot projects



Standard tendering scheme



Guidelines:

- Competition and procurement law
- Technical Background
- Specific Criteria
- Labels



BUY SMART
Green Procurement for Smart Purchasing

Procurement and Climate Protection

Guideline for procurement of
efficient lighting

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www.buy-smart.info

Supported by:



Standard tendering scheme

- Performance Sheets
- Simplified / comprehensive procedure
- Combination of
 - Must-criteria
 - Target criteria
- Bidder has to
 - Fill in completely
 - Sign for correctness
- Result:
 - Number of target-points
 - Check must-criteria



Simplified procedure

- Only considering minimum requirements
- Minimum requirements have to be fulfilled

Comprehensive procedure

- weighting environmental criteria versus life cycle costs
- Procedure consists of:
 - performance sheet with additional target-criteria
 - calculation tool life-cycle-costs
 - evaluation tool best economical offer

Standard tendering scheme



Calculation Tool

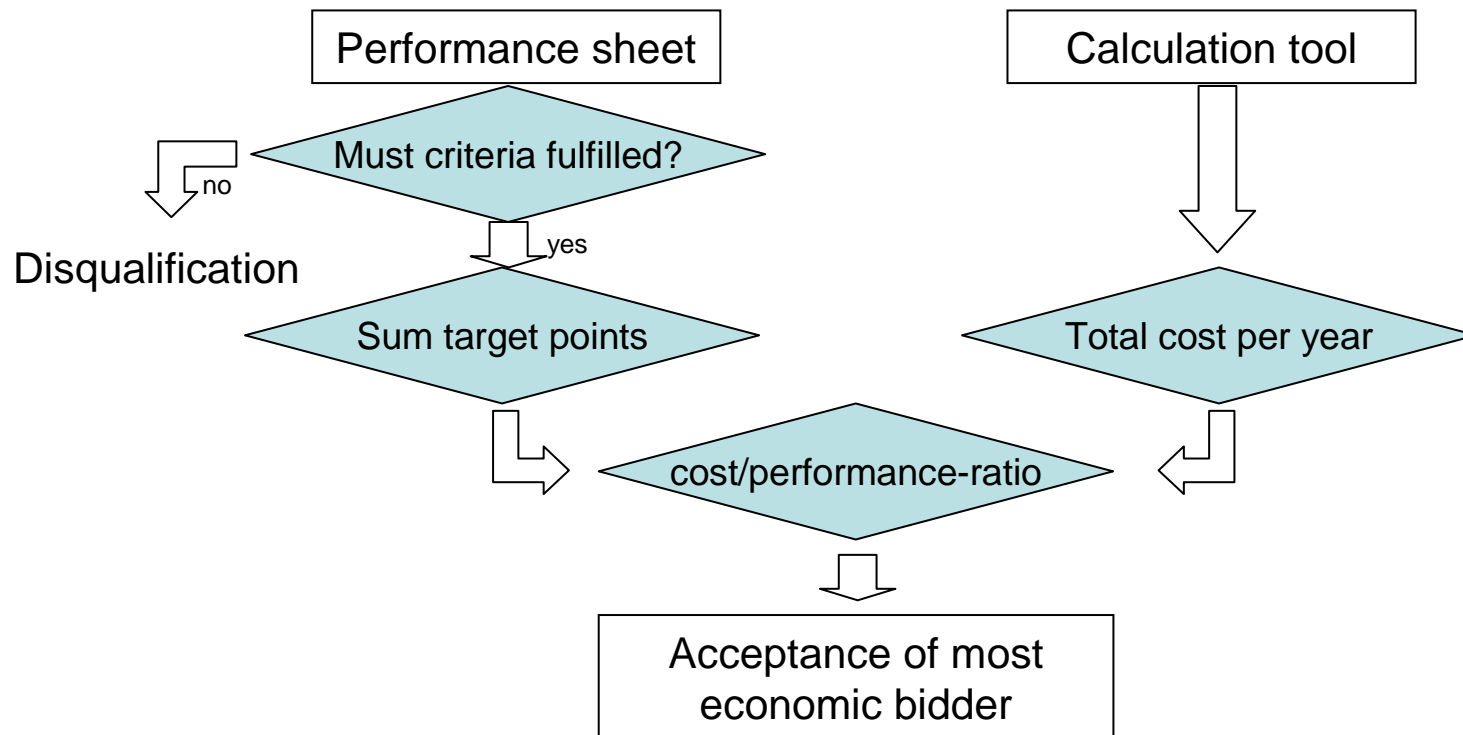
- Excel-Sheets
- Life cycle costs
- Most economical offer
- Result: Total costs per year

	Offer 1	Offer 2	Offer 3	Offer 4	Offer 5	Offer 6
Provider Name	xxx	xxx	xxx	xxx	xxx	xxx
Lamp type	xxx	xxx	xxx	xxx	xxx	xxx
Technical Details						
Lamps to be Purchased (number)	0 n	0 n	0 n	0 n	0 n	0 n
Nominal durability (hours)	0 h	0 h	0 h	0 h	0 h	0 h
Average burning time per year (hours/year)	0 h/y	0 h/y	0 h/y	0 h/y	0 h/y	0 h/y
Actual durability (years)	#DIV/0!	y	#DIV/0!	y	#DIV/0!	y
Lamps Purchasing Price						
Purchasing price per lamp (Euro/lamp)	0,00 €	0,00 €	0,00 €	0,00 €	0,00 €	0,00 €
Lamps purchasing price [(lamp number*purchasing price)]	0,00 €	0,00 €	0,00 €	0,00 €	0,00 €	0,00 €
Lamps Costs per Year						
Hourly wage for the maintenance & replacement of a lamp (Euro/hour)	0 €/h	0 €/h	0 €/h	0 €/h	0 €/h	0 €/h
Lamp replacement effort (min/number lamp)	0 min	0 min	0 min	0 min	0 min	0 min
Lamps replacement costs per year (Euro/year) [(lamp number*replacement costs)/(actual durability)]	#DIV/0!	€	#DIV/0!	€	#DIV/0!	€
Other Costs per lamp (Euro/lamp)	0,00 €	0,00 €	0,00 €	0,00 €	0,00 €	0,00 €
Annual maintenance flat-rate of 2 minutes/lamp (Euro/lamp*year)	0,00 €	0,00 €	0,00 €	0,00 €	0,00 €	0,00 €
Lamps replacement & maintenance costs per year	#DIV/0!	€	#DIV/0!	€	#DIV/0!	€
Lamps Energy Costs per Year						
Electric energy price (Euro/kWh)	0,00 €	0,00 €	0,00 €	0,00 €	0,00 €	0,00 €
Lamp power consumption (Watt)	0 W	0 W	0 W	0 W	0 W	0 W
Lamps energy consumption per year (kWh/year)	0,0 kWh	0,0 kWh	0,0 kWh	0,0 kWh	0,0 kWh	0,0 kWh
Lamps energy consumption costs per year	0,00 €	0,00 €	0,00 €	0,00 €	0,00 €	0,00 €
Input for Present Worth Factor (PWF) for LLC						
Economic period (years)	0,00 years	0,00 years	0,00 years	0,00 years	0,00 years	0,00 years
discount rate (%)	0 %	0 %	0 %	0 %	0 %	0 %

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Standard tendering scheme



Good-Practice-Examples Lighting



- **Free and Hanseatic City of Hamburg:**
Saving of about 22 million kWh/year and about 16,800 tons of CO₂
- **Legambiente:**
Saving of more than 16 million kWh/year and more than 8,000 tons of CO₂
- **The Koźuchów Municipality:**
Reduction of the electricity consumption by 35– 40 % compared to the present state and reduction of the exploitation cost by 40–50 %.

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