

Street Lighting & Traffic Signals – Green Public Procurement Product Sheet

Green Public Procurement (GPP) is a voluntary instrument. This Product Sheet provides a summary of the GPP criteria developed for the Street Lighting and Traffic Signals product group. The accompanying Background Report provides full details on the reasons for selecting these criteria and references for further information.

The format for the purchasing recommendations comes in the form of two sets of criteria:

- The core criteria are those suitable for use by any contracting authority across the Member States and address the key environmental impacts. They are designed to be used with minimum additional verification effort or cost increases.
- The comprehensive criteria are for those who wish to purchase the best products available on the market. These may require additional verification effort or a slight increase in cost compared to other products with the same functionality.

Within the core and comprehensive criteria, the guidance follows the various stages of a public procurement procedure and explains how best to integrate environmental criteria at each stage:

- **Subject matter.** It means the title of the tender, i.e. a short description of the product, works or service to be procured.
- **Technical Specifications.** Provide a clear, accurate and full description of the requirement and standard to which goods, works or services should conform. Description of the minimal technical specifications which all bids need to comply with. Set specific environmental criteria, including hurdles and levels that need to be met for specific products.
- **Selection Criteria.** It is based in the capacity / ability of the bidders to perform the contract. Assist in the identification of appropriate suppliers, for example to ensure adequately trained personnel or relevant environmental policies and procedures are in place.
- **Award Criteria.** The award criteria on the basis of which the contracting authority will compare the offers and base its award. Award criteria are not pass/fail criteria, meaning that offers of products that don't comply with the criteria may still be considered for the final decision, depending on their score on the other award criteria.
- **Contract Performance Clause -** Specify the conditions that must be met in the execution of the contract, for example as to how the goods or services are to be supplied, including information or instructions on the products to be provided by the supplier.

It should be noted that the contractor is bound by the existing legal framework.

Where the verification for the criteria states that other appropriate means of proof can be used, this could include a technical dossier from the manufacturer, a test report from a recognised body, or other relevant evidence. The contracting authority will have to satisfy itself on a case by case basis, from a technical/legal perspective, whether the submitted proof can be considered appropriate.

1. Definition and Scope

For both Street Lighting and Traffic Signals the units themselves are considered with respect to life-cycle impacts. Both of these products are considered to be Energy-using Products by virtue of both containing energy using parts and being an energy consumer in itself, therefore it is included at 'part' and 'product' level. Poles, building mounts, or any other type of support and the required fixing mounts are considered separately.

Street Lighting

For the purpose of this product sheet a public street light will be defined¹ as a:

“Fixed lighting installation intended to provide good visibility to users of outdoor public traffic areas during the hours of darkness to support traffic safety, traffic flow and public security”

This is derived from EN13201 and does not include tunnel lighting, private car park lighting, commercial or industrial outdoor lighting, sports fields or installations for city beautification for example monument, building or tree lighting.

In addition for the purposes of this GPP specification, only high intensity discharge lamps for street lighting are considered. In particular high pressure sodium and metal halide lamps are the focus of the lamp efficacy criteria. These are both used in street lighting, but for different kinds of applications, each with its own advantages. For example, metal halides are best suited for clear white illumination, for example in city centre streets, where the light gives the true colours of objects around it. Whereas high pressure sodium lamps are well suited to general street lighting with their yellow colour which has the advantage of attracting fewer insects and thereby requiring less maintenance and cleaning. They also have long operational times from three to six years.²

The Background Report outlines in more detail why HID lamps are the focus of these criteria, but in brief this is due to the following:

- Both the EuP Lot 9 Study on Street Lighting¹ and the main trade body for lamps³ consider that the most predominantly used lamps in street lighting are high-intensity discharge lamps (HID).
- Compact Fluorescent Lamps (CFLs) are only used for slow road categories; they are not used at all for medium and fast road categories. Sales for the slow road category are limited (13%) compared to HID lamps (87%)¹.
- The road category is important in making purchasing decisions, as different lamp types for the same road category have comparable environmental impacts¹
- CFLs are mainly used for domestic and office lighting applications, which would represent a different product group to street lighting and traffic signals.
- The use of LEDs for street lighting is currently limited, and although this is an emerging market there is currently no significant evidence base on which to develop criteria and they are therefore not included in this GPP specification.

Traffic Signals

For the purposes of this report traffic signals will be defined as:

“Red, yellow and green signal lights for road traffic with 200mm and 300mm roundels. Portable signal lights are specifically excluded from the scope of this European Standard.”

This in accordance with EN12368: 2006 Traffic Control Equipment – Signal Heads.

¹ EuP Lot 9 Study: Public Street Lighting, VITO, January 2007, <http://www.eup4light.net>

² European Lamp Companies Federation, 'Saving Energy through Lighting' http://buybright.elcfed.org/uploads/fmanager/saving_energy_through_lighting_ic.pdf

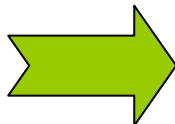
³ http://www.elcfed.org/documents/-56-finelc_road_map_11_07.pdf

2. Key Environmental Impacts

The key environmental impact from street lighting and traffic signals is energy consumption in the use phase and associated greenhouse gas emissions. Other environmental impacts could potentially result from the use of certain substances e.g. mercury and light pollution, depending on the location of the lighting.

- Therefore the core criteria focus on energy consumption, in particular lamp efficacy and ballast efficiencies for street lighting and promotion of LED traffic signals. Setting energy efficiency requirements for lamps will lead to a reduction in their overall mercury content.
- The comprehensive criteria include further aspects on energy consumption and luminaire design.

Key Environmental Impacts	GPP Approach
<ul style="list-style-type: none"> • Energy consumption, in all phases, but especially the use phase of street lighting and traffic signals • High energy consumption from the use of incandescent bulbs in traffic signals • Use of materials and generation of waste (hazardous and non-hazardous) • Potential Pollution of air, land and water due to the use of hazardous materials e.g. mercury • Light pollution from street lighting 	<ul style="list-style-type: none"> • Purchase lamps with high lamp efficacy • Purchase efficient ballasts • Promote the use of LEDs in traffic signals • Encourage the use of dimmable ballasts where circumstances allow • Promote the purchase of lamps with a lower mercury content • Promote the use of luminaires that limit light emitted above the horizon • Promote the purchase of luminaires with high utilisation factor⁴ for applications where luminaires are going to be used



Please note that the order of impacts does not necessarily translate to the order of their importance.

3. GPP Criteria for Street Lighting

3.1. Street Lighting – Core criteria

SUBJECT MATTER

Purchase of high efficiency lamps

TECHNICAL SPECIFICATIONS

1. High Pressure Sodium lamps with a colour rendering index $Ra \leq 60$ shall have at least the following lumen efficacy⁵:

⁴ Utilization Factor (UF) of an installation for a reference surface, which means the ratio of luminous flux received by the reference surface to the sum of the individual total fluxes of the lamps of the installation.

⁵ These are based on Ecodesign Second Stage requirements, due to come into force three years after the introduction of the Ecodesign Regulation for Tertiary Lighting, i.e. after January 2012

Nominal Lamp wattage (W)	Rated Lamp Efficacy (lm/W) – Clear	Rated Lamp Efficacy (lm/W) - Coated
$W \leq 45$	≥ 60	≥ 60
$45 < W \leq 55$	≥ 80	≥ 70
$55 < W \leq 75$	≥ 90	≥ 80
$75 < W \leq 105$	≥ 100	≥ 95
$105 < W \leq 155$	≥ 110	≥ 105
$155 < W \leq 255$	≥ 125	≥ 115
$255 < W \leq 605$	≥ 135	≥ 130

High Pressure Sodium lamps with Ra > 60 shall meet the efficacies indicated below for metal halide lamps.

Lamps that meet the above specification shall be purchased for existing street lighting installations where the existing installation permits the use of lamps that meet these standards. All new installations shall include fittings for lamps that meet the above specification.

Verification: The bidder shall provide the technical specification of the lamp or a written declaration to demonstrate this criterion is met.

2. Metal Halide lamps and High Pressure Sodium lamps with Ra > 60 shall have at least the following lumen efficacy⁶.

Nominal Lamp wattage (W)	Rated Lamp Efficacy (lm/W) – Clear	Rated Lamp Efficacy (lm/W) - Coated
$W \leq 55$	≥ 60	≥ 60
$55 < W \leq 75$	≥ 75	≥ 70
$75 < W \leq 105$	≥ 80	≥ 75
$105 < W \leq 155$	≥ 80	≥ 75
$155 < W \leq 255$	≥ 80	≥ 75
$255 < W \leq 405$	≥ 85	≥ 75

Lamps that meet the above specification shall be purchased for existing street lighting installations where the existing installation permits the use of lamps that meet these standards. All new installations shall include fittings for lamps that meet the above specification.

Verification: The bidder shall provide the technical specification of the lamp or a written declaration to demonstrate this criterion is met.

3. Ballasts for high intensity discharge lamps shall have the following efficiency⁶

Nominal lamp wattage (P)	Minimum ballast efficiency ($\eta_{ballast}$) %
$P < 30$	65
$30 < P \leq 75$	75
$75 < P \leq 105$	80
$105 < P \leq 405$	85
$P > 405$	90

Where:

- Ballast efficiency ($\eta_{ballast}$) means the ratio between the lamp power (ballast output) and the input power of the lamp-ballast circuit with possible sensors, network connections and other auxiliary loads disconnected.

⁶ These are based on Ecodesign Second Stage requirements, due to come into force three years after the introduction of the Ecodesign Regulation for Tertiary Lighting, i.e. after January 2012

Verification: The bidder shall provide the technical specification of the ballast or a written declaration to demonstrate this criterion is met. Note: Standards covering the measurement of efficiency of HID ballasts are currently in preparation and will be a requirement at stage 3 of Regulation 245/2009.

AWARD CRITERIA

- Where metal halide lamps are identified as the most suitable lamp type, additional points shall be awarded for those metal halide lamps that meet the following rated luminous efficacies:

Nominal lamp wattage	Rated lamp efficacy (lm/W) – Clear lamps	Rated lamp efficacy (lm/W) – Frosted lamps
$W \leq 55$	≥ 70	≥ 65
$55 < W \leq 75$	≥ 80	≥ 75
$75 < W \leq 105$	≥ 85	≥ 80
$105 < W \leq 155$	≥ 85	≥ 80
$155 < W \leq 255$	≥ 85	≥ 80
$255 < W \leq 405$	≥ 90	≥ 85

Verification: The bidder shall provide the technical specification of the lamp or a written declaration to demonstrate that this criterion is met.

- Additional points shall be awarded for lamps that meet the following lamp lumen maintenance factors (LLMF) and lamp survival factors (LSF):

Burning Hours	2000	4000	8000	16000
LLMF	0.98	0.97	0.95	0.92
LSF	0.99	0.98	0.95	0.92

Verification: The bidder shall provide the technical specification of the lamp or a written declaration to demonstrate this criterion is met.

CONTRACT PERFORMANCE CLAUSES

- The following product information shall be provided with the lamps to be used in street lighting:
 - Nominal and rated lamp wattage.
 - Nominal and rated lamp luminous flux.
 - Rated lamp efficacy at 100 hours in standard conditions (25°C). It shall be stated in a conspicuous manner that the power dissipated by auxiliary equipment such as ballasts is not included in the power consumed by the source.
 - Rated lamp Lumen Maintenance Factor at 2000h, 4000 h, 6000 h, 8000h, 12000 h, 16000 h and 20000 h (up to 8000h only for new lamps on the market where no data is yet available), indicating which operation mode of the lamp was used for the test if both 50 Hz and High Frequency operation are possible.
 - Rated lamp Survival Factor at 2000h, 4000 h, 6000h, 8000h, 12000 h, 16000 h and 20000 h (up to 8000h only for new lamps on the market where no data is yet available), indicating which operation mode of the lamp was used for the test if both 50 Hz and High Frequency operation are possible.
 - Lamp mercury content as X.X mg.
 - Colour Rendering Index (Ra) of the lamp.
 - Colour temperature of the lamp.

Verification: The bidder shall provide a copy of the product's information as evidence that

this criterion is met.

3.2 Street Lighting – Comprehensive criteria

SUBJECT MATTER

Purchase of high efficiency lamps.

TECHNICAL SPECIFICATIONS

1. High Pressure Sodium lamps (clear and frosted) shall have at least the following lumen efficacy⁷:

Nominal Lamp wattage (W)	Rated Lamp Efficacy (lm/W)
$W \leq 55$	≥ 88
$55 < W \leq 75$	≥ 91
$75 < W \leq 105$	≥ 107
$105 < W \leq 155$	≥ 110
$155 < W \leq 255$	≥ 128
$255 < W \leq 405$	≥ 138

Lamps that meet the above specification shall be purchased for existing street lighting installations where the existing installation permits the use of lamps that meet these standards. All new installations shall include fittings for lamps that meet the above specification.

High pressure sodium lamps above 4000lm luminous flux shall be clear lamps.

Verification: The bidder shall provide the technical specification of the lamp or a written declaration to demonstrate this criterion is met.

2. Metal Halide lamps (clear and frosted) shall have at least the following lumen efficacy⁷:

Nominal Lamp wattage (W)	Rated Lamp Efficacy (lm/W) – $Ra \geq 80$	Rated Lamp Efficacy (lm/W) – $80 > Ra \geq 60$
$W \leq 55$	≥ 80	≥ 95
$55 < W \leq 75$	≥ 90	≥ 113
$75 < W \leq 105$	≥ 90	≥ 116
$105 < W \leq 155$	≥ 98	≥ 117
$155 < W \leq 255$	≥ 105	
$255 < W \leq 405$	≥ 105	

Lamps that meet the above specification shall be purchased for existing street lighting installations where the existing installation permits the use of lamps that meet these standards. All new installations shall include fittings for lamps that meet the above specification.

Metal halide lamps above 4000lm luminous flux shall be clear lamps.

Verification: The bidder shall provide the technical specification of the lamp or a written declaration to demonstrate this criterion is met.

⁷ These are based on the indicative benchmarks of the best available technology at the time of the adoption of this Regulation; from Annex V of the Ecodesign Regulation for Tertiary Lighting (EC 245/2009).
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:076:0017:0044:EN:PDF>

3. High pressure sodium lamps and metal halide lamps shall have the following lamp lumen maintenance factors⁸:

Lamp Type	Burning Hours	Lamp lumen maintenance factor
MH Lamps	12,000	> 0.80
HPS Lamps	12,000 (P ≤ 75 W)	> 0.80
HPS Lamps	16,000 (P > 75 W)	> 0.85

Lumen Maintenance Factor (LLMF) is defined as the ratio of the luminous flux emitted by the lamp at a given time in its life to the initial luminous flux.

Luminous flux is a quantity derived from radiant flux (radiant power) by evaluating the radiation according to the spectral sensitivity of the human eye.

P is the power in watts.

Verification: The bidder shall provide the technical specification of the lamp or a written declaration to demonstrate this criterion is met.

4. High pressure sodium lamps and metal halide lamps shall have the following lamp survival factors⁸:

Lamp Type	Burning Hours	Lamp survival factor
MH Lamps	12,000	> 0.80
HPS Lamps	12,000 (P ≤ 75 W)	> 0.90
HPS Lamps	16,000 (P > 75 W)	> 0.90

Lamp Survival Factor (LSF) is defined as the fraction of the total number of lamps, which continue to operate at a given time under defined conditions and switching frequency.

P is the power in watts.

Verification: The bidder shall provide the technical specification of the lamp or a written declaration to demonstrate this criterion is met.

5. Ballasts for high intensity discharge lamps shall have the efficiency described in the following table:

Nominal lamp wattage (P) W	Minimum ballast efficiency ($\eta_{ballast}$) %
$P \leq 30$	78
$30 < P \leq 75$	85
$75 < P \leq 105$	87
$105 < P \leq 405$	90
$P > 405$	92

Verification: The bidder shall provide the technical specification of the ballast or a written declaration to demonstrate this criterion is met. Note: Standards covering the measurement of efficiency of HID ballasts are currently in preparation and will be a requirement at stage 3 of Regulation 245/2009.

⁸ These are based on Ecodesign second and third stage requirements, due to come into force three and eight years after the introduction of the Ecodesign Regulation for Tertiary Lighting, i.e. after January 2012 and 2017, respectively.

6. Luminaires shall be designed and installed to ensure that the proportion of light emitted by the luminaire going above the horizon is limited as specified in the table below, without detriment to the overall energy efficiency of the installation for which it is designed.

Reference lighting classes of the roads	Maximum ULOR for Street Lighting Luminaires	
	Functional (*)	Amenity (*)
ME1	3%	-
ME2	3%	-
ME3	3%	-
ME4	5%	-
ME5	10%	-
ME6	10%	-
CE0	3%	10%
CE1	3%	15%
CE2	3%	15%
CE3	3%	15%
CE4	5%	20%
CE5	10%	20%
S1	3%	15%
S2	5%	20%
S3	10%	20%
S4	-	25%
S5	-	25%
S6	-	25%
S7	-	25%

Verification: The bidder shall provide the technical specification of the luminaire or a written declaration to demonstrate this criterion is met.

7. Luminaires shall have an optical system that has an ingress protection rating as follows:
- IP65 for road classes ME1 to ME6 and MEW1 to MEW6
 - IP64 for road classes CE0 to CE5, S1 to S6, ES, EV and A

Verification: The bidder shall provide the technical specification of the luminaire or a written declaration to demonstrate this criterion is met.

AWARD CRITERIA

1. Where dimming is required and/or beneficial, additional points will be given in proportion to the percentage of dimming in relation to the lamp power.

Note: The use of dimming ballasts will depend on location and other aspects, for example ambient light levels.

Verification: The bidder shall provide the technical specification of the ballast or a written declaration to demonstrate this criterion is met.

2. Additional points shall be awarded for luminaires in proportion to the reduction of light emitted above the horizon beyond the standards specified in Comprehensive Criteria 6, without detriment to the overall energy efficiency of the installation for which it is designed.

Verification: The bidder shall provide the technical specification of the luminaire or a written declaration to demonstrate this criterion is met.

3. Additional points shall be awarded for lamps that meet the following lamp lumen maintenance factors (LLMF) and lamp survival factors (LSF):

Burning Hours	2000	4000	8000	16000
LLMF	0.98	0.97	0.95	0.92
LSF	0.99	0.98	0.95	0.92

Verification: The bidder shall provide the technical specification of the lamp or a written declaration to demonstrate this criterion is met.

4. Additional points shall be awarded where luminaires are compatible with installations equipped with appropriate dimming and control systems that take account of daylight availability, traffic and weather conditions, and also compensate for the variation over time in surface reflection and for the initial dimensioning of the installation due to the lamp lumen maintenance factor.

Verification: The bidder shall provide the technical specification of the luminaire or a written declaration to demonstrate this criterion is met.

CONTRACT PERFORMANCE CLAUSES

1. The following product information shall be provided with the lamps to be used in street lighting:

- Nominal and rated lamp wattage.
- Nominal and rated lamp luminous flux.
- Rated lamp efficacy at 100 hours in standard conditions (25°C). It shall be stated in a conspicuous manner that the power dissipated by auxiliary equipment such as ballasts is not included in the power consumed by the source.
- Rated lamp Lumen Maintenance Factor at 2000h, 4000 h, 6000 h, 8000h, 12000 h, 16000 h and 20000 h (up to 8000h only for new lamps on the market where no data is yet available), indicating which operation mode of the lamp was used for the test if both 50 Hz and High Frequency operation are possible.
- Rated lamp Survival Factor at 2000h, 4000 h, 6000h, 8000h, 12000 h, 16000 h and 20000 h (up to 8000h only for new lamps on the market where no data is yet available), indicating which operation mode of the lamp was used for the test if both 50 Hz and High Frequency operation are possible.
- Lamp mercury content as X.X mg.
- Colour Rendering Index (Ra) of the lamp.
- Colour temperature of the lamp.

Verification: The bidder shall provide a copy of the product's information as evidence that this criterion is met.

2. The following product information shall be provided for luminaires for high intensity discharge lamps:

- If the luminaire is sold together with the ballast, information on the efficiency of the ballast, in accordance with the ballast manufacturer's data.
- If the luminaire is sold together with the lamp, lamp efficacy (lm/W) of the lamp, in accordance with the lamp manufacturer's data.
- If the ballast or the lamp is not sold together with the luminaire, information must be provided on the types of lamps or ballasts compatible with the luminaire
- Maintenance instructions to ensure that the luminaire maintains, as far as possible, its original quality throughout its lifetime.
- Disassembly instructions
- Luminaires for high intensity discharge lamps with a total lamp lumen above 4000 lumen shall indicate that they are designed for clear glass lamps.
- Utilization Factor values for standard road conditions in tabular form for the defined road class. The table contains the most energy efficient UF values for different road widths, different pole heights, maximum pole distances, luminaire overhang and inclination, as appropriate for the given road class and luminaire design.
- Installation instructions for optimising the Utilisation Factor.
- Additional installation recommendations to minimize obtrusive light (if not conflicting with UF optimisation and safety).
- For all luminaires excluding luminaires with bare lamps and no optics, applicable luminaire maintenance factor (LMF) value data.
- Replacement luminaires shall conform to EN60598 and meet the requirements of EN13201.

Verification: The bidder shall provide evidence that this criterion is met.

3. The following product information shall be provided for the ballasts for high intensity discharge lamps:

- The energy efficiency of the ballast, which is defined as the ratio between the lamp power (ballast output) and the input power of the lamp-ballast circuit with possible sensors, network connections and other auxiliary loads disconnected.

Verification: The bidder shall provide evidence that this criterion is met.

3.3 Street lighting - Explanatory notes:

The contracting authority should ensure that the street lighting installation meets the requirements of relevant Directives, any National laws and/or regulations and any applicable quality or health and safety standards.

The contracting authority should ensure that suitably qualified personnel undertake the design, installation and maintenance of the street lighting installation.

The contracting authority shall have regard to local circumstances (road type, usage, average climatic conditions) and undertake a market survey to determine the best available technology for the need identified. Where possible, in addition to the GPP criteria outlined in this Product Sheet, the contracting authority should also consider the wider implications and impacts of their street lighting installation as a whole. The contracting authority should also consider that new street lighting installations will be in place for a significant number of years, and should therefore consider choosing the best available technology available for the specific need identified.

The contracting authority shall consider luminaires and the included ballasts and lamps that are designed in a way that future upgrade of the lighting system is feasible (e.g. possibilities to change lamps without changing ballasts or vice versa)

The contracting authority should consider only lamps that meet the minimum requirements outlined in the criteria. The purchase of High Pressure Mercury should be avoided where

possible, as these are due to be phased out in the next 6 years. Where alternative lamps to MH and HPS are identified as suitable for the intended use the contracting authority should ensure they choose the best available technology. This may include for example LEDs, however these are not yet widely used for street lighting because of their relatively low power compared to HIDs, which makes the latter more suited for street lighting. Although the use of LEDs for street lighting is an emerging market there is currently no significant evidence base on which to develop criteria and they are therefore not included in this GPP specification. LEDs have a number of potential benefits, which include savings on power consumption and associated reductions in GHG emissions, reduced investment payback times, maintained brightness over their lifetime and reduced maintenance as a result of longer lamp lifetimes. However the use of LEDs would need to be considered on a case-by-case basis taking into account specific circumstances and requirements to ensure their use was suitable.

Award Criteria: Contracting authorities will have to indicate in the contract notice and tender documents how many additional points will be awarded for each award criterion. Environmental award criteria should, altogether, account for at least 10 to 15% of the total points available.

The contracting authority must ensure that multiwattage ballasts comply with the requirements according to each wattage on which they operate.

Where fluorescent lamps or LEDs are being replaced, the contracting authority must ensure the most energy efficient versions are used as replacements.

Where installations are being upgraded contracting authorities must ensure bidders employ the most energy efficient lamps (fluorescent or LED), ballasts (where these are not integrated) and luminaires available. However, care must be taken to ensure health and safety legislation is adhered to.

When the Street Lighting GPP criteria are updated the Commission will take the opportunity to review the incorporation of criteria for fluorescent and LED lamp types.

4. GPP Criteria for Traffic Signals

4.1 Traffic Signals – Core criteria

SUBJECT MATTER

Purchase of energy efficient Light Emitting Diode (LED) traffic signals.

TECHNICAL SPECIFICATIONS

- 100% of traffic signal purchases shall be LEDs. This includes the installation of new traffic signals and the retrofitting of existing traffic signals with LEDs. Where contracting authorities are installing or upgrading traffic signals they should include the following minimum requirements in tender documentation.

Module Type	Maximum Wattage (74°C)	Nominal wattage (at 25°C)
300mm Red Ball	17	11
200mm Red Ball	13	8
300mm Red Arrow	12	9
300mm Green Ball	15	15
200mm Green Ball	12	12
300mm Green Arrow	11	11

The wattage requirements in the table above are to be met by the individual module, not the

traffic signal heads. These levels include power demand from the LED power circuit.

Verification: The bidder shall provide the technical specification of the LED or a written declaration to demonstrate this criterion is met.

4.3 Traffic signals - Explanatory notes:

The contracting authority should ensure that the traffic signal installation meets the requirements of relevant Directives, any National laws and/or regulations and any applicable quality or health and safety standards.

The contracting authority should ensure that suitably qualified personnel undertake the design, installation and maintenance of the traffic signal installation.

The contracting authority shall have regard to local circumstances (road type, usage, average climatic conditions) and undertake a market survey to determine the best available technology for the need identified. The contracting authority should also consider that new traffic signal installations will be in place for a significant number of years, and should therefore consider choosing the best available technology available for the specific need identified.

The contracting authority should specify in their tender documents which installation/part of the installation should meet the criteria where it is proposed to utilise LEDs together with other types of traffic signal technology.

5. Cost Considerations

5.1. Street Lighting

When purchasing HID lamps, it is important to not only consider the initial cost of the lamps, but also the lamp efficacy. Although HPM lamps may appear to be cheaper, it must be remembered that these types of lamps have a lower lumen efficacy; therefore they will require more watts to give the same lumen output as an HPS lamp or MH lamp.

This will provide energy savings, and therefore cost savings, as HPS lamps and MH lamps will use less power (watts) than a HPM lamp to provide the same lumen output. These benefits will however depend on other factors, for example, are the sockets the same and will the light distribution change therefore requiring other changes to the street light installation e.g. a different luminaire/ballast. On a replacement only basis, long payback would be expected due to the cost of the whole fitting i.e. lamp, ballast and luminaire e.g. greater than ten years⁹.

Therefore to ensure street lighting is economic it is important in terms of cost considerations for the contracting authority to consider this GPP specification and the best available fittings for new lighting installations and refurbishment of existing installations, for example upgrading ballasts. Obviously where fittings allow, more efficient lamps should be used depending on the location and specific light use requirements.

Good street lighting design may be able to reduce costs by the resulting increase in distance between the streetlights and lower lamp power. However this will need to be balanced against requirements, for example local health and safety requirements regarding spacing and lighting requirements for specific uses.

Furthermore, using lamps that have longer lifetimes and better lumen maintenance will result in longer maintenance times, therefore reducing costs. This will also reduce the indirect

⁹ Policy Brief: Improving the energy performance of street lighting and traffic signals, DEFRA, July 2008
http://www.mtprog.com/spm/files/download/byname/file/2006-07-10%20Policy_Brief_street_lighting%20fin.pdf

impacts incurred through replacement and maintenance, such as vehicular emissions and the associated impacts from manufacturing and distributing more components, mainly lamps.

It should be noted that limited information and data is available regarding the costs considerations for street lighting.

5.2. Traffic Signals

There are a number of cost considerations that the contracting authority will need to taken into account when purchasing traffic signals.

The cost of Light Emitting Diode (LED) traffic signals has been a barrier to the wider implementation of these types of traffic signals over the years, although some countries such as USA and Germany have implemented replacement programmes to upgrade traffic signals to LEDs.

The costs¹⁰ for a standard (incandescent) red-amber-green head is currently around €187.5 compared to over €750 for an equivalent LED model however LED prices are falling rapidly. Therefore, although the initial up-front costs are more for LEDs, overall lifetime costs are lower thanks to a reduction in energy used and far lower maintenance costs¹¹. Other designs allow the use of LEDs with common traffic controllers and reduce replacement costs to €250 – €375 per head¹².

Although the initial capital costs for installation of LED traffic signals is more than conventional (incandescent) versions, the payback following the installation of LED traffic signals has proved to be relatively short as a result of reduced electricity charges and maintenance costs, as the examples below demonstrate. The benefits will be further increased if the price of energy keeps on increasing, as has been the trend over recent times.

A European example of replacing conventional traffic signals with LED traffic signals is provided by the city of Freiburg in Germany. Here 53 traffic signals were replaced in 2006 with projected annual savings of €155,000 as a result of lower maintenance costs and a reduction of 350,000 kilowatts in power consumption, equating to a reduction in emissions of CO₂ of 240 tonnes. The financing of this project is over 15 years, with annual repayments of €140,000, which is less than the total savings per year¹³.

In the USA for example, the California Energy Commission has estimated that a city converting all traffic signals at an intersection (cross-roads) with LEDs will reduce energy use by an estimated 70%, resulting in a simple payback of three to five years. In the city of Portland, Oregon nearly all red and green incandescent traffic lights were replaced in 2001 with LEDs. This resulted in net payback in less than three years due to energy and maintenance savings totalling \$400,000¹², approximately¹⁴ €284,000.

6. Relevant EU legislation and information sources

6.1. EU Legislation

- Directive on Waste Electrical and Electronic Equipment 2002/96/EC:
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32002L0096:EN:HTML>
- Directive on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment 2002/95/EC:

¹⁰ Costs have been converted from Pounds Sterling to Euros using an exchange rate of €1.25 to £1

¹¹ <http://www.reuk.co.uk/UK-Traffic-Lights-57000-Tonnes-Of-CO2.htm>

¹² Quick Hits, Traffic Signal, UK ERC, December 2006

¹³ http://www.ukerc.ac.uk/Downloads/PDF/06/0612_Traffic_Signals_QH.pdf

¹⁴ http://w1.siemens.com/innovation/en/news_events/innovationnews/innovationnews_articles/lighting/smart_financing_for_new_traffic_signals.htm

¹⁴ Savings have been converted from US Dollars to Euros using an exchange rate of €0.71 to \$1

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32002L0095:EN:HTML>

- Directive establishing a framework for the setting of Ecodesign Requirements for Energy-related Products 2009/125/EC:
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:285:0010:0035:en:PDF>
- The CLP Regulation (EC) No 1272/2008. The Regulation of 16 December 2008 on classification, labelling and packaging of substances and mixtures
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:353:0001:1355:en:PDF>
- Regulation (EC 245/2009) with regard to ecodesign requirements for fluorescent lamps without integrated ballast, for high intensity discharge lamps, and for ballasts and luminaires able to operate such lamps, repealing Directive 2000/55/EC
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:076:0017:0044:EN:PDF>
- Commission Regulation 347/2010 amending Commission Regulation 245/2009 as regards ecodesign requirements for fluorescent lamps without integrated ballast, for high intensity discharge lamps, and for ballasts and luminaires able to operate such lamps
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:104:0020:0028:EN:PDF>
- Energy Labelling of Household Lamps Directive 98/11/EC
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:1998:071:0001:0008:EN:PDF>
- Regulation (EC 1907/2006) concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC:
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:396:0001:0849:EN:PDF>
- Low Voltage Directive (LVD) 2006/95/EC
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:374:0010:01:EN:HTML>
- Electromagnetic Compatibility Directive (EMC) 2004/108/EC
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2004:390:0024:0037:EN:PDF>
- Directive on the promotion of End-use efficiency and Energy Services 2006/32/EC
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:114:0064:0085:EN:PDF>
- UNECE Convention on Long-range Transboundary Air Pollution (CLRTAP)
<http://www.unece.org/env/lrtap/>
- The EU Climate-energy Package,
http://ec.europa.eu/environment/climat/climate_action.htm
- The Construction Products Directive (CPD) 89/106/EEC
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31989L0106:EN:HTML>
- Council Directive 93/68/EEC amending many Directives including 89/106/EEC (construction products)
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31993L0068:EN:HTML>

6.2. Ecolabels and other Criteria Sources

- European Ecolabel for Light Bulbs (Regulation 2002/47/EC)
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2002:242:0044:0049:EN:PDF>
- USA Green Seal – Compact Fluorescent Lamps
http://www.greenseal.org/certification/standards/energy_efficient_lighting_compact_fluorescent_lights_GS_05.pdf
- Singapore Green Label (Modular and Integral) Compact Fluorescent Lamps
http://www.sec.org.sg/greenlabel_htm/
- Ecologo America Compact Fluorescent Lamps
http://www.ecologo.org/en/seeourcriteria/details.asp?ccd_id=239
- Energy Star Compact Fluorescent Lamps
http://www.energystar.gov/index.cfm?c=cfls.pr_crit_cfls
- Energy Star - Traffic Signals (Suspended)
http://www.energystar.gov/ia/partners/product_specs/eligibility/traffic_elig.pdf
- EuP Lot 9 Study: Public Street Lighting, VITO, January 2007,
<http://www.eup4light.net>
- Information on renewable raw materials and bio-based products
http://ec.europa.eu/enterprise/policies/innovation/policy/lead-market-initiative/biobased-products/index_en.htm