

Procurement of energy efficient street lighting

Municipality of Župa Dubrovačka (Croatia)

Background

The Municipality of Župa Dubrovnik is situated in the county of Dubrovnik-Neretva in the south-east of Croatia. Situated on the Mediterranean coast, the Municipality covers an area of approximately 23 km², includes 16 towns and has a population of 6,663 people.

In September 2014, the Municipality introduced a [Sustainable Energy Action Plan](#) (SEAP) which was established as part of the [Covenant of Mayors](#) initiative. The SEAP provides the Municipality with stronger leverage when they wish to implement a green public procurement (GPP) procedure.

Procurement objectives

The Municipality of Župa Dubrovačka recognised the need to improve the quality of street lighting in the Municipality and wished to do so by installing a fixed lighting installation which would achieve that goal and thereby improve public safety, traffic safety and traffic flow at night.

The Municipality decided to publish an open tender which would include the replacement of the existing street light fixtures and high pressure mercury lamps, with a new and more sustainable solution. Župa Dubrovnik decided for the first time to carry out a GPP procedure, as they wished to ensure that the final solution would emit less light pollution and cause less greenhouse gas emissions than the previous system.

In May 2014 an open tender was published, the total value of which was estimated at 180,000 euro (excluding VAT).

Criteria used

Subject matter of the contract: Procurement of a lighting solution for the Municipality of Župa Dubrovačka.

Technical specifications included the following:

Colour Rendering Index > 75

The Colour Rendering Index (CRI) is an index used to quantitatively measure the ability of a light source to accurately reveal the colours of various objects in comparison with an "ideal" or natural light source (resulting in a reduction of light pollution in comparison to other more artificial light sources). Typically, light sources with a high CRI are the most desirable. The Municipality opted for the technical standard CRI > 75.

Colour temperature (Kelvin) 3,000 – 4,000

A colour temperature of between 3,000 and 4,000 Kelvin is best suited for street lighting as it gives a warm white colour, which has a lower light intensity than cool white LED lamps.

General lighting-efficiency (lumen/watt) > 50

The more lumen per watt, the more light is produced for the least amount of energy.

Life-span (hours at L70) > 20,000 hours

L70 is a standard in the lighting industry which demonstrates the lifespan of an LED. The life-span indicates the number of hours before light output drops to 70% of the initial output.

These environmental requirements were included as part of the technical specifications and were prepared based on



information obtained from the following sources:

- International Commission on Illumination (CIE) Technical Report CIE-1509
- [CELMA Guide on Obtrusive Light](#)
- Energy Star standards and recommendations

Award criteria:

The sole award criteria for this tender was lowest price, however, the technical specifications were established in such a way that any solution proposed would have to comply with a variety of environmental and technical requirements which can typically only be met by an LED lighting solution (as outlined above). As an LED lighting solution was not specifically requested, the environmentally stringent requirements ensured that, should an even better solution be available on the market, it could also be offered as long as it met the requirements outlined in the technical specifications.

Contract performance clauses:

The contract stipulated that the winning bidder would be required to carry out repair and maintenance of the lighting solution, and offer a warranty of compliance for the following environmental aspects:

- All components (i.e. products within the lighting system) must be labelled with the [CE Marking](#) - the European Conformity (or Conformité Européene) label that demonstrates that products sold in the European Economic Area (EEA) have been assessed to meet high safety, health, and environmental protection requirements.
- All components (as above) of lamps must have a manufacturer's declaration of conformity with European law, including a statement that they meet the technical, environmental, health, and public safety requirements for such products in Europe.
- Provide a manufacturer's warranty for a minimum of five years for all lamps.
- All components (as above) must comply with the [Waste Electrical and Electronic Equipment \(WEEE\) EU Directive](#)

Results

By changing to an LED lighting solution, the Municipality was able to significantly reduce its energy consumption in comparison to the previous street lighting system, where high pressure mercury lamps were used.

The Municipality calculated the energy and CO₂ emissions saved using the GPP 2020 methodology with an assumed lifetime of 25 years. This calculation was based on the 686 newly installed LED lamps and produced the following results:

The new LED lighting solution consumes 210,000 kWh per year and emits 64 tonnes of CO₂ per year. In comparison to the previous system, which was consuming 330,000 kWh and emitting an average of 100 tonnes of CO₂ a year, the new LED lighting solution has reduced the CO₂ emissions (from street lighting) by 36%, saving the equivalent of 900 tonnes of CO₂ over a 25 year period. Financially, the new LED lighting solution is saving the Municipality approximately 13,800 euro a year at today's energy price (currently 0.115 euro per kWh for street lighting). This figure does not include the savings made from the reduced need to service light fixtures.

"In comparison to the previous system the new LED lighting solution has reduced the CO₂ emissions (from street lighting) by 36%, saving the equivalent of 900 tonnes of CO₂ over a 25 year period"

The new solution is programmed so that the lamps do not switch on until visibility reaches the minimum illumination level for street lighting required by law in Croatia. Furthermore, the new solution reduces the power (wattage) and energy consumption in accordance with the intensity of natural lighting by an automatic controller regulation which is installed in the system.

Environmental impacts

The installation of warm white lamps and the requirement of a CRI > 75 reduced the amount of light pollution created. By changing to LED lamps, the Municipality of Župa Dubrovačka reduced air, land and water pollution which is caused by the use of hazardous mercury.

Furthermore, by opting for LED lamps and introducing measures such as programming the lighting system so that lights only came on when a certain level of darkness was reached, the Municipality reduced their energy consumption by 120,000 kWh a year, saving 36 tonnes of CO₂.

Lessons learned

As bidders appeared to be able to comply with the requirements outlined in this tender without any problems, in future, the Municipality of Župa Dubrovačka aims to include more ambitious energy efficiency award criteria and technical specifications in all of its tenders. The Municipality's ability to carry out GPP procedures is further supported by the establishment of their SEAP in 2014.

Contact person: Admir Pajic, United Nations Development Programme (UNDP). Email: admir.pajic@undp.org
For more information, please see the European GPP criteria for [Street Lighting](#) and the [Technical Background Report](#).