

Energy performance contracting for efficient outdoor lighting

Municipality of Jimena de la Frontera, Cádiz (Spain)

Background

Jimena de la Frontera is a historic town located in the province of Cadiz, in the southern region of Andalusia, Spain, and has a population of approximately 10,000 people.

In July 2009, the Municipality expressed its commitment to sustainable development and the creation of a new local energy model by signing the Covenant of Mayors initiative and developing a [Sustainable Energy Action Plan](#) (SEAP), with an overall goal of reducing its greenhouse gas emissions (GHG) by 21% before 2020 (compared to 2007 levels).

The SEAP of Jimena de la Frontera was developed with the support of the [Provincial Energy Agency of Cadiz](#) and it was based on the main conclusions and results obtained in an [Emissions Analysis](#) done in Andalusia in 2009. Thus, the defined priority fields are the residential and public sector (including energy efficiency measures in buildings and changing user behaviour) and transport and mobility (with actions to promote pedestrian and cyclist mobility). These actions have been accompanied by others aimed at harnessing solar energy and particularly wind as the main renewable energy resources.

Procurement objectives

An improvement in the energy efficiency of public outdoor lighting was included in the SEAP as one of the specific areas where actions should be taken. The existing facilities had a need for modernisation in order to comply with the latest regulations, and achieve significant energy savings and high energy efficiency of facilities.

In 2008, a municipal energy audit was conducted in order to find out the technical and economic potential which the facilities offered. The results allowed defining potential improvements in the mode of operation, the overall performance of the lighting installations and the standing of components.

In December 2012, a call for tenders was published with the aim of modernising outdoor public lighting facilities, including the operation of the following installations for a period of ten years through an Energy Performance Contract (EPC):

- Measurement Modules
- Operation centres
- Points of light (luminaires and crosiers)
- Connection and ground lines

Throughout the procurement, the Provincial Energy Agency of Cadiz provided technical advice to prepare the call for tenders and check the documentation.

Criteria used in the procurement process

Subject matter of the contract: Supply and service management of outdoor public lighting in Jimena de la Frontera

Technical specifications: The contract period was ten years and included the following requirements from the service:

- P1. Energy Management: Energy and administrative management, including a remote control system and quality control



- P2. Preventive maintenance and inspection
- P3. Corrective maintenance with total guarantee of damaged elements in the existing installations during the contract period
- P4. Improvement works and renovation of facilities with high energy consumption
- P5. Investments in Energy Efficiency and Savings: Implementation and financing of works for inclusion, upgrading or renewal of equipment or items that promote saving and greater energy efficiency. These works should be considered, presented, implemented and funded by the winning bidder through the savings achieved within the contract period, and have no economic impact on the budget itself

The total estimated value of the contract was 1,461,625.50 euro (excluding value added tax).

The main aim of the contract is to guarantee minimum energy savings of 10% regarding final energy consumption of the current public lighting installations in Jimena de la Frontera, based on the average energy consumed in the previous year (June 2011 – May 2012) of 723,690 kWh/year.

Minimum requirements as described in the [Spanish Royal Decree 1890/2008](#) on Energy Efficiency for Outdoor Lighting Installations and additional performance requirements were described in all work packages.

In addition, more advanced criteria were included. For instance in P4, it was stated that renovation works to be carried out during the first six months of the contract should consist of at least the following:

- Replacement of all lamps using low-efficiency technology (such as, for example, mercury vapour lamps) by more efficient ones. All lamps in the installations had to have the capacity to regulate luminous flux, replacing those that did not have it
- Replacement of all damaged elements of the luminaires and, if necessary, replacement of the whole luminaire
- Implementation and operation of the remote management system and control system defined in P1 in at least 60% of the lighting points. During the next five years of the contract, it was required that the remote management and control system be installed for all lighting points

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Furthermore, a report containing a technical description of all proposed improvement measures by the supplier to achieve better energy savings and the detailed calendar of investments were to be submitted.

The report had to highlight the total energy savings to be achieved with the proposal, as measured by the International Performance Measurement and Verification Protocol Energy Savings (IPMVP) proposed by the [Efficiency Valuation Organization](#) (EVO) and a calculation of the reduced CO2 emissions and other pollutants achieved by these improvements. Energy savings had to reach at least 20%.

Award criteria: Bids were evaluated based on the most economically advantageous tender (on the basis of a weighting system with a total score of 100 points) with the contract awarded to the bid obtaining the highest score according to the following categories:

- a. Reduction of the estimated maximum value of the contract (15 points). 0.6 points were awarded for every percentage point reduction, compared to the estimated maximum value given in the technical specifications
- b. Assessment of the Technical Report submitted for work package P4 (maximum of 60 points)
- c. Assessment of the Technical Report submitted for work package P5 (maximum of 20 points)
- d. Method for conducting information and awareness campaigns (maximum of 5 points), which should describe the procedure to conduct awareness raising campaigns, to produce a change in behaviour for certain target groups: using existing and new facilities, and their associated environmental impacts

Contract performance clauses: The winning bidder had to keep track of annual lighting levels, which at all times had to meet the minimum requirements of the current legislation. Annual reports should also be submitted to the Municipality about the status quo and main conclusions of the supply management, lighting levels and energy efficiency.

The Municipality can, at any time, carry out checks of the lighting levels in order to verify compliance with the contract. Furthermore, preventive maintenance and cleaning of luminaires should be conducted with a certain frequency and, in case of any malfunctions, these should be repaired in less than 24 hours.

Results

The call for tenders was published in December 2012 and three bidders submitted proposals. The contract was finally awarded for 1,315,555 euro.

According to the EPC, the Energy Service Company (ESCO) deals with the payments of the public electricity bill associated with this contract for the ten year period. As described in the call for tenders, the ESCO has guaranteed energy savings of 65%, which are being used by the ESCO to carry out the contracted services.

Savings over this amount are shared between the Municipality (40%) and the company (60%). The Municipality pays a monthly fixed fee to the ESCO during the contract period. This amount is 20% lower than the quantity previously paid for electricity supply.

Less than a year after the contract was awarded, most of the corrective and maintenance actions planned had been carried out, with achievements of 65% savings in total energy consumption. As of July 2016, the following improvements have been carried out:

- Review and renewal of all operation centres included in the contract and introduction of remote control and management systems
- Replacement of 1,412 low-power compact fluorescent lamps for light emitting diodes (LEDs) integrated into the remote control system. 1,569 lighting points are managed under the remote control system
- Planning of short and mid-term awareness raising campaigns, consisting of regularly publishing information on the Municipality's website and the organisation of information days for citizens

The contract has been currently running for three years, and in 2015, savings of 70% had been achieved (measured based on the audit protocol from EVO).

Environmental Impacts

Replacing traditional lamps such as mercury vapour lamps with LED lamps has a positive effect in the reduction of air, land and water pollution, which is caused by the use of hazardous mercury. New facilities also prevent light pollution, and reduce the production of GHG emissions significantly.

Lessons learned

- * Change of attitude in the local administration: One of the main difficulties faced during the process was the one of trying to implement a change process within the contracting authority. Staff were initially reluctant to implement the new approach in the field of energy service management. It was necessary to overcome this barrier by making an additional effort in raising awareness and explaining in detail the advantages of using this type of approach.
- * Support from the Provincial Energy Agency of Cadiz: The Municipality of Jimena de la Frontera and the Provincial Energy Agency of Cadiz signed a collaboration agreement to provide technical assistance for the preparation and development of the procedure. Without the specialised support of the Agency, this procedure may not have been as successful, as the Municipality lacked the necessary experience. The Agency carried out several technical tasks, such as identifying the targeted facilities, analysing documentation and inventory, writing technical specifications and assessing the quality of the bids received.
- * Feasibility of using the ESCO model in small municipalities: The approach provides a good model for replication in municipalities of a similar size to Jimena de la Frontera – that is, of approximately 10,000 inhabitants.
- * Modernisation of public outdoor lighting: The new energy management service carried out by ESCO has enabled greater control of the public outdoor lighting installations through their modernisation, and a reduced consumption in energy. Furthermore, the more modern lighting facilities provide an improved service to the general public.

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For related information, please see [European GPP](#) criteria for Street Lighting and the [Technical Background Report](#).