

Renewal of Public Lighting: beyond the 80% energy saving threshold.

The new technologies for energy efficiency in Public Lighting allow to overcome the 80% saving of electricity compared to traditional systems. This claim seems to be confirmed in Italy by the analysis of the latest tenders for the award of Energy Performance Contracting with Result Guarantee (EPC-RG) and Third Party Financing (TPF), reserved to Energy Service Companies (ESCO), carried out within the ELENA facility, financed by the EIB with EU funds.

If it is true, as stated by the GSE (Energy Services Manager), that Public Lighting represents 20-30% of municipal energy bills, the renewal of Public Lighting systems allows Municipalities to have very important Budget Reliefs.

In the last 3 tenders, carried out by the Province of Padua and by the Metropolitan City of Venice, high savings levels have been achieved, exceeding 80% in terms of electrical efficiency.

The **first tender** was launched in August 2016 and concerned the energy requalification of the public lighting systems of 15 Municipalities of the Province of Padua, a Municipality of the Province of Rovigo, as well as three cemeteries: Castelbaldo, Cervarese Santa Croce, Conselve, Merlara, Mestrino, Piombino Dese, Pontelongo, Torreglia, Urbana, Vigonza, Villa Estense, Costa di Rovigo, Battaglia Terme, Rovolon, Veggiano and Massanzago.

The Monetary Energy Baseline, to power over 20,000 Light Points, of which 2,000 for votive lighting, was 1,449,034 € and that for operation and management (O&M) was 268,611 €, for a total of 1,717,645 €. The minimum investment required, to achieve savings of at least 30%, was 2,400,000 €, excluding VAT.

The tender, which saw the participation of 6 competitors in the final phase, was assigned at the end of December 2017 to an ESCo group headed by Servizi a Rete srl (SAR) associated with GDS Lighting srl and BL Impianti Elettrici srl, which offered an investment of 7,160,189 € excluding VAT, with a guaranteed energy saving of 80.2%, of which 42.1% returned to the Municipalities. The ESCo also offered a 40% discount on operation and maintenance (O&M) costs, bringing the global immediate Budget Relief for all Municipalities to 598,000 €, equal to 35% of the previous expenditure on Electricity and O&M.

The **second tender**, concluded in April 2019, involved the renewal of the public lighting systems (17,000 light points) of 22 municipalities in the Province of Belluno: Alano di Piave, Arsié, Chies D'Alpago, Farra D'Alpago, Pieve D'Alpago, Puos D'Alpago, Quero Vas, San Gregorio nelle Alpi, Sedico, Alleghe, Cortina D'Ampezzo, Danta di Cadore, Falcade, Gosaldo, Livinallongo Col di Lana, Lorenzago di Cadore, Rivamonte Agordino, San Pietro di Cadore, Santo Stefano di Cadore, Selva di Cadore, Vallada Agordina and Vigo di Cadore.

The Electric Baseline was 6,300 MWh with a cost of 1,089,130 € for Electricity, in addition to 186,704 € for the O&M of the plants, for a total annual amount of 1,275,834 €.

The investment proposed by the ESCo that won the tender, Servizi a Rete srl (SAR) in group with 2 other companies, GDS Lighting srl and F.lli Carollo Impianti Elettrici srl, was 7,272,125 € with a Guaranteed Energy Saving of 81.1%, of which 22.1% recognized to Municipalities which, added to a 16% reduction in O&M costs, lead to a total of € 224,800 of immediate annual Budget Relief, equal to 18% of the total cost for Energy and O&M.

The **third tender** examined, divided into two lots, awarded but yet in the "stand still" period, saw the participation of 9 competitors in the final phase of the restricted procedure.

The tender concerned the renewal of the Public Lighting systems of 15 Municipalities in the territory of the Metropolitan City of Venice, for a total of over 33,500 Light Points: Fiesso D'artico, Fossò, Mirano, Santa Maria di Sala, Stra, Mira, Ceggia, Concordia Sagittaria, Eraclea, Fossalta di Piave, Jesolo, Meolo, Musile di Piave, Noventa di Piave, San Donà di Piave.

The Electric Baseline is 13,157 MWh for an annual cost of 2,296,260 € which, added to 270,000 € of O&M costs, lead to a total annual expenditure of 2,705,000 €. The minimum investment required to obtain a Guaranteed Energy Savings of at least 50% was 8,600,000 €, excluding VAT. The Guaranteed Electricity Savings, offered by the first 4 classified competitors, are all greater than 80% with shares of savings paid back to Municipalities ranging between 25% and 38%.

This is made possible by the combination of several factors:

- the luminous efficiency of sources with LED - Light Emitting Diode, for road applications, now reaches 180 lumens / Watt;
- the loss of the luminous flux of the best brands is around 10% after 150,000 hours of operation and the failure rate is around 10% after 100,000 hours of ignition;
- the so-called CLO (Constant Light Output) function is now commonly applied which, if on the one hand it helps to counteract the decay of the luminous flux over time, on the other it saves energy in the initial phase of the life of an LED source;
- the use of Adaptive Lighting is becoming increasingly widespread, that is, the control of street lighting in relation to the flow of traffic, weather conditions and luminance of the road surface. This allows, through special sensors and/or dedicated cameras, to adjust the street lighting in real time, according to the traffic. Very effective at night, adaptive lighting allows savings of even 20-30% compared to adjustments based on statistical evaluations and allow to take into account dangerous conditions deriving from adverse weather conditions or particularly intense traffic;
- in pedestrian areas, the so-called "Motion Light Systems" allow lighting to be activated only when pedestrians or cyclists pass by, with significant energy savings;
- the adoption of point-to-point remote control systems with radio frequency transmission, allows continuous monitoring of each individual Light Point and therefore rapid restoration of the pre-established conditions.

Can we go further? It is early to say. Certainly the current state of the art of Public Lighting represents a great opportunity for Public Bodies and Municipalities in particular who, with a little goodwill and foresight, can improve lighting in cities, heal their budgets and ultimately contribute to environmental sustainability, all without financial outlays.

Sergio Zobot, February 2020