

Municipality of Antiesenhofen, Upper Austria

Street lighting project

Project background and objectives

The street lighting system of the municipality of Antiesenhofen was quite old (partly from the 60s) and represented a large percentage of the municipality's electricity consumption. The light quality was unsatisfactory and significant repair work was required. Already some years earlier, the municipality considered a renovation, but it was suspended due to a lack of financial resources. In 2014, the project was undertaken and combined with repair work for damages on some concrete masts. The focus was put on refurbishing the public lighting on the main street and in the west part of the municipality.

Project description

The main objective of the project was to improve the physical state and energy efficiency of the street lighting system without compromising service quality. The municipality was interested in using an EPC (energy performance contracting) model for this project, 4 ESCOs were asked to submit an offer. The decision was taken not to include the maintenance costs in the EPC contract. This was intensively discussed in the preparatory phase. The municipality nevertheless benefits from a significant reduction of its maintenance costs due to the new energy efficient and low-maintenance LED lighting system.

Significant parts of the refurbishment work could not be financed by the electricity saving measures. For these, the municipality paid a deposit. However, combining the necessary repair work with the energy efficiency project ensured a professional implementation of all measures by a street lighting specialist.



Facts

- **Population:** 1,060 inhabitants
- **Type of streets:** 60 % of the street lighting (country roads, residential areas)
- **ESCO:** eww
- **Electricity cost savings:** 1,600 €/year
- **Reduction electricity consumption:** 10,600 kWh/year
- **CO₂ reduction:** 5 tons/year
- **Investment costs:**
 - 296,500 € (total investment)
 - 15,900 € (financed by the EPC project)
- **Subsidies:**
 - 3,200 € (regional contracting programme)
- **EPC contract duration:** 10 years

Further information:

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Municipality of Antiesenhofen, Upper Austria

Street lighting project

Project data	Before renovation	After renovation
Total installed electric capacity	5 kW	2.4 kW
Total number of lamps	82	58
Number of lighting points (luminaires)	54	58
Annual electricity consumption	20,700 kWh	10,100 kWh
Annual electricity costs	3,100 Euro	1,500 Euro
Annual maintenance costs	1,500 Euro	1,200 Euro

Results

The municipality wanted to limit the amount of digging and excavation work done during the project. This was made possible by working with a local company that employs pipe jacking - a trenchless method of drilling tunnels and lay piping underground with only minimal surface damage. This resulted in much less demolition and reconstruction of roads. The project benefited from the very positive collaboration between the ESCO and the local electrical company. The municipality is very satisfied with the implementation process and outcome of the project and is pleased with the quality of the lighting.

Support by the facilitation service

The facilitation service supported the municipality throughout the development of the EPC project by offering feedback and guidance on funding aspects as well as on the content of the EPC contract.



Photos: Gemeinde Antiesenhofen, OÖ Energiesparverband

Municipality of Bad Schallerbach, Upper Austria

Street lighting project

Project background and objectives

The Upper Austrian municipality of Bad Schallerbach is a well-known health resort. Being also committed to climate protection, the municipality continuously aims to improve its energy efficiency. Because of their aging public lighting system and the phasing out of high-pressure mercury lamps, the entire street lighting system was renovated at once, including Christmas lighting, within an EPC (energy performance contracting) project.

Project description

The original objective was to refurbish only the sections of the street lighting system that were in dire need of replacement. However, after realising the extent of the work required, the municipality decided to develop a holistic refurbishment concept for the entire street lighting system. This would permit them to harness the full energy efficiency potential. The decision was taken to carry out the project using an EPC model. Among others, reasons for this were the availability of an EPC facilitation service and a dedicated regional support programme in Upper Austria. Following a tender, the municipal council awarded the contract to a local ESCO. It was this company's first EPC project.

The ESCO, the local electrician, was responsible for maintenance work in the municipality prior to the refurbishment project.



Facts

- **Population:** 3.441 inhabitants
- **Type of streets:** entire street lighting system of the municipality
- **ESCO:** Elektro Kliemstein
- **Electricity cost savings:** 19,500 €/year
- **Maintenance cost savings:** 20,000 €/year (not guaranteed in the EPC contract)
- **Reduction electricity consumption:** 130,900 kWh/year
- **CO₂ reduction:** 60 tons/year
- **Investment costs:**
 - 354,600 € (total investment)
 - 196,400 € (financed by the EPC project)
- **Subsidies:**
 - 39,300 € (regional contracting programme)
 - 20,900 € (environmental subsidy)
- **EPC contract duration:** 10 years

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Municipality of Bad Schallerbach, Upper Austria

Street lighting project

Project data	Before renovation	After renovation
Total installed electric capacity	55 kW	23 kW
Total number of lamps	1,946	793
Number of lighting points (luminaires)	791	793
Main lamp type	HQL	LED
Annual electricity consumption	227,300 kWh	96,400 kWh
Annual electricity costs	34,000 Euro	14,500 Euro

Results

100 % of the street lighting system of Bad Schallerbach was renovated and converted to LED technology. There were a number of masts and decorative lamps that were quite recent or still in good condition. The municipality wanted to maintain these in the system. An LED module that fit into the decorative fixtures was found to ensure consistent appearance.

Support by the facilitation service

This was the first EPC project for the ESCO, a local company. The support offered by the EPC facilitation service was key to the project. Without this support, it is unlikely that the project would have taken place as an EPC project. The facilitation service guided the new ESCO step by step through the process of developing the project, thus helping to increase their knowhow and capacity as ESCO service provider.



Photos: Marktgemeinde Bad Schallerbach, OÖ Energiesparverband

Municipality of Gunskirchen, Upper Austria

Street lighting project

Project background and objectives

The municipality of Gunskirchen recognised that their street lighting system required significant refurbishment work and that the technology currently in use would soon be affected by the phasing out of lamps. Furthermore, it was acknowledged that refurbishing the system could offer a large energy saving potential. The local energy group that supports the municipality in the implementation of its local energy strategy was the driver of the project. Political consensus was reached for a comprehensive refurbishment solution covering about 80 % of the municipality's total street lighting system.

Project description

The decision was taken to refurbish the street lighting system to energy-efficient LED technology using EPC. The main criterion for this project was to reduce electricity consumption and maintenance costs without compromising the quality of the public lighting services. One of the first steps was to undertake a thorough analysis of the lighting points. The operational hours were also analysed and adapted according to actual needs. In some sections, they could be reduced. In others, due to security reasons, it was necessary to increase operational hours (e.g. village centre). The objective of the municipality was to find a good solution for every street. For the implementation, the municipality hired a planner who carried out a tendering procedure. Five ESCOs were invited to bid and all submitted for the call.



Facts

- **Population:** 5,800 inhabitants
- **Type of streets:** 80 % of the street lighting system of the municipality
- **ESCO:** eww
- **Electricity cost savings:** 12,500 €/year
- **Maintenance cost savings:** 28,000 €/year (not guaranteed in the EPC contract)
- **Reduction electricity consumption:** 78,300 kWh/year
- **CO₂ reduction:** 36 tons/year
- **Investment costs:**
 - 796,400 € (total investment)
 - 125,300 € (financed by the EPC project)
- **Subsidies:**
 - 25,100 € (regional contracting programme)
- **EPC contract duration:** 10 years

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Municipality of Gunskirchen, Upper Austria

Street lighting project

Project data	Before renovation	After renovation
Total installed electric capacity	58 kW	28 kW
Total number of lamps	971	725
Number of lighting points (luminaires)	727	725
Main lamp type	HQL	LED
Annual electricity consumption	148,700 kWh	70,400 kWh
Annual electricity costs	23,800 Euro	11,300 Euro

Results

In the context of this project, the municipality conducted significant refurbishment work on the infrastructure that could not be financed by the electricity saving measures. As a result, the municipality was required to contribute a deposit. In addition, the reduction in maintenance costs was not guaranteed in the EPC contract, which reduced the guaranteed savings and the percentage of the project that could be financed through the EPC contract. However, this did not compromise the economic viability of the project and the municipalities nevertheless benefits from the savings in maintenance costs due to the new lighting system. One recommendation of the municipality is to really perform a thorough analysis of the lighting system before renovation. The municipality is happy with the new lighting system and the response from the citizens is very good. An information event was held to inform citizens about the new street lighting system.

Support by the facilitation service

The EPC facilitation service provided support in applying for financial support from the regional contracting programme as well as contributed to discussion on various aspects of the project.



Photos: Marktgemeinde Gunskirchen, OÖ Energiesparverband



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Municipality of Rainbach, Upper Austria

Street lighting project

Project background and objectives

The municipality of Rainbach participates in the Upper Austrian EGEM programme - a programme through which municipalities set local energy goals and develop a local energy action plan. Converting the street lighting to LED technology is part of the municipality of Rainbach's action plan.

In the context of this project, the municipality refurbished the older sections of the lighting system to LED technology using EPC. The refurbishment project covered the village centre, one district and an underpass.

Project description

The municipality's objectives were to achieve a significant improvement in energy efficiency and to reduce electricity and maintenance costs while continuing to offer a lighting service that assures safety for pedestrians and drivers.

It was decided that the elements that were still in good condition (masts, control boxes, distribution points) should be kept whenever possible. Infrastructure that was installed in recent years should not be modified. Therefore, the project concentrated on the older sections of the lighting network.

A lighting planner conducted an analysis of the lighting system. The results were discussed with the municipality and a new design for the system was agreed upon. The EPC contract was signed between the municipality and the ESCO, who then conducted the implementation.



Facts

- **Population:** 2,900 inhabitants
- **Type of streets:** Village centre, district "Summerau", underpass
- **ESCO:** Linz AG
- **Electricity cost savings:** 2,900 €/year
- **Maintenance cost savings:** 4,200 €/year
- **Reduction electricity consumption:** 18,700 kWh/year
- **CO₂ reduction:** 8.6 tons/year
- **Investment costs:**
 - 190,400 € (total investment)
 - 95,700 € (financed by the EPC project)
- **Subsidies:**
 - 14,800 € (regional contracting programme)
 - 2,900 € (environmental subsidy)
- **EPC contract duration:** 10 years

Further information:

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Municipality of Rainbach, Upper Austria

Street lighting project

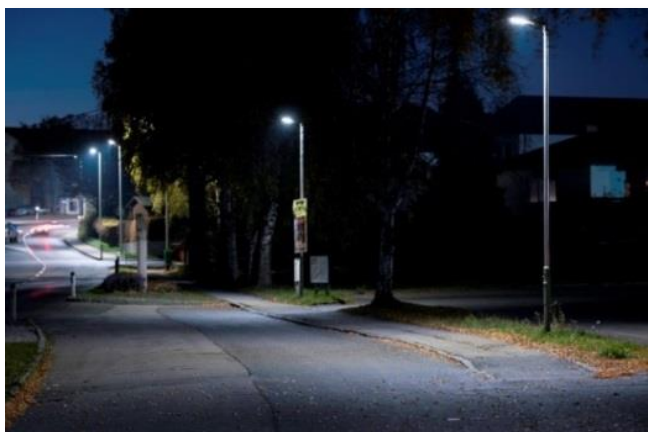
Project data	Before renovation	After renovation
Total installed electric capacity	9.5 kW	5.6 kW
Total number of lamps	701	190
Number of lighting points (luminaires)	192	190
Main lamp type	Fluorescent	LED
Annual electricity consumption	44,300 kWh	25,600 kWh
Annual electricity costs	6,900 Euro	4,000 Euro
Annual maintenance costs	5,800 Euro	1,600 Euro

Results

As the street lighting system of Rainbach was very old, maintenance costs before renovation were quite high. As a result, the maintenance cost savings that are guaranteed by the ESCO are also very high (over 70 %).

Support by the facilitation service

Throughout the project, the facilitation service supported the municipality and the ESCO in aspects mostly related to the development of the EPC contract.



Photos: OÖ Energiesparverband

Municipality of Rohrbach-Berg, Upper Austria

Street lighting project

Project background and objectives

Rohrbach-Berg is a municipality in the Northern part of Upper Austria located in a rural area close to the borders to Germany and Czech Republic.

The street lighting project was originally planned in the municipality of Berg. After Berg and the neighbouring municipality of Rohrbach were amalgamated, the project was completed by the municipality officials of former Rohrbach. It was successfully carried out and finalised in 2015.

The renovation project covered the whole street lighting of the former municipality of Berg and a part of Rohrbach. As Rohrbach had already implemented two EPC projects in recent years, Berg benefited from their experience and know-how.

Project description

The street lighting system of Berg was very old (1960s) and renovation was needed. Some of the masts were in poor condition. Besides improving these aspects, the municipality's main aim was to save electricity and use more efficient lighting technology. As parts of the streets are highly frequented by pedestrians, the municipality also wanted a suitable solution for pedestrian safety.

Four ESCOs were asked to bid. A rough analysis was carried out and used as a basis for the development of the first offer.



Facts

- **Population:** 5,100 inhabitants
- **Type of streets:** street lighting system of the district "Berg" and a small part of the district "Rohrbach"
- **ESCO:** Elin
- **Electricity cost savings:** 5,700 €/year
- **Maintenance cost savings:** 6,500 €/year
- **Reduction electricity consumption:** 37,700 kWh/year
- **CO₂ reduction:** 17 tons/year
- **Investment costs:**
 - 271,100 € (total investment)
 - 121,500 € (financed by the EPC project)
- **Subsidies:**
 - 24,300 € (regional contracting programme)
 - 4,400 € (environmental subsidy)
- **EPC contract duration:** 10 years

Further information:

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Municipality of Rohrbach-Berg, Upper Austria

Street lighting project

Project data	Before renovation	After renovation
Total installed electric capacity	12.5 kW	3.5 kW
Total number of lamps	276	139
Number of lighting points (luminaires)	139	139
Main lamp type	Fluorescent	LED
Annual electricity consumption	52,500 kWh	14,800 kWh
Annual electricity costs	7,800 Euro	2,100 Euro
Annual maintenance costs	7,500 Euro	1,000 Euro

Results

The project was implemented shortly after the municipalities of Rohrbach and Berg were amalgamated. The amalgamation resulted in the decision to enlarge the project to also include the renovation of a part of the former municipality of Rohrbach. As a result, more lighting points were renovated than initially planned and agreed upon by the municipality and ESCO (139 instead of 121). The municipality Rohrbach-Berg is very happy with the new street lighting system and highly recommends LED technology to other municipalities.

Support by the facilitation service

Before starting the project, the municipality attended a Streetlight-EPC information event organised by the Upper Austrian facilitation service through which a quick-check was completed and discussion about the project commenced. This was the kick-off for the project. During the development and implementation of the project, the facilitation service was contacted several times. The support of the facilitation service was regarded as very welcome and helpful.



Photos: Stadtgemeinde Rohrbach-Berg, OÖ Energiesparverband

City of Wels, Upper Austria

Street lighting project

Project background and objectives

This project was a continuation of the city of Wels' long-term ambition to refurbish 100 % of its public lighting to LED technology.

The lighting system in the "Underpass Neustadt" in Wels was installed in the 1970s. 40 years later, refurbishment was required due to the age and high maintenance costs of the system.

The municipality was interested in installing LEDs in the underpass due to their long life span and low energy demand. Since the underpass lighting is in operation 24 hours per day, 7 days per week, it was a good candidate for refurbishment through EPC.

Project description

The main economic objective of this project was to reduce electricity consumption and maintenance costs.

The city of Wels has much experience with EPC and the city's energy utility (eww) has been active as ESCO for many projects in the region. The refurbishment took place in 2015 with eww as ESCO. The eww conducted a rough analysis which, after discussion with the city, was further developed to achieve the desired results.



Facts

- **Population:** 59,900 inhabitants
- **Type of streets:** underpass
- **ESCO:** eww
- **Electricity cost savings:** 1,700 €/year
- **Maintenance cost savings:** 1,500 €/year
- **Reduction electricity consumption:** 7,000 kWh/year
- **CO₂ reduction:** 3.2 tons/year
- **Investment costs:** 19,000 €
- **EPC contract duration:** 5.5 years

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City of Wels, Upper Austria

Street lighting project

Project data	Before renovation	After renovation
Total installed electric capacity	1.9 kW	1.1 kW
Total number of lamps	40	40
Number of lighting points (luminaires)	40	40
Main lamp type	Fluorescent lamps (wet room)	LED (wet room)
Annual electricity consumption	16,800 kWh	9,800 kWh
Annual electricity costs	3,700 Euro	2,000 Euro
Annual maintenance costs	2,000 Euro	500 Euro

Results

According to the city of Wels, the most crucial aspect in an EPC project is finding a trustworthy partner. The project goals of achieving the best quality for the citizens (safety, comfort, no glare, good colour/temperature of light etc.) can only be reached with reliable partners.

The new lighting system was successfully refurbished and commissioned. A key aspect is to ensure good visibility, especially when entering the underpass from the north on sunny days.

Support by the facilitation service

The facilitation service provided support on various aspects throughout the project. This support was appreciated by the city of Wels and was said to have helped accelerate and ease the implementation of the project.



Before renovation



After renovation

Photos: www.fotoclubwels.org, Stadt Wels

Realised project street lighting: Municipality of Stadl-Paura, Upper Austria

Project background and objectives

Stadl-Paura is a municipality of 5,000 inhabitants in the district of Wels-Land. It lies at the junction of the Ager and Traun Rivers.

Since the lighting system was approaching the end of its operational life, the municipality started considering a refurbishing. At the beginning of the planning phase, the question arose as to whether a one-time refurbishment or a multi-phase approach would be preferable. Finally, the municipality opted to replace all old lamps with LEDs through a one-step large-scale general refurbishment project. Since the municipality had already had good experience with Energy Performance Contracting (EPC) during a small lighting project in 2003, they turned to EPC again for their large lighting refurbishment.

Project description

The entire street lighting (more than 700 lighting points) were renewed. The old HQI lamps were replaced by LEDs. The municipality placed special emphasis on high energy efficiency, achieving lighting standards and the uniformity of the lighting system throughout the town. It was decided to also include work on the mast as part of the project. Old concrete masts were replaced and more recent masts were equipped with extensions.

At night, the lighting can now be dimmed, a much better solution for energy savings than the previous option of turning off every second light.



Facts

- **Population:** 4,960 inhabitants
- **Type of streets:** main road and municipal roads
- **ESCO:** Elin
- **Electricity cost savings:** 24,800 €/year
- **Maintenance cost savings:** 21,200 €/year
- **Reduction electricity consumption:** 166,000 kWh/year
- **CO₂ reduction:** 76 tons/year
- **Investment costs:**
 - 562,700 € (total investment)
 - 392,900 € (financed by the EPC project)
- **Subsidies:**
 - 50,000 € (regional contracting programme)
 - 22,600 € (environmental subsidy)
- **EPC contract duration:** 10 years

Further information:

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Realised project street lighting: Municipality of Stadl-Paura, Upper Austria

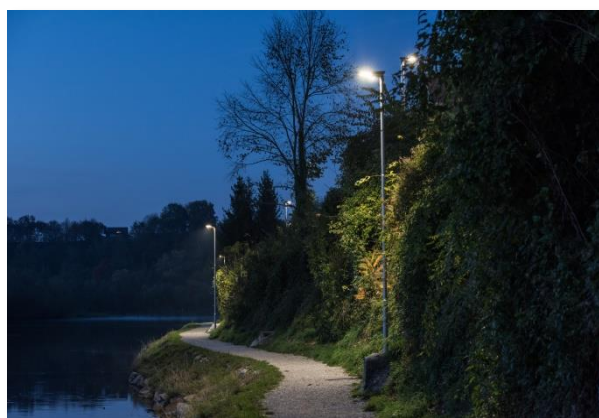
Streetlight data of the project	Before renovation	After renovation
Total installed electric capacity	61 kW	52 kW
Total number of lamps	1,106	737
Number of lighting points (luminaires)	737	737
Annual electricity consumption	257,000 kWh	91,000 kWh
Annual electricity costs	38,500 Euro	13,700 Euro

Results

The population and municipal councillors are very satisfied with the new lighting and impressed by the quality of the lighting. Local councillors have commented that the new LED lights do not "shine in all directions" as the previous ones did. The light is directed where it is needed. The local authorities are convinced that they have made the right decision by choosing to conduct refurbishment work at once as opposed to a multi-phase project. Due to its size, the implementation of the project took about one year.

Support by the facilitation service

The municipality took part in training seminars and events organised by the facilitation services on topics of EPC and streetlight refurbishment with LEDs. Streetlight-EPC tools (i.e. quick-check) were used while evaluating the feasibility of the project for EPC. Throughout the project, the facilitation service supported the municipality and the ESCO in aspects mostly related to the development of the EPC contract.



Photos: OÖ Energiesparverband

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Realised project street lighting: Municipality of Aigen-Schlögl, Upper Austria

Project background and objectives

Aigen-Schlögl is a town in the north-western part of the Mühlviertel region. The municipality was founded in 2015 through the merging of the previously independent municipality of Aigen im Mühlkreis and municipality of Schlögl.

The refurbishment of the street lighting was the first joint project after the merger. The road lighting from Aigen had already been successfully renovated with Energy Performance Contracting (EPC). Due to the very positive experience, Aigen-Schlögl opted to use EPC again to refurbish the entire street lighting of the district of Schlögl to energy-efficient LED lighting.

The previous lighting system was up to 35 years old and in need of work. This resulted in a high saving potential for electricity and maintenance. These conditions increased the suitability of the project for EPC.

Project description

In order to minimise costs, mast extensions were used where the condition of the masts permitted. However, some masts had to be exchanged completely. Some distributors and cabling were also renewed.

As part of the project, the street lighting and cabling was digitalised, this now helps the municipality maintain a better overview of the entire lighting system.



Facts

- **Population:** 3,100 inhabitants
- **Type of streets:** municipal roads and country road
- **ESCO:** Elin

- **Electricity cost savings:** 1,700 €/year
- **Maintenance cost savings:** 3,600 €/year
- **Reduction electricity consumption:** 10,300 kWh/year
- **CO₂ reduction:** 4.7 tons/year

- **Investment costs:**
 - 166,400 € (total investment)
 - 53,130 € (financed by the EPC project)
- **Subsidies:**
 - 21,300 € (regional contracting programme)
 - 2,500 € (environmental subsidy)
- **EPC contract duration:** 10 years

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Realised project street lighting: Municipality of Aigen-Schlägl, Upper Austria

Streetlight data of the project	Before renovation	After renovation
Total installed electric capacity	7.7 kW	2.4 kW
Total number of lamps	84	84
Number of lighting points (luminaires)	84	84
Annual electricity consumption	19,700 kWh	9,400 kWh
Annual electricity costs	3,300 Euro	1,600 Euro

Results

Thanks to this second renovation project, both municipalities - Aigen and Schlägl - now have modern, state of the art, energy-efficient and low-maintenance public lighting.

The municipality wanted to contribute to the good long-term management of municipal finance through the refurbishment of the lighting system. The guaranteed energy savings have been reached and are sometimes even exceeded. The Head of Office recommends other municipalities to take the step towards lighting renovation: "It really brings a lot of benefits, it is uncomplicated and absolutely recommendable!"

Support by the facilitation service

Throughout the project, the facilitation service supported the municipality and the ESCO in aspects mostly related to the development of the EPC contract.



Photos: OÖ Energiesparverband, Marktgemeinde Aigen-Schlägl

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Realised project street lighting: Municipality of Lichtenberg, Upper Austria

Project background and objectives

Lichtenberg is located on the 927 m high hill of the same name, Lichtenberg. Due to its proximity to Linz, the region's capital, it is a typical commuter community.

The municipality's street lighting system was quite advanced in age and maintenance costs had increased. First ideas for the renovation of the lighting system emerged in 2012. Finally, after visiting several municipalities' refurbished systems in the area, Lichtenberg decided to move forward with a full refurbishment project and conversion to LED technology.

The decision was made to implement the project using the Energy Performance Contracting (EPC) model because it offered a lower financial burden during the initial implementation phase. The ESCO was selected through a tender process.

Project description

The entire street lighting system of the 2,700 inhabitant municipality was converted to LED technology. Special emphasis was placed on the energy efficiency of the new lamps. As a result of the project, the total installed capacity was reduced from 8.6 kW to 2.9 kW, allowing almost 24,000 kWh of electricity savings per year.



Facts

- **Population:** 2,700 inhabitants
- **Type of streets:** municipal and country road
- **ESCO:** Linz Energie Service
- **Electricity cost savings:** 2,900 €/year
- **Reduction electricity consumption:** 23,900 kWh/year
- **CO₂ reduction:** 11 tons/year
- **Investment costs:**
 - 120,000 € (total investment)
 - 29,000 € (financed by the EPC project)
- **Subsidies:**
 - 11,600 € (regional contracting programme)
 - 3,780 € (environmental subsidy)
- **EPC contract duration:** 10 years

Further information:

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Realised project street lighting: Municipality of Lichtenberg, Upper Austria

Streetlight data of the project	Before renovation	After renovation
Total installed electric capacity	8.6 kW	2.9 kW
Total number of lamps	93	93
Annual electricity consumption	35,900 kWh	12,000 kWh
Annual electricity costs	4,300 Euro	1,400 Euro

Results

While discussing the project, the options of conducting a one-time general refurbishment or a multi-phase projects over several years were considered. In retrospect, the Head of Office judges refurbishing the entire network at one to have been the right decision since it permitted the municipality to quickly benefit from a modern, energy-efficient system which is optically and technically uniform. For municipalities that are planning a similar project, he advises to rely not only on the external know-how, but also to designate a municipal employee who can get deeply involved in the project and evaluate investment options and alternative offers.

Support by the facilitation service

Throughout the project, the facilitation service supported the municipality and the ESCO in aspects mostly related to the development of the EPC contract.



Photos: OÖ Energiesparverband, Marktgemeinde Lichtenberg

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Realised project street lighting: Municipality of Freistadt, Upper Austria

Project background and objectives

With 7,700 inhabitants, Freistadt is the educational, cultural, medical and economic centre of the district of Mühlviertel in Upper Austria.

The city started converting the lighting in parts of the historical centre to modern LED technology in 2013. The low-maintenance, high energy-saving lamps that ensure a higher light quality and a better atmosphere are very well received by the population and lighting operation staff. The success led to an analysis of the city's entire street lighting system, which showed large savings potentials in electricity and maintenance costs. The analysis also confirmed that parts of the lighting and electrical installations no longer fulfilled current standards.

Project description

Finally, the decision was made in favour of a large-scale refurbishment project: converting all lamps to LEDs, replacing outdated structures and, where necessary, renovating switch points and cable networks. The new lighting is dimmed at night and each luminaire can be controlled individually.

With the previous lighting system, along the federal road, streetlights were required on both sides of road in order to meet lighting requirements. Due to the high illumination capacity of the LEDs, one-sided illumination is now sufficient. Therefore, it was possible to eliminate one row of luminaires without sacrificing the light quality.



Facts

- **Population:** 7,700 inhabitants
- **Type of streets:** residential area, main roads
- **ESCO:** Linz Energieservice
- **Electricity cost savings:** 35,500 €/year
- **Maintenance cost savings:** 24,000 €/year (not guaranteed)
- **Reduction electricity consumption:** 300,000 kWh/year
- **CO₂ reduction:** 138 tons/year
- **Investment costs:**
 - 1,558,000 € (total investment)
 - 355,000 € (financed by the EPC project)
- **Subsidies:**
 - 75,000 € (regional contracting programme)
 - 33,000 € (environmental subsidy)
 - 150,000 € (other subsidy)
- **EPC contract duration:** 10 years

Further information:

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Realised project street lighting: Municipality of Freistadt, Upper Austria

Streetlight data of the project	Before renovation	After renovation
Total installed electric capacity	109 kW	38 kW
Number of lamps	1,184	1,138
Main lamp type	HQL	LED
Annual electricity consumption	458,500 kWh	158,500 kWh
Annual electricity costs	54,300 Euro	18,800 Euro

Results

In contrast to many other EPC projects, the Freistadt project was not financed by the ESCO since the municipality could access a loan at low cost. The contractor planned and carried out the refurbishment work and guaranteed the savings in terms of energy consumption and maintenance. However, the financing was done by the municipality itself.

According to the experience in Freistadt, informing the population about planned measures can be important for the success of a project. In this case, it was important to explain the reasons for the reduction of the number of lights along the federal road.

Support by the facilitation service

Throughout the project, the facilitation service supported the municipality and the ESCO in aspects mostly related to the development of the EPC contract.



before renovation



after renovation

Photos: Oberösterreich Tourismus_Andreas Röbl / Stadt Freistadt

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Realised project street lighting: Municipality of St. Oswald, Upper Austria

Project background and objectives

St. Oswald bei Freistadt is a municipality in the region of lower Mühlviertel. It lies about 600 meters above sea level.

Sections of the street lighting system were up to 40-years old, the light quality was no longer suitable and the system showed safety-related defects. In addition to the high maintenance costs, the electricity costs weighed heavily in the municipal budget. In 2011, the environmental committee started developing the idea of improving the public lighting. During the planning phase, they visited several refurbished system in the area.

First contact with an ESCO took place. This led to the launch of a call for tenders through which the ESCO was selected.

Project description

The refurbishment covered approximately two-thirds of the municipality's entire street lighting. A large amount of work was needed to bring the system to the latest state-of-the-art. A part of the extensive investment was financed by the energy savings.

In addition to the safety-related and energy saving aspects, improving the quality of light was an important criterion for the municipality. Therefore, a good illumination and high colour rendering were key factors in choosing what technology to use.



Facts

- **Population:** 2,800 inhabitants
- **Type of streets:** municipal roads
- **ESCO:** eww
- **Electricity cost savings:** 6,700 €/year
- **Maintenance cost savings:** 2,800 €/year
- **Reduction electricity consumption:** 41,800 kWh/year
- **CO₂ reduction:** 19 tons/year
- **Investment costs:**
 - 750,000 € (total investment)
 - 95,000 € (financed by the EPC project)
- **Subsidies:** 38,100 € (regional contracting programme)
- **EPC contract duration:** 10 years

Further information:

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Realised project street lighting: Municipality of St. Oswald, Upper Austria

Streetlight data of the project	Before renovation	After renovation
Total installed electric capacity	28 kW	16 kW
Total number of lamps	351	274
Number of lighting points (luminaires)	HQL	LED
Annual electricity consumption	99,400 kWh	57,600 kWh
Annual electricity costs	16,000 Euro	9,300 Euro

Results

The street lighting on the town square also serves aesthetic purposes. Coloured lights and fountain lighting were used to make the area more appealing.

The municipality decided to implement the project using EPC mainly for financial reasons. However, the aspect of contractually guaranteed savings was also key: "As a municipality, we highly appreciated that we already knew what savings to expect. One doesn't have that certainty without EPC." According to the municipality, good planning is crucial to the success of such a project. For example, it is important to take the dismantling options into account in the planning phase.

Support by the facilitation service

Throughout the project, the facilitation service supported the municipality and the ESCO in aspects mostly related to the development of the EPC contract. In addition, representatives of the municipality of St. Oswald attended training seminars and site visits on LED lighting and EPC organising by the facilitation service.



Photos: Marktgemeinde St. Oswald

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Realised project street lighting: Municipality of Straß im Attergau, Upper Austria

Project background and objectives

Straß im Attergau is a municipality with 1,500 inhabitants located between Attersee, Mondsee and Irrsee in the Upper Austrian lake region.

Energy efficiency and renewable energy have been a long-standing priority for the municipality. Therefore, technical problems and the high maintenance costs of the public lighting were seen as an opportunity to conduct a comprehensive refurbishment of the entire system.

Project description

Extensive reconstruction work was needed on the lighting system. The complete wiring was worked on, switchboxes were renovated and the old concrete masts were replaced with new ones. All lamps have been converted to energy-saving, programmable LEDs. Since this refurbishment would permit to achieve electricity costs savings of 75 %, the municipality decided to bring the entire system up to the latest state of the art. Approximately 12 % of the comprehensive refurbishment measures were financed through EPC.

Achieving a good price-performance ratio was important for the municipality. The objective was to achieve a low-cost, low-maintenance and energy-efficient lighting system that offers a higher illumination quality. A large part of the lighting system is dimmed as of 22:00 and switched off between 24:00 and 5:00. This permits to achieve high energy savings, without compromising citizen security.



Facts

- **Population:** 1,500 inhabitants
- **Type of streets:** residential area
- **ESCO:** Elin

- **Electricity cost savings:** 1,500 €/year
- **Maintenance cost savings:** 2,400 €/year
- **Reduction electricity consumption:** 10,900 kWh/year
- **CO₂ reduction:** 5 tons/year

- **Investment costs:**
 - 337,000 € (total investment)
 - 40,000 € (financed by the EPC project)
- **Subsidies:**
 - 15,800 € (regional contracting programme)
 - 7,350 € (environmental subsidy)
- **EPC contract duration:** 10 years

Further information:

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Realised project street lighting: Municipality of Straß im Attergau, Upper Austria

Streetlight data of the project	Before renovation	After renovation
Total installed electric capacity	9.8 kW	2.4 kW
Number of lighting points (luminaires)	105	105
Main lamp type	fluorescent tubes	LEDs
Annual electricity consumption	14,600 kWh	3,700 kWh
Annual electricity costs	2,000 Euro	500 Euro

Results

The municipality is very satisfied with the cooperation with the ESCO. According to the Chief Officer, "The coordination and implementation of the work on the ground was easy. There is surprisingly little for the municipality to do." He also recommends informing the public about planned measures and refurbishment work early on in the process so that concerns can be addressed in a timely manner. In Straß, you can clearly see the conical lighting control of the modern LED lamps. The Chief Officer is impressed by the new technology: "The light is directed where it is required rather than in the bedroom of the residents".

Support by the facilitation service

Throughout the project, the facilitation service supported the municipality and the ESCO in aspects mostly related to the development of the EPC contract.



Photos: Municipality of Straß, OÖ Energiesparverband

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Tennis Hall Ried, Upper Austria

Indoor lighting project

Project background and objectives

Fischer UTC, with 600 members, is one of the largest and longest-standing tennis clubs in Upper Austria. The tennis club offers its members 8 exterior tennis courts and 4 interior courts in its hall.

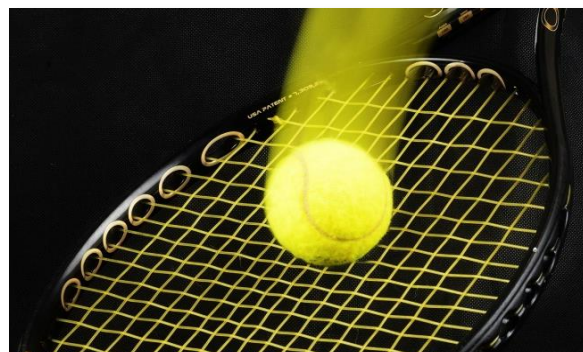
The tennis hall was built in 1992. However, over the years, the lighting system had become increasingly failure-prone – sometimes the lighting would even fail during a match. As the club is committed to its members' satisfaction, the decision was made to renovate the lighting system.

Project description

The planning for the renovation of the lighting system started in spring 2015. Implementation had to be carried out quickly as the tennis courts had to be ready for championships in September. The main priorities for the new lighting system were: best illumination of the courts, no interruptions in lighting and reduction of maintenance and electricity costs.

Tennis halls lighting systems need to fulfil particular requirements and luminaires need to be robust enough to withstand the impact of a tennis ball. At the time of the project, as there was no suitable LED solution for this tennis hall's requirements on the market, efficient fluorescent lamps were used.

The tennis club compared several ESCOs and decided to develop the EPC contract with the local electrician who had done maintenance work in the hall before. This was his first EPC project.



Facts

- **Company name:** Fischer UTC – Tennis hall in Ried
- **Type of lighting:** Indoor lighting in a tennis hall
- **ESCO:** Gadermeier
- **Electricity cost savings:** 4,300 €/year
- **Maintenance cost savings:** 1,300 €/year (not guaranteed in the EPC contract)
- **Reduction electricity consumption:** 26,200 kWh/year
- **CO₂ reduction:** 12 tons/year
- **Investment costs:**
 - 60,100 € (total investment)
 - 29,900 € (financed by EPC)
- **Subsidies:**
 - 4,600 € (regional contracting programme) (additionally, the project was subsidised by several sport related programmes)
- **EPC contract duration:** 7 years

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Tennis Hall Ried, Upper Austria

Indoor lighting project

Project data	Before renovation	After renovation
Total installed electric capacity	31 kW	24 kW
Number of lighting points (luminaires)	480	288
Main lamp type	Fluorescent lamps (58 W each) with low-loss ballasts	Fluorescent lamps (80 W each) with electronic ballasts
Annual electricity consumption	44,200 kWh	18,000 kWh
Annual electricity costs	7,200 Euro	2,900 Euro

Results

Tennis halls have a high potential for lighting renovation. Due to the ceiling height, a crane is often needed to exchange lamps – this is expensive and disturbs the hall's operation. A lighting system that requires low maintenance is therefore very important. For this project, since implementation had to take place very quickly, the new lighting system was installed in only 2 weeks.

The tennis club is very happy with the achieved results. The estimated energy savings have been achieved and the maintenance requirements have been significantly reduced. The chairman of the tennis club is also satisfied and emphasises that thorough project planning pays off.

Support by the facilitation service

As this was the first EPC project for the ESCO, a local electrician, support from the facilitation service was necessary and highly appreciated. Neither the ESCO nor the chairman of the tennis club was experienced with the EPC model. They contacted the facilitation service several times for guidance and support, especially regarding technical and contractual issues.



Before renovation

Photos: UTC-Fischer, pixabay,



After renovation



Co-funded by the Intelligent Energy Europe
Programme of the European Union

www.streetlight-epc.eu



Direct Parcel Distribution Austria, Upper Austria

Indoor lighting project

Project background and objectives

Direct Parcel Distribution (DPD) Austria is a logistics company that has been offering parcel services for more than 20 years.

In the context of a refurbishment of the heating system, a thorough analysis of possible energy efficiency potentials in the buildings was performed. This showed that the lighting system held significant savings potential. As a result, the company decided to carry out a comprehensive EPC project covering the renovation of the lighting system as well as the heating system.

Project description

Due to the high energy savings potential of exchanging the HQL lamps by more efficient technology, a short payback time could be achieved. Furthermore, the refurbishment would result in less break downs and maintenance efforts (the old lamps had a high failure rate and a crane was often necessary to replace them). These reasons were key in the company's decision to undertake the refurbishment of the lighting system.

The company obtained several offers and decided to work with the ESCO that guaranteed fixed savings. Robust luminaires and high quality exchangeable lamps were selected for the project. The lighting control system was not changed.

The project was carried out very quickly: it was developed and implemented in less than one year. The new lighting system was mounted within 2 days.



Facts

- **Company name:** Direct Parcel Distribution Austria
- **Type of lighting:** indoor lighting, hall
- **ESCO:** Siemens
- **Electricity cost savings:** 8,200 €/year (for lighting)
- **Maintenance cost savings:** 2,800 €/year (for lighting)
- **Reduction electricity consumption:** 100,700 kWh/year (for lighting)
- **CO₂ reduction:** 46 tons/year (for lighting)
- **Investment costs:**
 - 161,500 € (total project investment)
 - 50,000 € (for the lighting system, entirely financed by the EPC project)
- **Subsidies:**
 - 9,000 € (regional contracting programme, attributed for costs of the lighting system)
 - Costs of the heating system were also subsidised
- **EPC contract duration:** 8.7 years (overall project)

Further information:

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Direct Parcel Distribution Austria, Upper Austria

Indoor lighting project

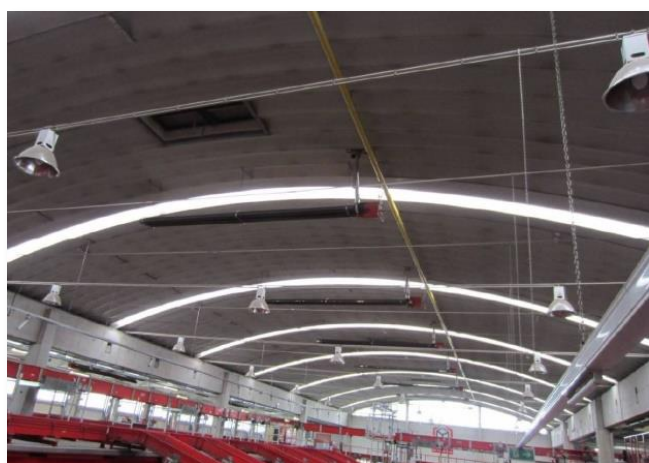
Project data	Before renovation	After renovation
Total installed electric capacity	39 kW	16 kW
Main lamp type	Fluorescent + HQL lamps	LED Tubes + LED lamps
Annual electricity consumption	163,300 kWh	62,600 kWh
Annual electricity costs	13,400 Euro	5,200 Euro

Results

The company is convinced that choosing EPC was a good decision. Among others, the ESCO is well experienced in lighting design and can obtain better prices for lighting products. The employees are very satisfied with the new lighting system: it is brighter, the lamps achieve their full illumination immediately after being turned on and no cooling phase is required before turning on again. With the old lighting system, an average of 4-5 lamps per week had to be exchanged. With the new system, 6-months into the project, no single lamp failed. As a result of the positive experience with LED lighting, the company now plans to refurbish outside lighting to LED as well.

Support by the facilitation service

The facilitation service provided help in applying for financial support from the regional contracting programme. Actors involved in the project communicated their appreciation for the quality of the advice received and the possibility of contacting the service to get information in an uncomplicated and timely manner.



Before renovation



After renovation

Photos: Direct Parcel Distribution Austria, Siemens

Fischer Brot, Upper Austria

Indoor lighting project

Project background and objectives

The family-owned company Fischer Brot was founded in 1958. It now has 4 locations in Upper Austria and Vienna and more than 400 employees. Fischer Brot produces baked goods, mainly bread, on an industrial scale. The renovation of the indoor lighting system was carried out at the site in Pichling near Linz. 130 employees work at this 9,000 m² production plant.

An energy consultant analysed the entire building. The refurbishment of the lighting system and the optimisation of the heating system were shown to hold significant energy efficiency potentials. As the company had already noticed a reduction of luminous power of the HQL lamps, the decision was taken to renovate the indoor lighting system.

Project description

The refurbishment of the 15 year old lighting system was combined with an optimisation of the heating system.

Several special requirements for the lighting system had to be taken into account: being a bakery, the constant presence of flour dust means luminaires have to be resistant to dust accumulation. The company wanted a solution that offered better illumination than before and an appropriate light colour (a white that is not too warm and not too cold). An additional challenge for the project was that the implementation had to be carried out during operation hours, since the company could not permit itself to interrupt production. Furthermore, strict hygiene regulations had to be followed.



Facts

- **Company name:** Fischer Brot
- **Type of lighting:** indoor lighting in a hall where bread is baked on an industrial scale
- **ESCO:** Linz AG in collaboration with Siemens
- **Electricity cost savings:**
42,200 €/year (for lighting)
- **Maintenance cost savings:**
6,800 €/year (for lighting)
- **Reduction electricity consumption:**
291,600 kWh/year (for lighting)
- **CO₂ reduction:** 134 tons/year (for lighting)
- **Investment costs:**
 - 385,000 € (total project investment)
 - 245,700 € (for the lighting system, entirely financed by the EPC project)
- **Subsidies:**
 - 27,300 € (regional contracting programme, attributed for costs of the lighting system)
 - Costs of the heating system were also subsidised
- **EPC contract duration:**
5.8 years (overall project)

Further information:

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Fischer Brot, Upper Austria

Indoor lighting project

Project data	Before renovation	After renovation
Total installed electric capacity	99 kW	43 kW
Number of lighting points (luminaires)	370	340
Main lamp type	Fluorescent + HQL	LED Tube + LED lamps
Annual electricity consumption	514,000 kWh	222,400 kWh
Annual electricity costs	74,500 Euro	32,300 Euro

Results

This project combined the refurbishment of the lighting system with the optimisation of the heating system. The long operational time of the lighting system (5,000 hours/year) contributed positively to the economic feasibility of the lighting refurbishment project. In addition, with the previous lighting system, the lights were often left on 24 hours per day even if they were not needed. With the new LED lighting, the control system enables the lights to be turned on and off as needed – thus increasing overall energy savings.

Since the project comprised work on both the lighting and heating system, the project was conducted in collaboration with 2 ESCOs. The Linz AG is acting as main ESCO. The technical work (design, installation, maintenance) was subcontracted to the company Siemens.

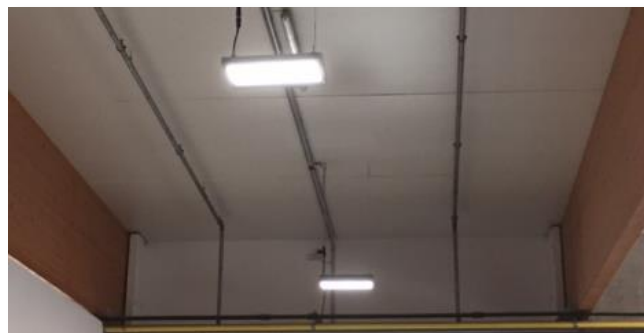
Support by the facilitation service

The company manager stated that without the option of using EPC, the project would not have been carried out (quote: "we are bakers, not energy experts"). The energy analysis of the entire building at the beginning of the project was very helpful to detect energy efficiency potentials. The facilitation service arranged the energy advice session for the company and informed them about the EPC model. Additionally, the facilitation service provided assistance in the application for financial support.



Before renovation

Photos: Fischer Brot, Siemens



After renovation

Gas station "Pink", Upper Austria

Indoor and outdoor lighting project

Project background and objectives

The "Pink Tankstelle" gas station chain has 15 locations in Austria and Bavaria. The station in Neuzeug includes a pumping area, a shop, a restaurant and a car washing facility.

The gas station manager heard about an EPC lighting renovation project in a nearby tennis hall. Because of the gas station's high electricity costs, he became interested in LED technology and contacted the ESCO of the tennis hall project.

The manager was not familiar with Energy Performance Contracting. Although the gas station was only five years old, an analysis showed that converting the lighting system to LED using EPC could make sense.

Project description

In 2015, the whole lighting system (indoor and outdoor lighting) was refurbished to LED technology and a new lighting control system was installed. A local electrician served as ESCO and implemented the project.

In total, 133 luminaires were exchanged resulting in a reduction of the installed electric capacity from 18 to 5.6 kW. The annual electricity consumption was reduced by 25 %, resulting in significant cost savings.



Facts

- **Company name:** Pink Tankstelle, Neuzeug
- **Type of lighting:** Gas station indoor and outdoor lighting, car wash lighting
- **ESCO:** Green Energy Projects

- **Electricity cost savings:** 7,600 €/year
- **Maintenance cost savings:** 1,900 €/year
- **Reduction electricity consumption:** 58,400 kWh/year
- **CO₂ reduction:** 27 tons/year

- **Investment costs:**
 - 62,400 € (total investment)
 - 60,200 € (financed by EPC)
- **Subsidies:**
 - 12,000 € (regional contracting programme)
 - 2,200 € (environmental subsidy)
- **EPC contract duration:** 10 years

Further information:

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Gas station "Pink", Upper Austria

Indoor and outdoor lighting project

Project data	Before renovation	After renovation
Total installed electric capacity	17.9 kW	5.6 kW
Number of lighting points (luminaires)	133	133
Main lamp type	a range of different lamps	LED
Annual electricity consumption	231,100 kWh	172,700 kWh
Annual electricity costs	30,000 Euro	22,400 Euro

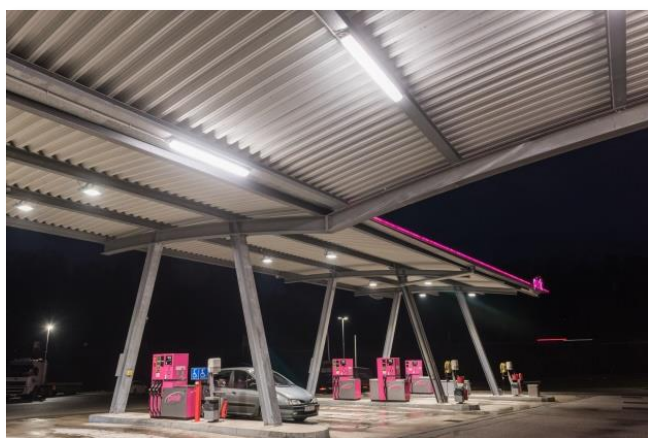
Results

Small companies or projects with a low number of luminaires tend to be of limited interest for ESCOs. However, in this case, the combination of the shop, restaurant and car wash resulted in a project that was large enough for a feasible EPC. This shows the importance of conducting an analysis of the situation before disregarding EPC as a potential financing and operation model.

The ESCO involved is the local electrician and this was one of his first EPC projects. The implementation was done very quickly. A tender was carried out in May 2015 and the implementation was carried out 5 months later, in October 2015.

Support by the facilitation service

As this was one of the ESCO's first EPC projects, support from the facilitation service was necessary and highly appreciated. The operator of the gas station was not familiar with the EPC model. Therefore, information and support were requested.



Photos: OÖ Energiesparverband

Realised project indoor lighting: Elementary schools in Wels, Upper Austria

Project background and objectives

Approximately 1,000 pupils, taught by around 90 teachers, currently attend these 4 elementary schools in Wels. Due to high ceilings, the noise level in the classrooms and halls was very high and affected both teachers and children. During the process of equipping the buildings with suspended ceilings to improve the acoustic performance, the poor lighting level in the classes and hallways became apparent. This led to the decision to refurbish the lighting as part of the renovation work.

The schools are attended to a high proportion (up to 70%) by children of non-German native language. In addition, some of the students have special educational needs. These challenges are met with innovative pedagogical concepts and work in small groups. Since there are not enough classrooms available, the teachers also use the hallways for teaching purposes. However, the lighting in the halls did not meet the requirements of a classroom. The lighting requirements were also not fulfilled in several classrooms.

Project description

The main focus of the refurbishment was to achieve suitable lighting levels and lighting quality and the most comfortable learning environment possible. Since energy efficiency and low costs were both high priorities, T5 fluorescent lamps with electronic ballasts were chosen for the corridors and classrooms in 2 schools. In the other 2 schools, modern LEDs were installed.



Facts

- **Municipality:** City of Wels
- **Type of lighting:** indoor lighting in 4 elementary schools:
 - VS 8 / 9 (class rooms, teachers' room, hallways)
 - VS 3 and 6 (Hallways)

- **Electricity cost savings:** 750 €/year
- **Reduction electricity consumption:** 4,400 kWh/year
- **CO₂ reduction:** 2 tons/year

- **Investment costs:** 64,000 €

Further information:

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Realised project indoor lighting: Elementary schools in Wels, Upper Austria

Project data	Before renovation	After renovation
Total installed electric capacity	23 kW	21 kW
Number of lighting points (luminaires)	334	313
Main lamp type	Fluorescent tubes	T5 lamps (electronic ballasts), LED
Annual electricity consumption	46,300 kWh	41,900 kWh
Annual electricity costs	7,850 Euro	7,100 Euro

Results

The refurbishment permitted to significantly increase the comfort and quality of the learning space for the teachers and children. The illumination level in the corridors was increased by more than 3-fold to an average of 320 lux. In the classrooms, it was increased by 43 % to achieve 330 lx. In the teacher's room, 500 lx have been reached, the minimum requirement for offices.

This project shows very well that higher lighting levels do not necessarily mean higher electricity consumption. Despite the better illumination, the number of luminaires and the installed electric capacity were reduced. In the future, the electricity consumption will be about 10 % lower than before. As a result of this project, the pupils, teachers and the city of Wels, as owner of the schools, will benefit from refurbishment measures.

Support by the facilitation service

The facilitation service supported the municipality on technical aspects of the project.



Before



After



Before



After

Photos: Stadt Wels

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Realised project indoor/outdoor lighting: Schachinger Logistik, Upper Austria

Project background and objectives

The logistics company Schachinger employs approximately 600 people. It has 15 locations in Austria and neighbouring countries with a total of 400,000 m² of operating space and 120,000 m² of high-tech storage space. Schachinger attaches great importance to energy efficiency and has already set benchmarks for new buildings in the logistics sector.

In addition, the company aims to reduce the energy consumption of its building stock. Lighting offers a high savings potential in the warehouses, which run on a two-shift operation. Therefore, it was decided to convert the entire interior and parking lighting at the site in Hörsching to LED technology. The project encompasses over 3,000 light points in 7 buildings. In addition, the heating systems in the buildings were optimised and their monitoring, control and regulation technology were renewed.

Project description

For economic reasons, it was decided to keep the fixtures of the indoor lighting system and only replace the lamps. A light control system, motion detector and dimming options were not installed. Since employees are constantly present from 6:00 to 22:00 and daylight in the hall is minimal, the full illumination strength is almost always required when the lighting is on. Very stable lamps with a long service life were chosen in order to meet the food sector's higher requirements.



Facts

- **Company:** Schachinger Immobilien und Dienstleistungs
- **Type of lighting:** indoor & outdoor lighting of a logistics hall
- **ESCO:** Siemens

- **Electricity cost savings:** 54,200 €/year
- **Maintenance cost savings:** 15,700 €/year
- **Reduction electricity consumption:** 637,900 kWh/year
- **CO₂ reduction:** 293 tons/year

- **Investment costs:**
 - 170,000 € (total amount financed by contracting)
- **Subsidies:**
 - 21,000 € (regional contracting programme)
- **EPC contract duration:** 2.4 years

Further information:

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Realised project indoor/outdoor lighting: Schachinger Logistik, Upper Austria

Project data	Before renovation	After renovation
Total installed electric capacity	247 kW	95 kW
Number of lighting points (luminaires)	3,238	3,238
Main lamp type	Fluorescent tubes (KVG) / halogen floodlights	LED-tubes / LED-floodlights
Annual electricity consumption	1,050,000 kWh	402,100 kWh
Annual electricity costs	88,400 Euro	34,200 Euro

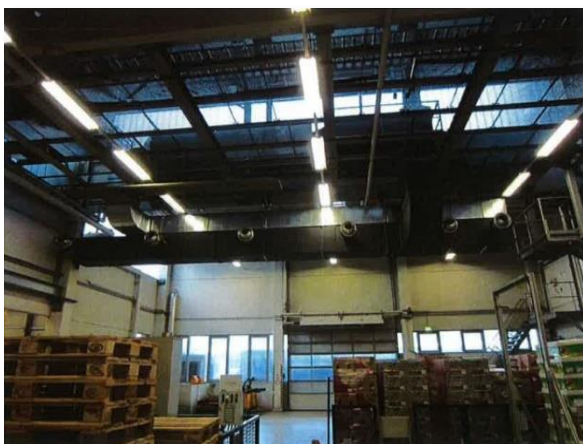
Results

The company decided to use EPC in order to have a reliable and competent partner that could cover both renovation areas or lighting and heating. Additional advantages were the possibility of using the energy savings to finance the project and the availability of a regional subsidy.

Schachinger's management team is convinced that in many halls where the lighting runs a minimum of 10 hours per day, switching to LED is both ecologically and economically beneficial. In large companies, lighting refurbishment can significantly reduce the installed capacity, which leads to cost savings or frees up load capacity for other applications. At Schachinger, for example, the refurbishment permitted to reduce the installed capacity by 150 kW. This capacity is now available to charge the company's fleet of electric vehicles.

Support by the facilitation service

Throughout the project, the facilitation service supported the municipality and the ESCO in aspects mostly related to the development of the EPC contract.



Photos: Schachinger Immobilien und Dienstleistungs

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Realised project indoor lighting: Sports Hall Enns, Upper Austria

Project background and objectives

The Sporthalle Enns was opened in 2003 and is used as sports hall for the school, sports club and for championships. The home games of the first division volleyball team "Supervolley OÖ" are watched by up to 500 spectators and partly broadcasted on television.

For television broadcasting, at least 800 lux are required on the playing surface. This was not achievable with the old lighting system. Provisional solutions did not provide enough security for the spectators and drove the electricity consumption up. Therefore, the municipality decided to refurbish the 15-year old lighting system.

Project description

The old fluorescent lamps were replaced with LEDs. In addition, a demand-oriented control system that takes into account different types of hall usage and available daylighting was installed. Different lighting intensities are required for cleaning, school classes and sport club activities. These are automatically made available by the new lighting management system. For television broadcasting, the old lighting is used in addition to the new one in order to achieve the minimum value of 800 Lux.

In the cloakrooms and equipment rooms, the installed capacity was adapted to the use-specific demand and motion detectors were installed, thus resulting in further energy savings.



Facts

- **Company name:** Municipality of Enns
- **Type of lighting:** indoor lighting in a sports hall
- **ESCO:** Cofely Gebäudetechnik

- **Electricity cost savings:** 5,000 €/year
- **Maintenance cost savings:** 2,000 €/year
- **Reduction electricity consumption:** 40,800 kWh/year
- **CO₂ reduction:** 19 tons/year

- **Investment costs:** 95,000 €
- **Subsidies:**
 - 32,400 € (regional contracting programme)
 - 7,500 € (environmental subsidy)
- **EPC contract duration:** 10 years

Further information:

OÖ Energiesparverband
A-4020 Linz, Landstrasse 45
Telephone: +43-732-7720-14380
E-mail: office@esv.or.at

Realised project indoor lighting: Sports Hall Enns, Upper Austria

Project data	Before renovation	After renovation
Total installed electric capacity	16.5 kW	9.7 kW
Number of lighting points (luminaires)	189	54
Main lamp type	Fluorescent	LED
Annual electricity consumption	53,300 kWh	12,500 kWh
Annual electricity costs	6,600 Euro	1,600 Euro

Results

The municipality of Enns is convinced of the advantages of implementing projects with the ESCO model. This is already the municipality's fifth EPC project: several public were refurbished and connected to the district heating network, the street lighting was renovated and an old oil heating system was replaced with a pellet boiler. Owing to their positive experience and long collaboration, the municipality turns to their tried and tested ESCO for all projects. Their cooperation has always run smoothly and the guaranteed energy savings have always been achieved. The local authority claims that "without the ESCO model, many of these projects could not have been financed". However, in addition to the financial advantages of contracting, the municipality recognises the added value received through the ESCO's experience and know-how in planning, implementation and maintenance as well as their support in obtaining subsidies.

Support by the facilitation service

The municipality and the ESCO have worked together on many projects in the past and are quite knowledgeable regarding the process of developing an EPC project. The facilitation services mostly offered support on technical issues and in applying for subsidies.



Photos: Stadt Enns

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City of Vrbovec, Zagreb County, North-West Croatia

Street lighting project

Project background and objectives

The city of Vrbovec is situated in Zagreb County, 30 km from the north-east of the city of Zagreb, the capital of Croatia.

The city refurbished its entire street lighting system to LED technology using Energy Performance Contracting (EPC). The project was done in cooperation with a local LED producer and a local maintenance company.

Project description

The project started with a detailed energy audit for the current lighting system. This analysis showed significant energy and maintenance cost saving potentials.

The city decided to launch a public procurement process for the refurbishment of the lighting system using Energy Performance Contracting (EPC). The selection of the ESCO was based on the most economically advantageous offer. The submissions were evaluated according to the following criteria:

- net present benefit for the city (energy and maintenance savings during and after the guaranteed savings period) (85 points),
- advanced street light management implementation (10 points)
- technical characteristic (5 points).

A contract was signed for 87 months. In addition to the replacement of the luminaires, overvoltage protection and a wireless controlled management system were installed.



Facts

- **Population:** 14,800 inhabitants
- **Type of streets:** National, regional and local
- **ESCO:** LED elektronika

- **Electricity cost savings:** 90,700 €/year
- **Maintenance cost savings:** 32,500 €/year
- **Reduction electricity consumption:** 1,215,100 kWh/year
- **CO₂ reduction:** 559 tons/year

- **Investment costs:**
 - 866,667 € (capital costs)
 - 995,360 € (overall contract value)
- **EPC contract duration:** 7.25 years

Further information:

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Web: www.regea.org



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City of Vrbovec, Zagreb County, North-West Croatia

Street lighting project

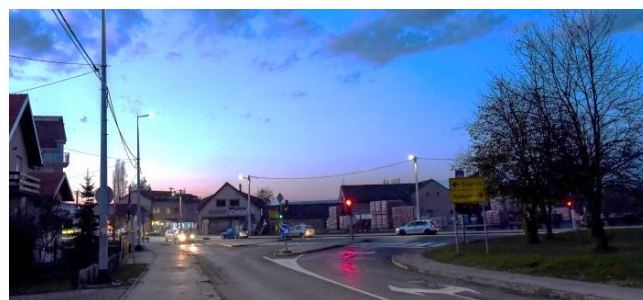
Project data	Before renovation	After renovation
Total installed electric capacity	352 kW	71 kW
Total number of lamps	2,247	2,211
Number of lighting points (luminaires)	2,247	2,211
Main lamp type	HPS	LED
Annual electricity consumption	1,433,400 kWh	218,300 kWh
Annual electricity costs	107,000 Euro	16,300 Euro

Results

The city's entire lighting system has been refurbished to LED technology. The lighting infrastructure has been modernised and the safety on the roads improved. A smart management system was also installed and almost 80 % energy savings have been achieved.

Support by the facilitation service

The facilitation service supported the preliminary technical data collection and energy audit as well as contributed technical advice throughout the project. Legal and financial advice was given through WebSEFF - the Western Balkans Sustainable Financing Facility. The facilitation is promoting the achieved results and providing relevant information to other municipalities interested in EPC implementation.



Photos: Regionalna Energetska Agencija Sjeverozapadne Hrvatske, Zagrebačka Županija



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Municipality of Kostrena, North-West Croatia

Street lighting project

Project background and objectives

The municipality of Kostrena is a popular seaside destination close to the city of Rijeka. The municipality decided to refurbish the public lighting on the national, county and local roads on its territory. The aim was to achieve safer conditions for pedestrians and drivers by complying with the lighting standard (EN 13 201). This is one of the first projects in Croatia to be implemented and financed with Public Private Partnership (PPP).

Project description

The municipality's priorities were to achieve energy and costs savings while increasing the safety and comfort on the streets and in public spaces. In addition to replacing the lamps and luminaires, the project includes improvements to parts of the infrastructure (e.g. pole replacement and repair, relocation of the measuring points, implementation of a street lighting monitoring system).

The ESCO will take care of the maintenance of the lighting system and ensure that it fulfils defined standards. The selection of the ESCO took place through a two-step tendering process. The most economically advantageous offer was selected based on:

- lowest present value of the unitary charge for ESCO's services (worth 77 points)
- lowest installed electrical power of the lighting system (20 points)
- lowest Internal Rate of Return (IRR) (3 points).

A 12-year contract has been signed (starting after the construction phase in 2017). The project has been subsidised by the Environmental Protection and Energy Efficiency Fund.



Facts

- **Population:** 4,180 inhabitants
- **ESCO:** IMC
- **Electricity cost savings:** 24,000 €/year
- **Maintenance cost savings:** 20,500 €/year
- **Reduction electricity consumption:** 222,500 kWh/year
- **CO₂ reduction:** 102 tons/year
- **Investment costs:**
 - 250,000 € (capital costs)
 - 456,000 € (overall contract value)
- **Subsidies:** 85,000 € (national fund)
- **PPP contract duration:** 12 years

Further information:

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Municipality of Kostrena, North-West Croatia

Street lighting project

Project data	Before renovation	After renovation
Total installed electric capacity	75 kW	27 kW
Total number of lamps	407	407
Number of lighting points (luminaires)	407	407
Main lamp type	HPM	LED
Annual electricity consumption	307,500 kWh	85,000 kWh
Annual electricity costs	33,200 Euro	9,200 Euro

Results

In Croatia, PPP has shown to be a convincing financing and contractual option regarding risk distribution, public debt issues and accounting aspects (e.g. on or off government balance sheet treatment, initial capital expenditure, combined financing). As this is one of the first projects in Croatia to use PPP for the refurbishment of public lighting, the preparation of the documentation and tendering process were challenging. The project serves as a learning ground and paves the way for further projects of this type.

Support by the facilitation service

The facilitation service supported the project in cooperation with the ESCO grupa - a company that facilitates PPP projects in public lighting. The facilitation service offered advisory services regarding PPP documentation and the dissemination of the results while ESCO grupa developed the PPP documentation and managed the tendering process.



Photos: Regionalna Energetska Agencija Sjeverozapadne Hrvatske, Zagrebačka Županija

Realised project in street lighting: City of Ludbreg, North-West Croatia, Croatia

Project background and objectives

The city of Ludbreg is situated in North-West Croatia, on the left coast of the Bednja River and 25 km away from Varazdin, the county capital. The city refurbished most of the street lighting system (70%) to LED technology using Energy Performance Contracting (EPC).



Project description

The first phase consisted of a detailed analysis of the baseline of technical and financial data of the lighting system. Based on this analysis, the city decided to modernise the existing system and upgrade it to meet lighting standards (EN 13 201).

The city applied to a tender of the Environmental Protection and Energy Efficiency Fund and received a 40 % subsidy for the reconstruction and upgrading. Due to fact that more than 190 new luminaires are going to be installed (the system will be extended by more than 25%), the subsidy was required to make the project economically feasible.

The selection of the ESCO was based on the most economically advantageous offer. The submissions were evaluated according to the following criteria:

- net present benefit for the city,
- quality and technical characteristics.

The contract has been signed with a duration of 103 months, during which the guaranteed savings must be achieved for a minimum of 100 months.

Facts

- **Population:** 9,194 inhabitants
- **Type of streets:** National, regional and local
- **ESCO:** Energetska učinkovitost - Cementara and Energy plus

- **Electricity cost savings:** 29,700 €/year
- **Maintenance cost savings:** 6,300 €/year
- **Reduction electricity consumption:** 252,300 kWh/year
- **CO₂ reduction:** 116 tons/year

- **Investment costs:** 345,800 €
- **EPC contract duration:** 8.6 years

Further information:

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Realised project in street lighting: City of Ludbreg, North-West Croatia, Croatia

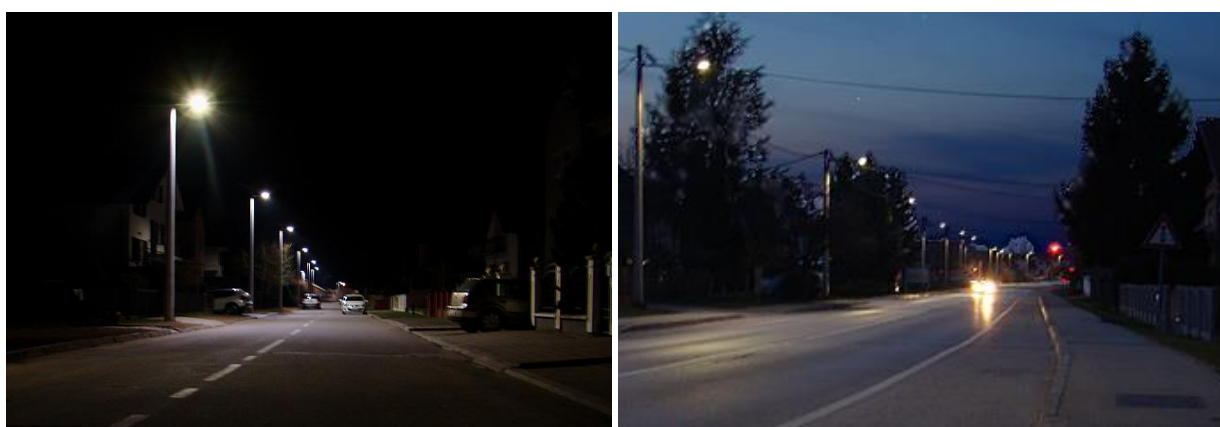
Project data	Before renovation	After renovation
Total installed electric capacity	126 kW	47 kW
Total number of lamps	716	910
Number of lighting points (luminaires)	716	910
Main lamp type	HPS/HPM	LED
Annual electricity consumption	446,000 kWh	193,700 kWh
Annual electricity costs	52,500 EUR	22,800 EUR

Results

70 % of the city's lighting system has been refurbished to LED technology. The lighting infrastructure has been modernised and the safety on the roads improved. Additional luminaires have been added in order to meet required standards. Part of the system is equipped with a management system that dims the lighting to 50 % at selected times. Overall results include energy savings are more than 63 % as well as improved lighting quality and security.

Support by the facilitation service

The facilitation service was involved in the steps of assessment and verification as well as in calculating and promoting the achieved results.



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Elementary schools of Krapina-Zagorje County, North-West Croatia, Indoor lighting project

Project background and objectives

Krapina-Zagorje County encompasses 7 cities and 25 municipalities. The county has a 3-year Energy Efficiency Strategy. One of the planned activities is improving the energy efficiency of the county's 45 schools.

The county was not familiar with the EPC financing model. With the support of the regional EPC facilitation service, the county decided to undertake a pilot project as a learning process. This project is one of the first of its type in Croatia.

Project description

Energy audits were carried out on the lighting systems in all schools. The 3 schools with the highest energy savings potential (the elementary schools Zabok, Oroslovje and Donja Stubica) were chosen for the pilot project.

The most economically advantageous offer was selected through an open tender process. Evaluation criteria were: highest energy savings (50 pts) points, advanced technical solutions (30 pts), net present value of the energy performance fee (15 pts) and the overall investment cost (5 pts). Meeting the indoor lighting standard (EN 12 464-1) was mandatory.

The project was co-financed by the Environmental Protection and Energy Efficiency Fund (80 % of capital costs).



Facts

- **Population:** 132,400 inhabitants
- **Type of lighting:** Indoor lighting in 3 elementary schools
- **ESCO:** Lipapromet
- **Electricity cost savings:** 5,000 €/year
- **Reduction electricity consumption:** 28,000 kWh/year
- **CO₂ reduction:** 13 tons/year
- **Investment costs:** 209,700 €
- **Subsidies:** 157,600 € (environmental fund)
- **EPC contract duration:** 14.25 years

Further information:

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Elementary schools of Krapina-Zagorje County, North-West Croatia, Indoor lighting project

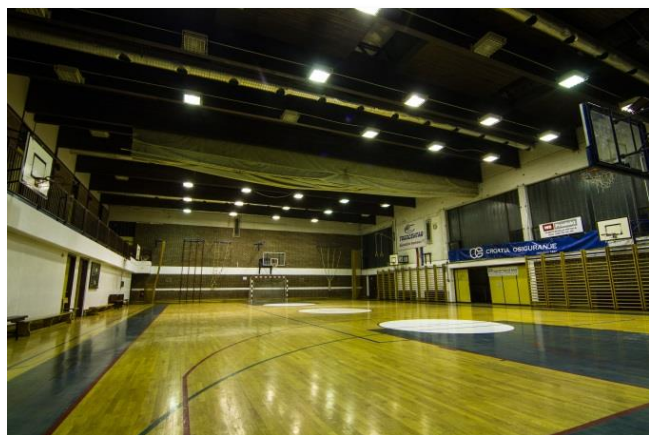
Project data	Before renovation	After renovation
Total installed electric capacity	151 kW	83 kW
Total number of lamps	2,334	2,242
Number of lighting points (luminaires)	2,334	2,242
Main lamp type	Incandescent light bulbs	Tubular fluorescent T5
Annual electricity consumption	69,900 kWh	41,900 kWh
Annual electricity costs	12,500 Euro	7,500 Euro

Results

The refurbishment took place in the summer of 2016. The performance indicators were measured after the completion of the project and showed greater than expected results. The electricity savings are 14 % higher than planned and the illuminance is 36 % higher than prescribed. Working conditions for the pupils and teachers have been significantly improved, while achieving energy savings. This is the first EPC project for the ESCO Lipapromet. The performance of the new lighting system will be monitored on a yearly basis. Non-achieving of the performance indicators will directly affect the monthly payment to the ESCO.

Support by the facilitation service

The facilitation service supported Krapina-Zagorje County throughout the project. Support included energy auditing and developing the EPC documentation (tender, contract, measuring and verification protocol, subsidy application, controlling of the refurbishment process). The facilitation service also supported Lipapromet in becoming an ESCO by offering, among others, support on regulatory issues.



Photos: Regionalna Energetska Agencija Sjeverozapadne Hrvatske, Zagrebačka Županija

Realised project in indoor lighting: High school sports hall, Karlovac County, North-West Croatia

Project background and objectives

Karlovac County encompasses 5 cities and 17 municipalities. It covers an area of 3,622 km² and is one of the larger regional authorities in Croatia.

Over the last decade, the county has been implementing its Energy Efficiency Strategy and investing in energy efficiency measures. One of these measures is the refurbishment of the aged indoor lighting systems in all public buildings.

Project description

The county's primary objective is to reduce its monthly electricity consumption and cost for indoor lighting. An energy analysis of the indoor lighting systems of buildings managed by the county showed that sports halls hold the biggest energy savings potential due to long operational hours and high installed electric capacity. The High School of Natural Sciences had the highest energy savings potential among all analysed sports halls.

Karlovac County has experience with Energy Supply Contracting: two of its schools are supplied with thermal energy by an ESCO provider. Energy Performance Contracting (EPC) was considered for the lighting refurbishment of the sports hall. However, due to the availability of funds in the county's budget, it was decided to proceed with the investment on their own. The metal halide lamps were replaced with dimmable LEDs and a control management system was installed, greatly reducing energy consumption.



Facts

- **Population:** 128,900 inhabitants
- **Type of lighting:** indoor sports hall
- **Maintenance cost savings:** 150 €/year
- **Electricity cost savings:** 2,130 €/year
- **Reduction electricity consumption:** 10,300 kWh/year
- **CO₂ reduction:** 4.7 tons/year
- **Investment costs:** 11,600 €
- **Simple payback period:** 5.1 year

Further information:

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Realised project in indoor lighting: High school sports hall, Karlovac County, North-West Croatia

Project data	Before renovation	After renovation
Total installed electric capacity	10.0 kW	2.2 kW
Total number of lamps	21	21
Number of lighting points (luminaires)	21	21
Main lamp type	Metal halide	LED
Annual electricity consumption	13,200 kWh	2,900 kWh
Annual electricity costs	2,370 Euro	240 Euro

Results

In 2016, the 400 W metal halide lamps were replaced with 100 W dimmable and wirelessly controlled LEDs. The quality of the lighting in the sports hall was significantly improved and energy savings of almost 80 % have been achieved. Since the sports hall has multiple functions, a smart control management system was installed. Groups of luminaires can be dimmed in the sections of the hall that are not being used according to a few pre-programmed dimming modes.

Support by the facilitation service

The regional facilitation service supported the project with the rough analysis of the energy savings potential, estimation of the required investment, defining the minimum technical characteristic and the evaluation of the tender.



Photos: Regionalna Energetska Agencija Sjeverozapadne Hrvatske, Zagrebačka Županija

Realised project street lighting: Municipality of Trhové Sviny, South Bohemia

Project background and objectives

The city of Trhové Sviny is a small city with a beautiful historical centre. Since time immemorial, the city has been an important trading centre of the southernmost tip of South Bohemia. Even today, it is still known for its markets.

The public lighting on the main square of the city was in need of refurbishment and the high pressure sodium lamps were inefficient. The city saw in this situation the opportunity to improve the public lighting system while achieving energy savings. The main objective was to reduce the overall installed capacity and the light pollution in the surrounded area. This was possible by applying innovative lighting technology.

Project description

The project consisted of refurbishing the 23 luminaires in the area of the main square to LED technology. The project was analysed on a technical and financial level. The results of these analyses indicated that the planned measures represented a rather low cost investment. In addition, the high electricity and maintenance cost savings achieved by the implementation of LED technology resulted in an estimated payback time of less than 5 years. This allowed the city to finance the project from its own budget.



Facts

- **Population:** 5,100 inhabitants
- **Type of streets:** main square
- **Electricity cost savings:** 1,090 €/year
- **Maintenance cost savings:** 740 €/year
- **Reduction electricity consumption:** 9,900 kWh/year
- **CO₂ reduction:** 4.6 tons/year
- **Investment costs:** 8,480 €
- **Payback time:** 5 years

Further information:

Energy Centre Ceske Budejovice
CZ-370 01, Nam. Premysla Otakara II. 87/25
Telephone: +420-387 312 580
E-mail: eccb@eccb.cz

Realised project street lighting: Municipality of Trhové Sviny, South Bohemia

Streetlight data of the project	Before renovation	After renovation
Total installed electric capacity	3.5 kW	1.2 kW
Total number of lamps	50	23
Number of lighting points (luminaires)	23	23
Main lamp type	HPS	LED
Annual electricity consumption	14,700 kWh	4,800 kWh
Annual electricity costs	1,630 Euro	540 Euro

Results

The HPS lamps were replaced with 50 W LED lamps with a light temperature of 4,000 K. This permitted to reduce the electricity consumption by 68 %. In addition, since LED lamps enable to direct the light where it is needed, light pollution in the surrounding area was greatly reduced.

This project is representative of many potential projects in South Bohemian municipalities. It serves as an example of how refurbishment of older lighting systems to LED technology can offer high cost savings and short payback time, making it even possible for municipalities to implement the project from their own budget.

Support by the facilitation service

The regional facilitator, ECCB, was involved in the whole process and supported the city of Trhové Sviny in the preparation of technical documentation and in the negotiation process.



Photos: Energy Centre České Budějovice (ECCB), Město Trhové Sviny

Realised project street lighting: Municipality of Dírná, South Bohemia

Project background and objectives

The City of Dirna is a small town in the rural landscape of South Bohemia. The objective of this particular project was to renovate the public lighting on the main square.

The main motivation was to reduce the installed capacity of the lamps and to use new, modern technology such as LEDs in order to achieve high energy savings.



Project description

As first step, the municipality conducted an inventory of the street lighting installation. They were supported in this task by the company EON. Based on the inventory, a rough analysis for the refurbishment was prepared including an analysis of the budget and calculation of the savings potential.

The municipality decided to implement the project and finance it using their own funds and a subsidy offered by the local government.

Facts

- **Population:** 410 inhabitants
- **Type of streets:** streets and town square

- **Electricity cost savings:** 1,350 €/year
- **Maintenance cost savings:** 800 €/year
- **Reduction electricity consumption:** 12,200 kWh/year
- **CO₂ reduction:** 5.6 tons/year

- **Investment costs:** 14,600 €
- **Subsidies:** 7,300 €
- **Payback time:** 6.8 years (without subsidy)

Further information:

Energy Centre Ceske Budejovice
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Realised project street lighting: Municipality of Dírná, South Bohemia

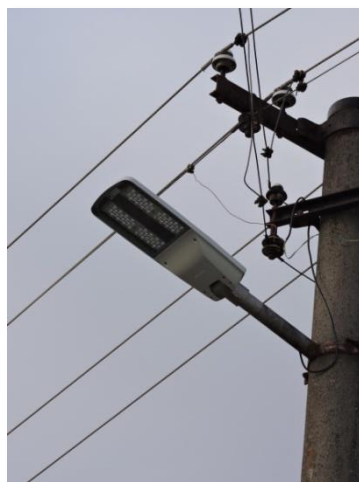
Streetlight data of the project	Before renovation	After renovation
Total installed electric capacity	4.2 kW	1.3 kW
Total number of lamps	62	62
Number of lighting points (luminaires)	62	62
Main lamp type	HPS tube	LED
Annual electricity consumption	17,600 kWh	5,400 kWh
Annual electricity costs	1,950 Euro	600 Euro

Results

The previous lamps were replaced with modern and energy efficient LED lamps. The position of the light posts was not changed. Lamps with an capacity of 18 W and 38 W and a light colour of 4,000 K were used. This project represents a typical small lighting refurbishment that could be replicated in many towns in South Bohemia. Although such small projects may not always be suitable for EPC, they represent low cost measures that permit significant and long term energy savings for the municipalities.

Support by the facilitation service

As regional facilitation service, ECCB was engaged in the project and offered support on technical aspects and during negotiations between parties.



Photos: archive of ECČB

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Realised project indoor lighting: Sports hall in Trhové Sviny, South Bohemia

Project background and objectives

Trhové Sviny is a smaller city with a beautiful historical centre. The objective of this particular project was to renovate the indoor lighting luminaires in the city's sports hall. The main motivation was to reduce the installed capacity of the lamps and to use the new, modern technology, i. e. luminaires providing quality lighting in terms of intensity, contrast and colour rendering – all parameters needed for good visibility while practicing indoor sports.

Project description

The first step of the project was to complete an inventory of the lighting system in the sports hall. A rough analysis was then carried out along with an estimation of the investments costs and potential savings.

Since the project had a low investment cost and a short payback time, the municipality decided to cover the investment in collaboration with EON (the electricity supplier) instead of using the EPC model.



Facts

- **Population:** 5,100
- **Type of lighting:** sports hall, ceiling installation
- **Electricity cost savings:** 3,000 €/year
- **Maintenance cost savings:** 220 €/year
- **Reduction electricity consumption:** 20,600 kWh/year
- **CO₂ reduction:** 9.5 tons/year
- **Investment costs:** 7,300 €
- **Payback time:** 2.4 years

Further information:

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Realised project indoor lighting: Sports hall in Trhové Sviny, South Bohemia

Streetlight data of the project	Before renovation	After renovation
Total installed electric capacity	8,1 kW	3,2 kW
Total number of lamps	18	16
Number of lighting points (luminaires)	18	16
Main lamp type	HPS	LED
Annual electricity consumption	34,000 kWh	13,400 kWh
Annual electricity costs	4,950 Euro	1,950 Euro

Results

When designing the new installation, emphasis was placed on achieving high quality illumination and high visibility. Through good design, all required technical parameters were met. The newest LED technology lighting was needed to reach the required lighting intensity of 400 W equivalent.

Support by the facilitation service

ECCB was involved as facilitator during the entire process of the technical preparation and negotiation.



Photos: Energy Centre České Budějovice (ECCB), Město Trhové Sviny

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Municipality Gdańsk-Zaspa – Park JP II, Pomerania, Street lighting project

Project background and objectives

The lighting in the park situated in Gdańsk - Zaspa was worn out and the illumination level was insufficient. This resulted in frequent repairs and lower safety for people enjoying the park. The lighting, however, was not refurbished due to insufficient funds for the investment. Finally, a comprehensive lighting renovation in the park was implemented with financial support from the Voivod Fund for Environmental Protection and Water Management in Gdańsk in the framework of a pilot edition of the programme "Energy Saving Lighting of Pomerania".

Project description

The main objective of the project was to improve the technical state and energy efficiency of the street lighting system as well as safety conditions in the park. The City of Gdańsk applied for co-financing for the project. One of the selection criteria was the ecological effect calculated as PLN/Mg CO₂. The maintenance costs were not included in the calculation. The project consisted of exchanging the sodium lighting to LEDs as well as modernising the infrastructure. The co-financing by the Voivod Fund covered 28 % of the investment. The contract was awarded at the end of March 2015. The new lighting was operational in September 2015.

Eligible costs included:

- purchase and installation of the lighting points,
- purchase and laying of the power supply cable,
- purchase and installation of the energy management equipment,
- necessary documentation (including electrical audit).



Facts

- **Population:** 460,430 inhabitants Gdansk/
29,340 Zaspa Suburb of Gdańsk
- **Type of streets:** residential area
- **Electricity cost savings:** 650 €/year
- **Reduction electricity consumption:**
7,200 kWh/year
- **CO₂ reduction:** 3.3 tons/year
- **Investment costs:** 35,000 €
- **Subsidies:** 6,000 € (Regional Fund for Environmental Protection and Water Management)
- **Monitoring of the environmental effects:**
for 3 years

Further information:

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Municipality Gdańsk-Zaspa – Park JP II, Pomerania, Street lighting project

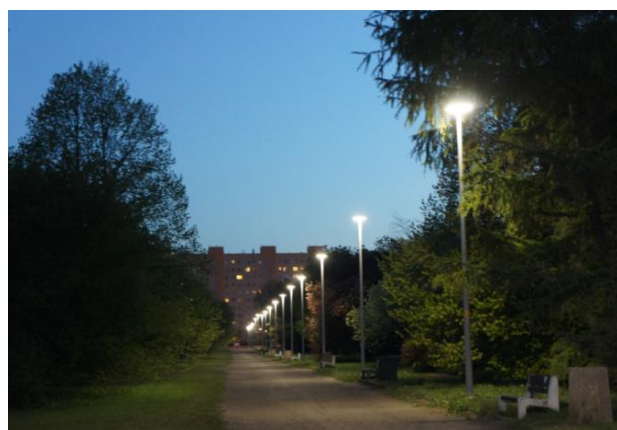
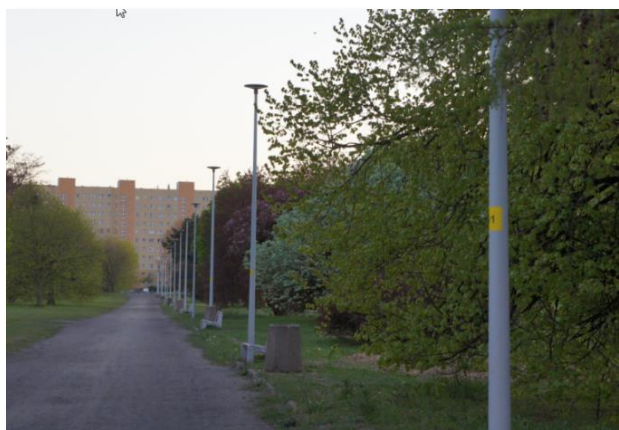
Project data	Before renovation	After renovation
Total installed electric capacity	1.68 kW	1.32 kW
Total number of lamps	24	25
Number of lighting points (luminaires)	24	25
Main lamp type	HPS	LED
Annual electricity consumption	10,700 kWh	3,500 kWh
Annual electricity costs	1,150 Euro	500 Euro

Results

The lighting along the paths in the park and the necessary infrastructure were modernised. Energy savings have reached almost 70 % and safety has been improved. After the refurbishment, dimming and control measures were implemented. This permitted to significantly reduce the overall operational hours of the system. This project served as a learning ground for LED technology and a pilot installation for the programme "Energy Saving Lighting of Pomerania". The project was financially supported by the Regional Fund for Environmental Protection and Water Management. The financial support was conditional to reaching the foreseen energy savings. The installation must be monitored for the first 3 years of operation to assure goals are reached.

Support by the facilitation service

The facilitation service supported the municipality throughout the assessment of the energy savings and CO₂ reduction.



Photos: Bałtycka Agencja Poszanowania Energii

Municipality of Gdansk – SOWA Piecewska, Pomerania, Street lighting project

Project background and objectives

Gdansk is a vivid, historic and industrial city located in the Southern part of the Baltic Sea. With over 460,000 inhabitants, Gdansk is one of the largest cities in Poland.

The "SOWA Piecewska" project encompasses the refurbishment of the public lighting along Piecewska street in Gdansk (lighted area: 19,130 m²). Due to new investments in this district of the city and the installation of a new tram line, an upgrade of the public lighting system was needed. Initially it was planned to simply exchange the sodium lamps with sodium lamps of lower capacity. However, ultimately, this solution was replaced with LED lamps due to innovation and higher energy savings of LED technology.

Project description

The main objective of the project was to upgrade the technical state and energy efficiency of the street lighting system. The City of Gdańsk obtained a subsidy for this project. The project included the replacement of sodium lamps with LEDs and the modernisation of the infrastructure. The co-financing by the National Fund for Environmental Protection and Water Management covered 45 % of the investment. The contract was signed in early 2015. The new lighting was operational in September 2015.

Eligible costs included:

- purchase and installation of the lighting points,
- purchase and installation of the energy management equipment,



Facts

- **Population:** 460,430 inhabitants
- **Type of streets:** residential area
- **Electricity cost savings:** 2,300 €/year
- **Reduction electricity consumption:** 16,000 kWh/year
- **CO₂ reduction:** 7.4 tons/year
- **Investment costs:** 11,100 €
- **Subsidies:** 5,000 € (National Fund for Environmental Protection and Water Management)
- **Monitoring of the environmental effects:** for 5 years

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Municipality of Gdansk – SOWA Piecewska, Pomerania, Street lighting project

Project data	Before renovation	After renovation
Total installed electric capacity	8.5 kW	4.5 kW
Total number of lamps	102	71
Main lamp type	HPS	LED
Annual electricity consumption	34,000 kWh	18,000 kWh
Annual electricity costs	4,900 Euro	2,600 Euro

Results

The lighting along Piecewska street was modernised. 44 lighting points were refurbished to energy efficient LED technology. Safety has been improved and energy savings have reached 47 %. The project was financially supported by the National Fund for Environmental Protection and Water Management. The financial support was conditional to reaching the foreseen energy savings. The installation must be monitored for the first 5 years of operation to assure goals are reached.

Support by the facilitation service

The facilitation service supported the municipality throughout the assessment of the energy and costs savings and CO₂ reduction. It played a key role in the final decision of converting to LED technology instead of refurbishing with sodium lamps of lower capacity.



Photos: Bałtycka Agencja Poszanowania Energii, Urząd Miejski w Gdańsku

Municipality of Gdansk – SOWA Nieborowska, Pomerania, Street lighting project

Project background and objectives

Gdansk is a vivid, historic and industrial city located in the Southern part of the Baltic Sea. With over 460,000 inhabitants, Gdansk is one of the largest cities in Poland.

The "SOWA Nieborowska" project encompasses the refurbishment of the public lighting along Nieborowska street in Gdansk (illuminated area: 20,437 m²). The project was triggered by the willingness to improve safety and security by upgrading the street lighting. Initially, it was planned to exchange the lighting to sodium lamps with lower capacity. However, ultimately, this solution was replaced with LED lamps due to innovation and higher energy savings of LED technology.

Project description

The main objective of the project was to upgrade the technical state and energy efficiency of the street lighting system. The City of Gdańsk obtained a subsidy for this project. The project consisted of exchanging part of the sodium lighting to LED and modernising the infrastructure. The co-financing by the National Fund for Environmental Protection and Water Management covered 45 % of the investment. The contract was signed in early 2015. The new lighting was operational in September 2015.

Eligible costs included:

- purchase and installation of the lighting points,
- purchase and installation of the energy management equipment,
- necessary documentation (including electrical audit).



Facts

- **Population:** 460,430 inhabitants
- **Type of streets:** residential area

- **Electricity cost savings:** 340 €/year
- **Reduction electricity consumption:** 2,400 kWh/year
- **CO₂ reduction:** 1.1 tons/year

- **Investment costs:** 5,300 €
- **Subsidies:** 2,390 € (National Fund for Environmental Protection and Water Management)
- **Monitoring of the environmental effect:** within 5 years

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Municipality of Gdansk – SOWA Nieborowska, Pomerania, Street lighting project

Project data	Before renovation	After renovation
Total installed electric capacity	5.6 kW	5 kW
Total number of lamps	49	49
Main lamp type	HPS	partly LED
Annual electricity consumption	22,400 kWh	20,000 kWh
Annual electricity costs	3,200 Euro	2,860 Euro

Results

The lighting along Nieborowska street was modernised and safety has been improved. 16 lighting points were refurbished to energy efficient LED technology. The new LED luminaires permit more than 60 % energy savings compared to the previous HPS lamps. Although only some the luminaires were replaced, energy savings over the entire system has reached almost 11 %. The project was financially supported by the National Fund for Environmental Protection and Water Management. The financial support was conditional to reaching the foreseen energy savings. The installation must be monitored for the first 5 years of operation to assure goals are reached.

Support by the facilitation service

The facilitation service supported the municipality throughout the assessment of the energy savings and CO₂ reduction. It played an influential role in the final decision of converting to LED technology instead of refurbishing with sodium lamps of lower capacity.



Photos: Bałtycka Agencja Poszanowania Energii, Urząd Miejski w Gdańsku

Implemented project indoor lighting Gdansk Subisława Street Youth Hostel, Pomerania, Poland

Project background and objectives

The City of Gdańsk has completed the task of transforming and expanding a section of a school into a youth hostel. The building has 37 rooms designed for a total of 107 guests. On the west side, the object was enlarged. Access roads for fire services and lawn were installed. The pavement was also repaired.

Project description

The main objective of the project was to carry out deep refurbishment of the building. The scope of the work covered:

- construction of new walls to create the spaces necessary for the adapted function,
- full range of finishing works in the above-ground "E wing",
- window openings in the wall of the western connector on all floors
- modernisation of indoor lighting in the corridors.



Facts

- **Population:** 460,430 inhabitants
- **Type of building:** public building
- **Electricity cost savings:** 1,000 €/year
- **Reduction electricity consumption:** 7,400 kWh/year
- **CO₂ reduction:** 3,4 ton/a
- **Investment costs:**
 - 38,800 € (total investment)
 - 9,700 € modernisation of indoor lighting
- **Subsidies:** 0%
- **Monitoring of the environmental effect:** no

Further information:

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Implemented project indoor lighting Gdansk Subisława Street Youth Hostel, Pomerania, Poland

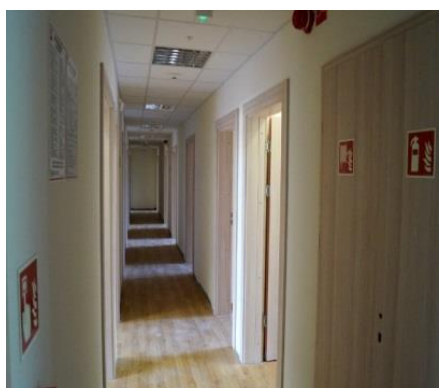
Streetlight data of the project	Before renovation	After renovation
Total installed electric capacity	12.1 kW	9.7 kW
Total number of lamps	151	151 (35 modernised)
Annual electricity consumption	36,400 kWh	29,000 kWh
Annual electricity costs	4,800 Euro	3,800 Euro

Results

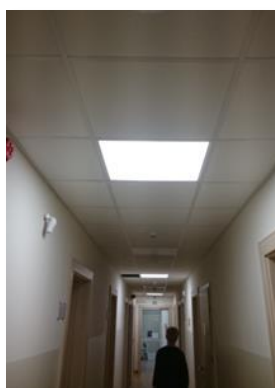
Implementation of the project started in August 2015 and proceeded until May 2016.

Support by the facilitation service

The facilitation service supported the municipality throughout the assessment of the energy savings and CO₂ reduction.



before renovation



after renovation

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Photos: City of Gdansk

Kilkenny City, Carlow Kilkenny County

Street lighting project

Project background and objectives

The street lighting infrastructure in Kilkenny County was established over the past 60-70 years. The area selected for this project was a representative sample of the 9,800 lamps throughout the county. Street lighting represents approximately 55 % of the municipality's electricity consumption. The light quality was variable and unsatisfactory. The cost of the upgrades was traditionally the barrier to change. In 2014, the regional partner and city partner successfully arranged a finance model for the project. The focus was put on refurbishing the public lighting on 5 streets & housing estates to test the model of incorporating energy into a traditional contract.

Project description

The main objective of the project was to improve the lighting standard and energy efficiency of the street lighting system with aesthetic considerations on historic and tourist attractions. The city partner was interested in using an EPRP (Energy Performance Related Payment) model. Through this type of EPC model, the city retained 10% of the project payment for one year until it was shown that the agreed energy savings were achieved. This model was assessed and disseminated to the decision makers at city level over many months. The decision was taken not to include the maintenance costs in the EPC contract. The city nevertheless benefits from a significant reduction of its maintenance costs due to the new energy efficient and low-maintenance LED lighting system. A grant of 50 % was achieved through an energy efficiency project application.



Facts

- **Population:** 95,420 (County), 24,420 (City)
- **Type of streets:** Urban – Residential and Public roads
- **EPC model:** Moroney Electrical (Energy Performance Related Payment)
- **Electricity cost savings:** 2,200 €/year
- **Reduction electricity consumption:** 15,600 kWh/year
- **CO₂ reduction:** 7.2 tons/year
- **Investment costs:**
 - 50,000 € (total investment)
 - 5,000 € (financed by the EPC project)
- **Subsidies:** 50 % SEAI (regional contracting programme)

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Kilkenny City, Carlow Kilkenny County

Street lighting project

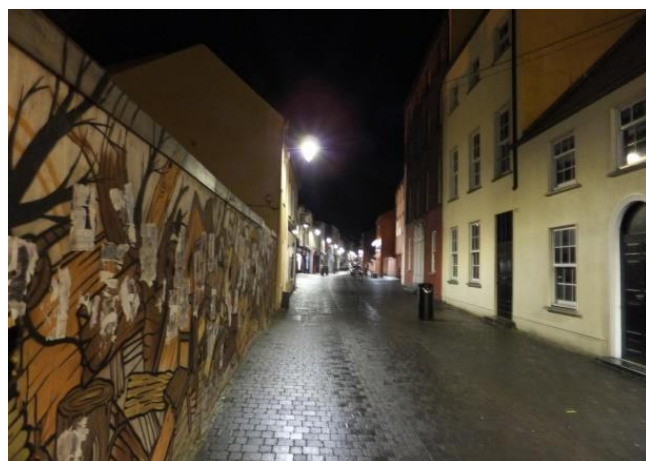
Project Data	Before renovation	After renovation
Total installed electric capacity	6.6 kW	3 kW
Total number of lamps	59	59
Number of lighting points (luminaires)	59	59
Annual electricity consumption	27,700 kWh	12,100 kWh
Annual electricity costs	3,900 Euro	1,700 Euro
Annual maintenance costs	1,650 Euro	300 Euro

Results

Kilkenny County Council was one of the first to implement EPRP (a form of EPC) in Ireland. The city successfully installed a number of varying technology lamps with approved historical and modern LED lanterns. This resulted in a successful upgrade to LED in 5 locations in the city. The municipality is very satisfied with the implementation process and outcome of the project and is pleased with the quality of the lighting. In 2016/17, it is proposed to complete the next phase of 1,500 luminaires in the county on the route to completing the 9,800 lamps within the coming 5-7 years using EPC from local electrical companies. Five of these companies have engaged in the development of phase II 2016/17.

Support by the facilitation service

The facilitation service supported the municipality throughout the development of the EPC project by offering feedback and guidance on funding aspects as well as on the content of the EPC contract. Among others, the topic of deeper ESCO and contractor finance has been discussed and phase II will incorporate the contractor bringing finance to the project over a 10-15 year contract.



Photos: The Carlow Kilkenny Energy Agency, Kilkenny County Council

Internal lighting retrofit, Kilkenny County Council, Indoor lighting project

Project background and objectives

Kilkenny County Council is committed to reaching their public sector targets of a 33 % reduction in energy by 2020 as set out by the National Energy Efficiency Action Plan. A number of energy efficiency projects were initiated in order to reduce their costs and energy consumption. Based on energy audits, lighting retrofits were carried out in 7 local authority owned buildings, including the corporate offices, the fire station, libraries, machinery yards, depots and the landfill.

Project description

An energy audit was carried out for each building, generating a list of lamps, lamp types and wattages. This information was used for the procurement documents. A "design and build" type contract was chosen for this project. The city also decided to use an EPRP (Energy Performance Related Payment) model. This is a form of EPC through which the city retained 10 % of the project payment for one year until it was shown that the agreed energy savings were achieved. Incorporating energy considerations into the contract allowed the contractor to specify a lamp type and wattage that met the specifications.

One year after completion of the project, a review was carried out with the consultant and the ESCO. This review compared the operation of the system and the energy usage over a one-year period. Localised smart meters were used record energy usage of the lighting system before and after installation. The review was positive and the retained payment was paid out.



Facts

- **Public Body:** Kilkenny County Council
- **Type of lighting:** Indoor and outdoor lighting
- **ESCO:** Moroney Electrical (Energy Performance Related Payment)
- **Electricity cost savings:** 8,250 €/year
- **Maintenance cost savings:** 4,800 €/year
- **Reduction electricity consumption:** 51,400 kWh/year
- **CO₂ reduction:** 23.6 tons/year
- **Investment costs:** 170,000 €
- **Subsidies:** 68,000 € (Sustainable Energy Authority of Ireland)

Further information:

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Internal lighting retrofit, Kilkenny County Council, Indoor lighting project

Project data	Before renovation	After renovation
Total installed electric capacity	62 kW	30 kW
Total number of lamps	962	967
Main lamp type	Fluorescent Lamps	LED
Annual electricity consumption	86,700 kWh/year	35,300 kWh/year
Annual electricity costs	13,900 Euro	5,650 Euro

Results

This project has resulted in not only achieving greater energy efficiencies but has also improved the working environment for the staff and public visiting the buildings. The project was completed under a SEAI Better Energy Community grant scheme and is used as a showcase for communities and other organisations to see LED lighting systems in operation. Due to its success a further project was carried out for the energy efficient lighting retrofit of two libraries in Kilkenny.

Support by the facilitation service

The process was supported by the Streetlight EPC facilitation service through technical advice and expertise. Carlow Kilkenny Energy Agency carried out the initial assessments of the indoor lighting systems and compiled the contract documentation. The facilitation service was used to incorporate Energy Performance Related Payments (EPRP) into the contract documents which allowed the project to have an energy performance contracting element build in, the first of its kind used by Kilkenny County Council.



Photos: The Carlow Kilkenny Energy Agency, Kilkenny County Council

Realised project heating upgrades: Kilkenny County Council Heating Upgrade, Ireland

Project background and objectives

Carlow Kilkenny Energy Agency (CKEA) and Kilkenny County Council (KCC) used the basis of energy performance contracting to include projects other than lighting. This allowed CKEA and KCC to test the model of energy contracting for other applications. This project came from the need to upgrade the heating systems in Kilkenny County Hall and the Kilkenny Fire Station.

Project description

KCC is committed to reaching their public sector target of a 33 % reduction in energy by 2020 as set out by the National Energy Efficiency Action Plan. Therefore, a number of energy efficiency projects were initiated to reduce their costs and energy consumption. Energy audits were carried out on two of the largest energy users in the local authority. The energy audits identified that heating upgrades were required to be carried out in Kilkenny County Hall and the Fire Service Headquarters.

The project was completed under a SEAI Better Energy Community grant scheme. KCC opted for a "design & build" model on this contract and opted for the heating design to be carried out by an independent design consultant. Traditional procurement was used.



Heating Upgrades Kilkenny County Hall

Facts

- **Type of buildings:** Headquarters of Kilkenny County Council & Headquarters of the Kilkenny Fire Service
- **EPC model:** Energy Performance Related Payment (EPRP)
- **Heating Source:** Natural Gas
- **Expected thermal cost savings:** 5,500 €/year
- **Expected reduction in thermal energy consumption:** 109,600 kWh/year
- **Expected CO₂ reduction:** 22.5 tons/year
- **Investment costs:** 90,000 €
- **Subsidies:** SEAI 50%
- **EPRP contract duration:** 1 Year

Further information:

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Carlow Kilkenny Energy Agency
driving sustainability

Realised project heating upgrades:

Kilkenny County Council Heating Upgrade, Ireland

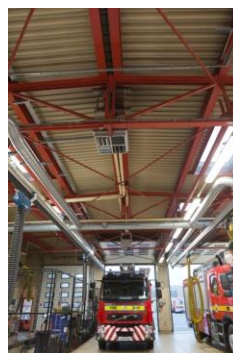
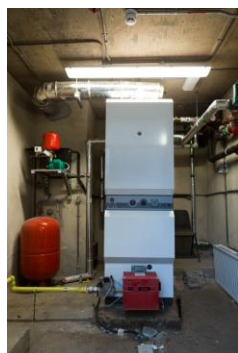
Project Data	Before renovation	After renovation
Total installed electric capacity	483 kW	475 kW
Annual Thermal Consumption (kWh/year)	465,000	518,500
Operational Time	1,500 Hours	1,200 Hours
Annual thermal costs	23,200 Euro	25,900 Euro
Annual maintenance costs	3,000 Euro	1,500 Euro

Results

When compared to energy lighting upgrades, the energy savings related to heating systems proved more difficult to estimate. This can be attributed to the various changes in weather patterns and upgraded thermal comfort in both buildings. The baseline year needs to be clearly defined from the outset and agreed by both parties. For example, the Fire Service Headquarters is now a much more comfortable building to work in; however, the heat consumption has increased. As we can see from the table above, the energy savings were not achieved and the new system resulted in increased energy consumption. In order to counteract this, a report was requested from the mechanical contractor to identify areas where the energy savings can be improved. The systems are all in place, but the thermal energy usage on site needs to be managed more effectively. Weather corrected data also needs to be factored into any baseline project analysis.

Support by the facilitation service

The facilitation service supported the municipality throughout the development of the EPC project. The facilitation service along with the municipality developed a tender brief to appoint a mechanical contractor to design the new energy efficient heating system in both buildings. The facilitation service used the examples and lessons learnt from internal and external lighting projects to apply it to other applications such as heating system upgrades.



Boiler Room & Appliance Bay Kilkenny Fire Station Headquarters

Photos: The Carlow Kilkenny Energy Agency, Kilkenny County Council

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Realised project street lighting: Ishallen-Sjukhuset, Municipality of Kalmar, Southeast Sweden

Project background and objectives

Kalmar is a modern, middle-sized Swedish municipality with old historical roots, surrounded by water.

The municipality has an overall need to modernise its street lighting system. This project covers a section of streets from the local hockey hall to the county hospital. The streets have varying loads of traffic, with some parts receiving heavier traffic than others. Pedestrian and bicycle paths run along the roads. The public lighting on these streets was inefficient both concerning energy use and illumination.

Project description

The municipality is conducting an ongoing inventory of its public lighting systems to identify areas in need of renovation. In parallel, it seeks to identify other types of work that are needed and/or planned on other public infrastructure. This permits to bundle projects in order to save time, money and reduce disturbance. Combining project is advantageous even if the projects are being implemented by various external companies.

For this project, the energy supplier Kalmar Energi, who is also a maintenance contractor for the municipality of Kalmar, was planning to renovate the electric cables. This offered the opportunity to combine the refurbishment of the lighting system with the replacement of the cables.

The conversion to LED technology was finalised in 2016.



Facts

- **Population:** 48,000 in the city centre
- **Type of streets:** city streets
- **ESCO:** Kalmar Energi

- **Electricity cost savings:** 2,000 €/year
- **Maintenance cost savings:** 1,300 €/year
- **Reduction electricity consumption:** 18,400 kWh/year
- **CO₂ reduction:** 7.6 tons/year

- **Investment costs:** 165,000 €
- **Subsidies:** 0 €

Further information:

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Realised project street lighting: Ishallen-Sjukhuset, Municipality of Kalmar, Southeast Sweden

Streetlight data of the project	Before renovation	After renovation
Total installed electric capacity	6.5 kW	2.1 kW
Total number of lamps	49	49
Number of lighting points (luminaires)	49	49
Main lamp type	HPS	LED
Annual electricity consumption	27,400 kWh	9,000 kWh
Annual electricity costs	3,000 Euro	1,000 Euro

Results

The project resulted in a modern, energy efficient street lighting system that is adapted to the needs of the area. Electricity consumption was reduced by over 66 %. This project demonstrates the advantage for municipalities to establishing integrated monitoring of required and planned work (energy supplier, paving, water and sewer work, etc.). It permits to bundle projects from an early stage, helping to save money and resources as well as reducing recurring disruptions in traffic flow. This is one of Kalmar Energi's first projects implemented with a form of Energy Performance Contracting (EPC) where the actor conducting the work guarantees the savings to be achieved.

Support by the facilitation service

Renovating public lighting is an ongoing project in the municipality. It is important that key actors such as technicians and landscape architects are aware of the possibilities offered by modern technologies so that effective approaches are used from beginning of the projects. The facilitation service supported the implementation of the EPC approach and helped increase awareness about the advantages of combining refurbishment measures.



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Photos: Håkan Olofsson, Kalmar Municipality

Realised project street lighting:

Pildalen, Municipality of Kalmar, Southeast Sweden

Project background and objectives

Kalmar is a modern middle-sized Swedish municipality with old historical roots, surrounded by water.

The municipality has a need for extensive modernisation of its street lighting system and strives to improve illumination to increase security for its citizens. The “Pildalen” area, located just across the bus and railway station in the city centre, encompasses city streets, parking lots and parks. It is a lively area at all times of the day, evening and night.

Project description

In Kalmar, the service administration is responsible for the streets and parks and their related lighting. Together with the landscape architects, they decide how areas should be illuminated and design systems for refurbishment. Kalmar Energi is a procured maintenance contractor, from which the municipality can suborder renovation of the lighting system. The Pildalen renovation was initiated mainly for security aspects. The police department had requested an improvement in illumination to increase visibility for pedestrians.

Kalmar Municipality's technician and landscape architects developed a plan to improve the area and subordered an energy efficient system with improved illumination from Kalmar Energi. According to the contract between Kalmar Energi and the municipality, energy savings for such projects must be guaranteed. The conversion of the public lighting system to LED technology was carried out in 2016.



Facts

- **Population:** 64,000 inhabitants in the municipality and 48,000 inhabitants in the city centre
- **Type of streets:** city streets, parking lots and parks in the city centre
- **ESCO:** Kalmar Energi
- **Electricity cost savings:** 70 €/year
- **Maintenance cost savings:** 260 €/year
- **Reduction electricity consumption:** 670 kWh/year
- **CO₂ reduction:** 0.3 ton/year
- **Investment costs:** 29,700 €
- **Subsidies:** 0 €

Further information:

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E-mail: info@energikontorsydost.se

Realised project street lighting: Pildalen, Municipality of Kalmar, Southeast Sweden

Streetlight data of the project	Before renovation	After renovation
Total installed electric capacity	0.8 kW	0.6 kW
Total number of lamps	9	10
Number of lighting points (luminaires)	9	10
Main lamp type	HPS	LED
Annual electricity consumption	3,270 kWh	2,600 kWh
Annual electricity costs	360 Euro	290 Euro

Results

The sodium lamps were replaced with LED units. Through the participation in the Streetlight-EPC project, the municipality of Kalmar has integrated systematic consideration of energy efficiency aspects at the starting of street lighting projects. As a result, key actors in the municipality are familiar with tools such as life cycle cost analysis and apply them to all projects. Even small projects like this one offer an opportunity to achieve many goals at once such as increased safety, installation of a modern low-maintenance lighting system and energy cost savings for the municipality for years to come.

Support by the facilitation service

Renovating public lighting is an ongoing project in the municipality. It is important that key actors such as technicians and landscape architects are aware of the possibilities offered by modern technologies so that favourable approaches are used from beginning of the projects. They also play an important role in developing the steering document used for future work. The regional facilitation service supported this project with information about the importance of creating a systematic approach to the implementation of energy efficient work. This assures that life cycle costs, energy performance contracting and energy efficiency are always considered and evaluated in new projects within the municipality.



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Photos: Håkan Olofsson, Kalmar Municipality

Realised project street lighting: Förlösa, Municipality of Kalmar, Southeast Sweden

Project background and objectives

The village of Förlösa, in the municipality of Kalmar, is an attractive area with a peaceful and nice atmosphere located about 8 km north of the city of Kalmar. The area consists of cultivated fields, woodland and housing areas. The existing buildings in Förlösa are unique with lovely old houses and a church built in the mid-1800s.

The 11 km long Förlösa road runs through the village. The lighting system along the road consists of lamps mounted on wooden poles and overhead electricity lines. It was decided to refurbish the public lighting along the road and increase the lighting to "village street" standards in order to increase safety for pedestrian and cyclist.

Project description

The project was triggered in 2016 when the energy supplier Eon announced that they planned on refurbishing the electric cables along the Förlösa road. This offered an interesting opportunity to simultaneously refurbish the luminaires and poles. Bundling the project with Eon's work permitted to reduce costs and disturbance of traffic.

The national legislation for road lighting (VGU) must be applied on this road since it is under the responsibility of the Swedish Transport Administration. The municipality of Kalmar decided to implement the project by taking into consideration life cycle costs and requesting a guarantee on achieved savings from the party conducting the design and refurbishment work.



Facts

- **Population:** 64,000 inhabitants in the municipality, 70 inhabitants in Förlösa
- **Type of streets:** residential street and country road
- **ESCO:** One Nordic AB

- **Electricity cost savings:** 660 €/year
- **Maintenance cost savings:** 660 €/year
- **Reduction electricity consumption:** 5,980 kWh/year
- **CO₂ reduction:** 2.8 tons/year

- **Investment costs:** 70,200 €
- **Subsidies:** 0 €

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Realised project street lighting: Förlösa, Municipality of Kalmar, Southeast Sweden

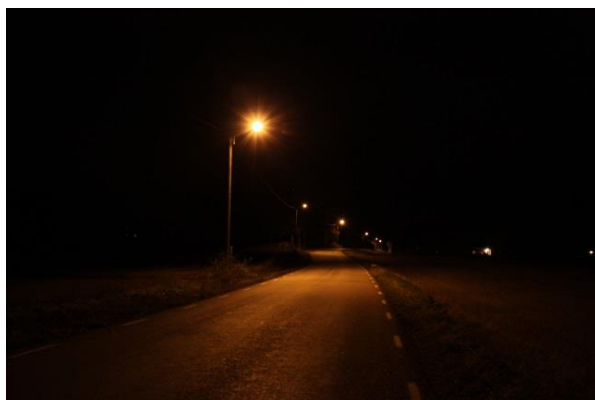
Streetlight data of the project	Before renovation	After renovation
Total installed electric capacity	2 kW	0.6 kW
Total number of lamps	24	25
Number of lighting points (luminaires)	24	25
Main lamp type	HPS	LED
Annual electricity consumption	8,370 kWh	2,390 kWh
Annual electricity costs	920 Euro	260 Euro

Results

The project resulted in a modern and energy efficient lighting installation with new poles, cables, luminaires and LED lamps. In addition, the new systems offers better illumination while permitting significant energy cost savings. By requesting guaranteed energy savings, the project introduced a new way of financing and implementing street lighting projects in the region. This contributed to informing suppliers that considering life cycle costs are a crucial aspect for making sound long term decision for streetlight refurbishment and that they should familiarise themselves with these tools. This was One Nordic's first project of this type.

Support by the facilitation service

Renovating public lighting is an ongoing project in the municipality. It is important that key actors such as technicians and landscape architects are aware of the possibilities offered by modern technologies so that effective approaches are used from beginning of the projects. The facilitation service has supported this project by providing information on how to consider energy efficiency, life cycle costs and energy performance contracting in street lighting refurbishment projects. It also contributed helpful information for the new ESCO.



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Photos: Håkan Olofsson, Kalmar Municipality

Valfiskén, Municipality of Kalmar, Southeast Sweden, Street lighting project

Project background and objectives

Kalmar is a modern middle-sized Swedish municipality with old historical roots, surrounded by water.

The municipality's overall public lighting system requires modernisation. Areas with mercury lamps are prioritised. One area that needed refurbishment in order to increase security for the citizens was "Valfiskén", a neighbourhood situated just outside the city centre.

The area, characterised by large office buildings dating from the 1970s, is populated mostly during daytime. The roads are reserved for pedestrian and bicycle traffic.

Project description

In Kalmar, the service administration is responsible for the streets and parks and their related lighting. Together with the landscape architects, they decide how areas should be illuminated and design systems for refurbishment.

Kalmar Energi is a procured maintenance contractor, from who the municipality can sub-order renovation of the lighting system. The project in Valfiskén was triggered by the need to replace the mercury lamps as well as the willingness to increase the energy efficiency of the system and improve the illumination and safety in the area.

The project consists of replacing the lamps by LEDs. The municipality sub-ordered this refurbishment work from Kalmar Energi with guaranteed energy savings.



Facts

- **Population:** 64,000 inhabitants in the municipality and 48,000 inhabitants in the city centre
- **Type of streets:** mostly pedestrian and cycling area
- **ESCO:** Kalmar Energi
- **Electricity cost savings:** 590 €/year
- **Maintenance cost savings:** 290 €/year
- **Reduction electricity consumption:** 5,450 kWh/year
- **CO₂ reduction:** 2.5 tons/year
- **Investment costs:** 8,200 €

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Valfisker, Municipality of Kalmar, Southeast Sweden, Street lighting project

Project data	Before renovation	After renovation
Total installed electric capacity	1.53 kW	0.23 kW
Total number of lamps	11	11
Number of lighting points (luminaires)	11	11
Main lamp type	Hg	LED
Annual electricity consumption	6,420 kWh	970 kWh
Annual electricity costs	700 Euro	110 Euro

Results

Mercury lamps are being phased out according to EU Directive. Through this project, the mercury lamps have been replaced by a modern, energy efficient lighting system that is well adapted to the lighting needs of the area. The municipality of Kalmar employed a new approach for contracting lighting refurbishment projects. The calculations were based on LCC and energy savings are guaranteed by the contractor. If not achieved, the contractor is required to adjust or exchange the equipment. This project has contributed to informing local suppliers and ESCOs about such tools.

Support by the facilitation service

Renovating public lighting is an ongoing project in the municipality. It is important that key actors such as technicians and landscape architects are aware of the possibilities offered by modern technologies so that favourable approaches are used from beginning of the projects. Through activities such as training events and site visits, the facilitation service has contributed to increasing actors' knowledge on technical aspects of modern lighting systems as well as their understanding of LCC and Energy Performance Contracting.



Photos: Håkan Olofsson, Kalmar Municipality



Lindsdal, Municipality of Kalmar, Southeast Sweden, Street lighting project

Project background and objectives

Lindsdal is a suburb in the municipality of Kalmar, located about 10 km north of the city of Kalmar. The area consists almost entirely of single-family homes. A large part of the suburb, with approx. 2,400 houses, was built in the 1970s.

In the last years, there has been extensive effort to initiate a process of development and modernisation of Lindsdal. The municipality has decided to use the procurement of a large streetlight renovation project in Lindsdal as a role model and a framework contract for all the streetlight refurbishments in the municipality of Kalmar.

Project description

This small project serves as a pilot project for the large upcoming renovation of Lindsdal's public lighting system. The lighting in a test street was converted to LED technology. The renovation was implemented in 2016 by ALV-teknik and Rexel, who hold a maintenance contract with the municipality. For this project, the refurbishment was sub-ordered from the existing maintenance contract with guaranteed energy savings. In addition, the contractors were required to base their calculations on LCC. This is a new approach to lighting refurbishment for the municipality of Kalmar.

The objective was to test the procurement and implementation process to be used for the large EPC project that will follow. Dialogues with the citizen will be an important part of the large refurbishment project and citizen acceptance is crucial for the project's success.



Facts

- **Population:** 6,500 inhabitants
- **Type of streets:** footpaths, cycleways and roads
- **ESCO:** ALV-teknik and Rexel
- **Electricity cost savings:** 240 €/year
- **Maintenance cost savings:** 290 €/year
- **Reduction electricity consumption:** 2,220 kWh/year
- **CO₂ reduction:** 1 ton/year
- **Investment costs:** 3,000 €

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Lindsdal, Municipality of Kalmar, Southeast Sweden, Street lighting project

Project data	Before renovation	After renovation
Total installed electric capacity	0.66 kW	0.13 kW
Total number of lamps	11	11
Number of lighting points (luminaires)	11	11
Main lamp type	HPS	LED
Annual electricity consumption	2,770 kWh	550 kWh
Annual electricity costs	300 Euro	60 Euro

Results

The pilot project permitted to test a system for developing and carrying out a qualitative dialogue with the citizens. This dialogue will be included in the extensive large-scale project and for the development of the framework contract that will result from it. The pilot project also offers an opportunity to familiarise with LED technology and see how it will work in this specific area. The municipality of Kalmar employed a new approach for contracting lighting refurbishment projects. The calculations were based on LCC and energy savings are guaranteed by the contractor. If not achieved, the contractor is required to adjust or exchange the equipment.

Support by the facilitation service

The facilitation service had supported the municipality of Kalmar in increasing their understanding of EPC and in integrating energy efficiency criteria in their procurement process for street lighting refurbishment. The facilitation service will also continue to support the municipality in the process of citizen dialogue.



Photos: Håkan Olofsson, Kalmar Municipality

Smedby, Municipality of Kalmar, Southeast Sweden, Street lighting project

Project background and objectives

Smedby is a village in the municipality of Kalmar, about 10 km west of the main city of Kalmar. It has beautiful green surroundings and is characterised by agricultural and forested landscape.

Smedby contains townhouses, single-family houses and apartments. Many of the homes were built in the 1960s and the townhouses around 1980. Some of the roads in the area have a streetlight system that is not adapted to the local needs. It is generally oversized and creates unnecessary light pollution.

Project description

In Kalmar, the service administration is responsible for the streets and parks and their related lighting. Together with the landscape architects, they decide how areas should be illuminated and design systems for refurbishment. It was decided to review the public lighting system in Smedby and replace the lamps. The objective was to convert the street lighting system to a modern, energy efficient installation that is well adapted to actual needs.

The work and lamps were sub-ordered from existing maintenance and supply contracts held by the municipality of Kalmar. The refurbishment was sub-ordered with guaranteed energy savings and the contractors were required to base their calculations on LCC. This is a new approach to lighting refurbishment for the municipality of Kalmar.



Facts

- **Population:** 3,490 inhabitants
- **Type of streets:** residential streets
- **ESCO:** ALV-teknik and Rexel

- **Electricity cost savings:** 2,400 €/year
- **Maintenance cost savings:** 1,000 €/year
- **Reduction electricity consumption:** 21,600 kWh/year
- **CO₂ reduction:** 10 tons/year

- **Investment costs:** 18,300 €

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Smedby, Municipality of Kalmar, Southeast Sweden, Street lighting project

Project data	Before renovation	After renovation
Total installed electric capacity	6.4 kW	1.3 kW
Total number of lamps	39	39
Number of lighting points (luminaires)	39	39
Main lamp type	HPS	LED
Annual electricity consumption	27,000 kWh	5,400 kWh
Annual electricity costs	3,000 Euro	600 Euro

Results

The project has resulted in the installation of a modern energy efficient lighting system that answers the lighting needs in this section of the municipality. Energy savings reach 80 %. The contractors have guaranteed the energy savings. If they are not achieved, they are required to adjust or exchange the equipment. The project was implemented according to a new approach for sub-ordering streetlight renovation projects from an existing maintenance contract with the municipality. It has contributed to suppliers' and ESCOs' increased awareness that the consideration of Life Cycle Costs (LCC) is crucial for making good long term decisions. It has also helped them get familiar with the LCC tool as well as the calculation of guaranteed savings. This was the first EPC project for the ESCOs ALV-teknik and Rexel.

Support by the facilitation service

The municipality of Kalmar is renovating its lighting system step by step. The facilitation service has supported the development of the new procurement approach and steering documents that will be used for future phases of refurbishment work. The facilitation service also helped the municipality in increasing its understanding of LCC and EPC tools, LED technology and defining criteria for energy efficiency procurement. As this was the ESCOs' first EPC project, additional support was required from the facilitation service in order to guide them through the process.



Photos: Håkan Olofsson, Kalmar Municipality

Svensknabben, Municipality of Kalmar, Southeast Sweden, Street lighting project

Project background and objectives

Kalmar, a modern middle-sized Swedish municipality with old historical roots, is working on a step by step modernisation of its lighting system. "Svensknabben", 3 km north of the city centre, is a century old cultural area with beautiful buildings from the early 1900s. It comprises a mix of residential and office buildings and a large horse-riding centre. Due to the use of outdated mercury lamps in this area, the municipality decided to refurbish the street lighting.

Project description

The municipality uses an inventory system of the public lighting to identify areas in need of renovation. Life Cycle Cost Analysis (LCC) is employed to identify the areas with the highest energy savings potential. Areas with mercury lamps, such as Svensknabben, are prioritised for refurbishment work. Within the municipality, the Service Administration is responsible for the streets, parks and related lighting. The new lighting systems are designed together with the municipality's landscape architects.

Kalmar Energi holds a maintenance contract with the municipality, from which streetlight renovation projects can be sub-ordered. For this project, the refurbishment was sub-ordered with guaranteed energy savings and Kalmar Energi was required to base their calculations on LCC. This is a new approach to lighting refurbishment for the municipality of Kalmar.

Kalmar Energi, in cooperation with the landscape architects, selected a suitable luminaire for the project. Selection criteria included e.g. energy consumption, glare, and design.



Facts

- **Population:** 64,000 inhabitants in the municipality and 48,000 inhabitants in the city centre
- **Type of object:** small residential streets and parking areas
- **ESCO:** Kalmar Energi
- **Electricity cost savings:** 970 €/year
- **Maintenance cost savings:** 500 €/year
- **Reduction electricity consumption:** 8,800 kWh/year
- **CO₂ reduction:** 4 tons/year
- **Investment costs:** 11,600 €

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Svensknabben, Municipality of Kalmar, Southeast Sweden, Street lighting project

Project data	Before renovation	After renovation
Total installed electric capacity	2.4 kW	0.3 kW
Total number of lamps	20	19
Number of lighting points (luminaires)	20	19
Main lamp type	Hg	LED
Annual electricity consumption	10,000 kWh	1,200 kWh
Annual electricity costs	1,100 Euro	130 Euro

Results

The project has resulted in a modern, energy efficient street lighting system, designed to meet the needs of the area. The mercury lamps were removed in order to comply with EU directives. The installation of LEDs has led to significant energy savings. In addition, the project is among the first projects in Kalmar to employ a new approach for contracting lighting refurbishment projects: LCC used to identify the areas with highest energy savings potentials and the project is sub-ordered from a supplier through their existing maintenance contract with the municipality. Energy savings are guaranteed and, if not achieved, the supplier (contractor) is required to adjust or exchange the equipment until the result is achieved.

Support by the facilitation service

The facilitation service has contributed to increasing the knowledge of LCC and EPC within the municipality. Study trips, training events and meetings were held to explain these tools, inform about modern lighting technology and support in formulating demand criteria in a tendering process in order to achieve the best solution for each purpose. Key actors, such as technicians and landscape architects, were supported in developing the methodology for street lighting refurbishment that will be used from now on by the municipality.



Photos: Håkan Olofsson, Kalmar Municipality

Realised project street lighting: Östra Kvarnholmen, Municipality of Kalmar, Southeast Sweden

Project background and objectives

Kalmar is a modern middle-sized Swedish municipality with old historical roots, surrounded by water.

The municipality's overall public lighting system requires modernisation. Areas with mercury lamps are prioritised. One area that needed refurbishment in order to increase security through better illumination was "Östra Kvarnholmen", situated in the city centre. The buildings in the "Östra Kvarnholmen" neighbourhood consists of small houses from 1600, industrial buildings from 1800, hotels, restaurants and municipal offices. All kind of traffic is permitted and the area is populated around the clock.

Project description

In Kalmar, the service administration is responsible for the streets and parks and their related lighting. Together with the landscape architects, they decide how areas should be illuminated and design systems for refurbishment.

Kalmar Energi is a procured maintenance contractor, from who Kalmar Municipality can suborder renovation for streetlights. "Östra Kvarnholmen" is a lamp replacement project. The inefficient mercury lamps are replaced with modern LEDs.

Kalmar Municipality subordered this refurbishment work with guaranteed energy saving.



Facts

- **Population:** 64,000 inhabitants in the municipality and 48,000 inhabitants in the city centre
- **Type of streets:** pedestrian, bicycle and vehicles
- **ESCO:** Rexell/Selga and Kalmar Energi
- **Electricity cost savings:** 2,750 €/year
- **Maintenance cost savings:** 1,500 €/year
- **Reduction electricity consumption:** 24,700 kWh/year
- **CO₂ reduction:** 11,3 tons/year
- **Investment costs:** 57,600 €

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Realised project street lighting: Östra Kvarnholmen, Municipality of Kalmar, Southeast Sweden

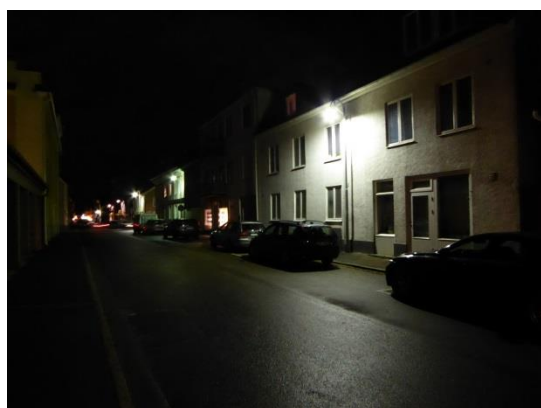
Streetlight data of the project	Before renovation	After renovation
Total installed electric capacity	7.9 kW	2.1 kW
Total number of lamps	57	57
Number of lighting points (luminaires)	57	57
Main lamp type	Hg	LED
Annual electricity consumption	33,300 kWh	8,600 kWh
Annual electricity costs	3,700 Euro	950 Euro

Results

Replacing the mercury lamps by LEDs permitted to achieve a modern and energy efficient street lighting system that is well adapted to the area's purpose and usage. In addition, mercury lamps were removed, an action that is in line with EU phasing out of certain lamp types. The project was implemented using a new way of procuring and subordering renovation work for streetlights.

Support by the facilitation service

Renovating public lighting is an ongoing project in the municipality. It is important that key actors such as technicians and landscape architects are aware of the possibilities offered by modern technologies so that favourable approaches are used from beginning of the projects. Through activities such as training events and site visits, the facilitation service has contributed to increasing actors' knowledge on technical aspects of modern lighting systems as well as their understanding of LCC and Energy Performance Contracting.



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Photos: Håkan Olofsson, Kalmar Municipality

Realised project street lighting: Municipality of Torsås, Southeast Sweden

Project background and objectives

Torsås is a municipality in Kalmar County situated along the coast. Although there are three main urban areas, it is mostly a sparsely populated municipality.

The road network in the municipality is owned partly by the municipality, the Swedish Transport Administration and the road association. The lighting systems for streets, pedestrian & cycle paths and parks are operated by two different actors - Eon and Kraftringen. The infrastructure and fixtures were old and needed to be refurbished.

Project description

A large part of the lighting system in Torsås is aged and of poor quality. In many areas, mercury lights are still being used. There are also unnecessary lamps that are still installed but don't have a proper function. There is an overall lack of documentation and digitalisation of the inventory of the installations.

As first step, a proper inventory had to be carried out. Once all figures were defined, a further analysis showed that EPC was the best solution for this project, which consists of refurbishing half of the lighting system of the municipality.



Facts

- **Population:** 7,000 inhabitants
- **Type of streets:** municipal streets, pedestrian & cycle paths and parks
- **ESCO:** Kraftringen
- **Electricity cost savings:** 59,800 €/year
- **Reduction electricity consumption:** 491,100 kWh/year
- **CO₂ reduction:** 226 tons/year
- **Investment costs:** Around 474,300 €
- **EPC contract.** 7 years EPC contract signed with the current maintenance service provider

Further information:

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Realised project street lighting: Municipality of Torsås, Southeast Sweden

Streetlight data of the project	Before renovation	After renovation
Total installed electric capacity	143 kW	23 kW
Total number of lamps	782	782
Number of lighting points (luminaires)	1,078	1,078
Main lamp type	Fluorescent, HQL, HPS	LED
Annual electricity consumption	585,900 kWh	94,800 kWh
Annual electricity costs	68,300 Euro	8,500 Euro

Results

Implementation was started in spring 2017. As the process progresses, all old poles and lamps will be analysed. The lamps and poles will be replaced according to the need. When considered appropriate, complete units will be removed. The investment required for the refurbishment of the poles is not financed by EPC. All lamps come with a traceable digital code. When they are installed, all poles and lamps will be attributes a GPS positioning which will be very helpful in future maintenance operations.

Support by the facilitation service

The Energy Agency for Southeast Sweden introduced the municipality to the concept of EPC and supported the municipality throughout the process, especially by offering support and knowledge on technical and contractual topics. The Agency also held meetings and phone calls with the ESCO to discuss EPC and the lighting installation in Torsås.



Photos: Christel Liljegren, The Energy Agency for Southeast Sweden

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Realised project outdoor lighting: Cycling tunnels, Kalmar, Southeast Sweden

Project background and objectives

Kalmar City is located by the coast in the southeast of Sweden. It is a residential city in Kalmar County. The municipality offers beautiful nature and a living city centre. Kalmar aims to be a good walking and cycling city and to increase the practice of these activities among its residents. The city centre already has over 16 km of bike paths. However, Kalmar aims to develop an overall transportation system that is long-term sustainable, fast, environmentally friendly and efficient.

Project description

In Kalmar Municipality, there are several pedestrian and bicycle tunnels. The tunnels form important, traffic-safe passages under roads and railways. The walking and cycling tunnels are used very diligently. For example, many of them are used by schoolchildren on their way to school. During the winter, these passages are often perceived as unsafe by road users, which discourages them from using these sustainable and healthy means of transportation. There is research that shows that women in particular will make long detours if they feel insecure on the shorter route. The tunnels were equipped with old lighting infrastructure with mercury lamps causing unnecessary costs and use of energy.

The objectives of this tunnel project were to illuminate more tunnels to increase security, to phase out the use of mercury lamps and to reduce the use of energy (and thus operating and maintenance costs).



Facts

- **Population:** 64,000 inhabitants in the municipality and 48,000 inhabitants in the city centre
- **Type of installation:** walking- and cycling tunnels
- **ESCO:** Kalmar Energi and HBV
- **Electricity cost savings:** 3,300 €/year
- **Maintenance cost savings:** 1,400 €/year
- **Reduction electricity consumption:** 30,100 kWh/year
- **CO₂ reduction:** 13.8 tons/year
- **Investment costs:** 295,200 €

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Realised project outdoor lighting: Cycling tunnels, Kalmar, Southeast Sweden

Streetlight data of the project	Before renovation	After renovation
Total installed electric capacity	8 kW	0.9 kW
Total number of lamps	58 in 7 tunnels	54 in 15 tunnels
Number of lighting points (luminaires)	58	54
Main lamp type	Mercury	LED
Annual electricity consumption	33,900 kWh	3,800 kWh
Annual electricity costs	3,700 Euro	400 Euro

Results

Tunnels are an important part of the infrastructure in Kalmar for achieving sustainable transportation. By having tunnels with adapted lighting, more people will walk and cycle and overall security for their citizens will be increased. With this project, the municipality was able to reduce energy consumption to 10 % of the origin amount while illuminating 8 new tunnels that previously unlit.

Support by the facilitation service

The municipality of Kalmar is renovating its lighting system step by step. The facilitation service has supported the development of the new procurement approach and steering documents that will be used for future phases of refurbishment work. The facilitation service also helped the municipality increase its understanding of Life Cycle Costs, Energy Performance Contracting, LED technology as well as for defining criteria for energy efficiency procurement.



Photos: Håkan Olofsson, Kalmar Municipality

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Municipality Demir Kapija, Macedonia

Street lighting project

Project background and objectives

Demir Kapija is a pristine municipality located by the Vardar River in the southern part of Macedonia. It is known for its production of red peppers and tobacco and for its vineyards and long tradition of wine making and wine tourism. It consists of a small town and 7 villages.

The public lighting system in the municipality was in crucial need of refurbishment: the installation was beyond its operational life, many light posts were without lamps and several sections of the towns and villages had no street lighting at all. The municipal council of Demir Kapija voted unanimously to make the refurbishment of the street lighting system a priority. The main objective was to improve the condition of the street lighting system and the security and well-being of the citizens. The project also contributes to the municipality's plan to bring a contemporary look to this part of the country.

Project description

The project includes reconstruction and expansion of the existing street lighting system and additional analysis of the rural communities adjacent to Demir Kapija. The decision was taken to replace the inefficient high pressure sodium lamps with LED technology to achieve high electricity savings. The project was financed by a supplier and equipment provider from the private sector. Competitive public tendering was used to select the company. Criteria for the tender included: at least 60 % less electricity consumption, reduction of maintenance costs, and long lifespan of the installation and lamps. A five year contract was signed between the parties. Implementation started in 2016.



Facts

- **Population:** 4,550 inhabitants
- **Type of streets:** Urban and non-urban
- **ESCO:** Eltra
- **Electricity cost savings:** 17,600 €/year
- **Maintenance cost savings:** 5,000 € for the first 5 years (ESCO in charge of maintenance), 2,000 €/ year afterwards
- **Reduction electricity consumption:** 163,500 kWh/year
- **CO₂ reduction:** 75 tons/year
- **Investment costs:** 308,800 €
- **EPC contract:** 5 years (the municipality will reimburse the supplier with monthly payments)

Further information:

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Municipality Demir Kapija, Macedonia

Street lighting project

Project data	Before renovation	After renovation
Total installed electric capacity	59 kW	33 kW
Total number of lamps	429	753
Number of lighting points (luminaires)	378	753
Main lamp type	HPS	LED
Annual electricity consumption	294,300 kWh	130,800 kWh
Annual electricity costs	31,600 Euro	14,000 Euro

Results

The municipality was going to implement the project with their own funds and a loan. Finally, the introduction of the Energy Performance Contracting model provided the municipality with a new tool and way of financing the project. The project was only possible after having increased trust between the local provider and the municipality. The competitive tendering process led to a contract that guarantees energy savings for the municipality. Although the lighting system was greatly expanded (number of luminaires was doubled), annual electricity costs were reduced by more than 50 %. The supplier is in charge of the installation and full maintenance for 5 years, during which the municipality will reimburse the supplier through monthly payments. This project, which permits to increase the quality of living of the citizens, improve the image of the area and achieve cost savings for the municipality, could be easily replicated by other urban-rural municipalities throughout Macedonia.

Support by the facilitation service

The facilitation service contributed significant support on technical, financial and contractual aspects such as street lighting system design, cost-benefit analysis, and increasing understanding of the Energy Performance Contracting model. Without the support and contribution from the facilitation service and the experts from the city of Skopje, the project would not have been implemented under this form.



Photos: Centar za Energetska Efikasnost na Makedonija

Municipality of Ribaforada, North/Central Spain

Street lighting project

Project background and objectives

Ribaforada is a municipality located in the province of Navarre in northern Spain. The municipality was interested in providing quality street lighting with LED technology. An increase in experienced companies in this field led the municipal council to move forward with the refurbishment of the public lighting system.

Project description

The municipality's aim was to improve the lighting system (installations and illumination) while achieving maximum energy efficiency and minimum maintenance costs. The EPC model was determined to be the most suitable option for the implementation of this project. An open tender was published and ESCOs were invited to submit their offers.

In 2015, a 14-year EPC contract was signed with the ESCO Rios Renovables. The contract includes the renovation of the street lighting system, energy management services, the payments for consumed electricity, preventive maintenance work according to regulations and a full guarantee on the infrastructure.

The refurbishment project has led to a significant reduction of the overall costs of the street lighting system. Electricity and maintenance costs are reduced due to the use of energy efficient and low-maintenance LED technology. Lighting management measures such as dimming allow additional energy savings.



Facts

- **Population:** 3,690 inhabitants
- **Type of streets:** 85 % residential and 15 % roads
- **ESCO:** Rios Renovables
- **Electricity cost savings:** 41,550 €/year
- **Maintenance cost savings:** 7,000 €/year
- **Reduction electricity consumption:** 548,000 kWh/year
- **CO₂ reduction:** 252 tons/year
- **Investment costs:**
 - 300,000€ (total investment)
- **EPC contract duration:** 14 years

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Municipality of Riberaforada, North/Central Spain

Street lighting project

Project data	Before renovation	After renovation
Total installed electric capacity	132 kW	52 kW
Total number of lamps	871	903
Number of lighting points (luminaires)	871	903
Annual electricity consumption	691,000 kWh	143,000 kWh
Annual electricity costs	57,350 Euro	15,800 Euro
Annual maintenance costs	13,000 Euro	6,000 Euro

Results

The municipality wanted to renovate the entire streetlight and start getting benefits by 2016 at the latest. This was made possible by working with an ESCO that has wide experience with renewables and streetlight projects. Due to the company's expertise, the refurbishment took less time than if the municipality had done it themselves. Through the combination of LED technology and regulating techniques such as dimming, almost 80 % energy savings were achieved. The project benefited from the very positive collaboration between the ESCO and the local administration. Both parties agreed on a 14-year contract duration as the most suitable option in their specific situation. The municipality is satisfied with the implementation process and outcome of the project and is pleased with the quality of the lighting.

Support by the facilitation service

The facilitation service supported the municipality and ESCO in the evaluation of the feasibility of the project, lighting system advice and overall project quality. It offered feedback and guidance on technical and financing issues and on specific questions about the EPC contract. The quality of the streetlights, citizens benefiting from a better street lighting service and the reduction in costs for the municipality were key discussion topics during the project.



Photos: Escan

Municipality of Cabanillas, North/Central Spain

Street lighting project

Project background and objectives

The municipality of Cabanillas, located in the province of Navarre, decided to evaluate the feasibility and benefit of refurbishing its public lighting system. The main targets were to improve the physical state and energy efficiency of the lighting system while maintaining or even increasing the quality of the service.

Project description

Several approaches for the procurement, installation and financing of the project were analysed. The energy performance contracting model (EPC) was selected as most suitable for this situation. The selection of the ESCO was preceded by a public tender. The main criteria for the tender were the renovation and improvement of the outdoor lighting installations with maximum energy efficiency and reduction of maintenance costs. The submission from the ESCO Rios Renovables was considered the most beneficial option for the municipality and its citizens.

A 14-year EPC contract was signed and includes the energy management, payment of the energy supply, preventive maintenance and full guarantee on the infrastructure. A combination of LED technology and lighting regulation techniques permitted to achieve over 70 % energy savings and a significant reduction in maintenance costs.



Facts

- **Population:** 860 inhabitants
- **Type of streets:** 80 % residential and 20 % roads
- **ESCO:** Rios Renovables
- **Electricity cost savings:** 21,300 €/year
- **Maintenance cost savings:** 4,000 €/year
- **Reduction electricity consumption:** 249,100 kWh/year
- **CO₂ reduction:** 115 tons/year
- **Investment costs:** 170,000 €
- **EPC contract duration:** 14 years

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Municipality of Cabanillas, North/Central Spain

Street lighting project

Project data	Before renovation	After renovation
Total installed electric capacity	87 kW	29 kW
Total number of lamps	450	440
Number of lighting points (luminaires)	450	440
Annual electricity consumption	343,850 kWh	94,750 kWh
Annual electricity costs	27,900 Euro	6,600 Euro
Annual maintenance costs	7,500 Euro	3,500 Euro

Results

The municipality wished to renovate the overall street lighting system in order to start getting benefits before the end of 2015. The municipality considered it crucial to contract an experienced ESCO with many references in streetlight energy efficiency and renewable energy projects. One of the benefits gained by the municipality by using the EPC model was the reduction in the timetable for the overall installation of the new system. The entire project has benefitted from the close cooperation between the ESCO and the municipality. Both parties agreed on a 14-year contract duration as the most suitable option in their specific situation. The municipality is satisfied with the implementation and project outcome as well as the lighting quality.

Support by the facilitation service

The facilitation service supported the municipality and ESCO in several steps of the project: providing advice and information on the project's feasibility and the quality of streetlight technologies. It offered feedback on technical and financing issues and on the development of the EPC contract. The quality of the streetlights, providing the citizens with an improved street lighting service and reducing costs for the municipality in the coming years were defined as key aspects of the project.



Photos: Escan

City of Santander, North/Central Spain

Street lighting project

Project background and objectives

The port city of Santander is located on the north coast of Spain. In recent years, the city of Santander has moved into the vanguard of smart cities: improving public services, developing policies oriented towards its citizens, and stimulating a new business model of productivity for the city. Integrated management allows an improvement in the efficiency and coordination of all the municipal services as well as a reduction of costs through the use of the technology.

Project description

The city undertook the ambitious project of converting the entire public lighting system - almost 23,000 lamps - to LED technology using EPC. The goals were to increase the energy efficiency of the lighting system, adapt lighting levels to traffic density and street parameters (without compromising street safety), and, overall, improve the quality of life of citizens and visitors.

An elaborate energy audit of the streetlight infrastructure was conducted. Improvement measures were identified and a Streetlight Director Plan was developed. The ESCO was selected through public tender. Criteria for the tender included, among others, improvement and maintenance of the system by the ESCO, at least 65 % guaranteed energy savings and warrantee of the infrastructure. When evaluating the bids, the economic aspects were analysed only if the technical requirements were fulfilled.

The contract was awarded in 2016. Energy savings of 80 % are foreseen and will be achieved by combining new LED technology and intricate control systems.



Facts

- **Population:** 175,000 inhabitants
- **Type of streets:** 90 % residential and 10 % roads
- **ESCO:** Elecnor
- **Electricity cost savings:** 1,500,000 €/year
- **Maintenance cost savings:** 300,000 €/year
- **Reduction electricity consumption:** 17,100,000 kWh/year
- **CO₂ reduction:** 7,866 tons/year
- **Investment costs:** 11,000,000 €
- **ESCO contract duration:** 15 years

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City of Santander, North/Central Spain

Street lighting project

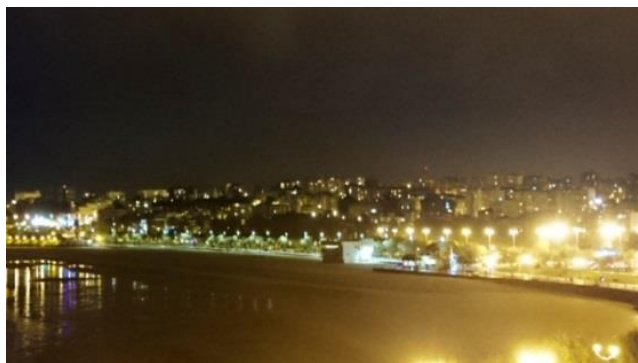
Project data	Before renovation	After renovation
Total installed electric capacity	4,509 kW	2,166 kW
Total number of lamps	22,915	22,842
Number of lighting points (luminaires)	22,700	22,700
Annual electricity consumption	21,400,000 kWh	4,300,000 kWh
Annual electricity costs	2,100,000 Euro	600,000 Euro
Annual maintenance costs	1,000,000 Euro	700,000 Euro

Results

This is one of the largest streetlight EPC projects in Spain and places Santander at the forefront of cities with large-scale energy efficient public lighting. Due to the size of the project, the overall process from the initial ideas to the signing of the EPC contract took 3 years. A 15-year contract was signed with Elecnor, an experienced ESCO in street lighting projects. 80 % energy savings will be achieved through the combination of LED technology and modern control systems that permit, for example, to dim the lighting or reduce operational hours. This project serves as a showcase example of streetlight refurbishment and will hopefully inspire other cities to follow suit.

Support by the facilitation service

The facilitation service supported the city in evaluating the feasibility of the project, conducting the viability analysis and assuring the overall quality of the project. Throughout the project, it also offered advice and guidance on technical and financial aspects, particularly regarding EPC contracting.



Before renovation



After renovation

Photos: Ayuntamiento de Santander, Escan

Lupa company, North/Central Spain

Indoor lighting project

Project background and objectives

Lupa distributes and sells food, mainly to smaller supermarkets. Environmental awareness has become more than a trend. Companies that want to gain the approval of consumers and governments have to take environmental sustainability into account and seek balance between efficiency, society's demands and nature.

Lupa realises the importance of these topics and actively contributes to sustainable development through actions that ensure environmental protection and promote social values.

Project description

In 2015, the company decided to perform an energy audit and seek professional advice on how to improve its energy efficiency. A focus was put on analysing the lighting system and monitoring the company's most significant energy needs. The technical, economic and financial aspects of lighting refurbishment were analysed in detail.

Lupa decided to convert the lighting system in its warehouse to energy-efficient LED technology using EPC. Quality criteria considered in the tendering process were: the quality of the lighting for the employees (including the level of lighting in the work plane and the absence of glare), the level of energy savings and the conditions of the warrantee offered by the manufacturer.



Facts

- **Company name:** Lupa
- **Type of lighting:** indoor lighting in a warehouse
- **ESCO:** Rios Renovables
- **Electricity cost savings:** 24,000 €/year
- **Maintenance cost savings:** 5,700 €/year
- **Reduction electricity consumption:** 370,000 kWh/year
- **CO₂ reduction:** 170 tons/year
- **Investment costs:** 95,000 €
- **EPC contract duration:** 4 years

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Lupa company, North/Central Spain

Indoor lighting project

Project data	Before renovation	After renovation
Total installed electric capacity	75 kW	23 kW
Total number of lamps	339	239
Number of lighting points (luminaires)	339	239
Annual electricity consumption	530,000 kWh	160,000 kWh
Annual electricity costs	35,000 Euro	11,000 Euro
Annual maintenance costs	6,000 Euro	300 Euro

Results

The project has resulted in high quality lighting for the employees. Lighting levels were improved and glare was reduced while achieving significant electricity and maintenance cost savings. The ESCO, Rios Renovables, has completed all project steps with success. The new system has been operational since 2015.

Support by the facilitation service

The facilitation service was contacted in the context of the Streetlight-EPC project. It supported the ESCO in evaluating the feasibility of the project and performing the viability analysis. The facilitation service provided technical support in evaluating the savings potential of converting to LED technology. It also participated in disseminating the positive impacts of the project. Feedback and guidance on technical and financing issues was offered throughout the process, particularly regarding the EPC model.



Photos: Escan

Transformados Ruiz, North/Central Spain

Indoor lighting project

Project background and objectives

Transformados Ruiz is a metal processing company specialised in stainless steel products. In its production hall in the region of Navarra, Spain, latest technology is employed to achieve the high quality cuts for both large serial production and the manufacturing of single prototypes. This level of precision work requires extremely good lighting.

Quality, service and teamwork are among the company's highest values. Special attention is also brought to sustainability and energy efficiency matters.

Project description

The company sought advice on the possibility of improving the lighting conditions in the production hall by converting to modern LEDs. Following an energy audit, it was decided to proceed with the refurbishment using EPC with guaranteed every savings.

A holistic approach to optimising the lighting system was employed throughout the refurbishment project. Technical, economic, financial and environmental aspects were considered. Criteria in selecting an ESCO included the quality of the lighting for the employees (e.g. illumination in the work plane and absence of glare), the overall payback time and the manufacturer's warranty on the equipment.

The refurbishment took place in 2015. Part of investment was financed by EPC. The rest was covered by a deposit from the company.



Facts

- **Company name:** Transformados Ruiz
- **Type of lighting:** Indoor lighting in a production hall
- **ESCO:** Rios Renovables
- **Electricity cost savings:** 6,300 €/year
- **Maintenance cost savings:** 500 €/year
- **Reduction electricity consumption:** 62,000 kWh/year
- **CO₂ reduction:** 28.5 tons/year
- **Investment costs:** 41,000 €
 - 41,000 € (total investment; partly financed by EPC project)
- **EPC contract duration:** 5 years

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Transformados Ruiz, North/Central Spain

Indoor lighting project

Project data	Before renovation	After renovation
Total installed electric capacity	32 kW	13 kW
Total number of lamps	72	72
Number of lighting points (luminaires)	72	72
Annual electricity consumption	85,000 kWh	23,000 kWh
Annual electricity costs	8,700 Euro	2,400 Euro
Annual maintenance costs	600 Euro	100 Euro

Results

In this industrial sector, high-precision manufacturing requires excellent lighting in the production halls. For this reason, in the tendering process, high priority was attributed to achieving a high quality lighting system for the workers. The economic aspects (investment cost and energy savings) of the applications were only considered if the technical criteria were achieved. The new lighting system has been operational since the end of 2015 and the ESCO has completed all project steps successfully. Due to dimming of the LEDs, additional energy savings are achieved.

Support by the facilitation service

The facilitation service supported the ESCO with the feasibility and viability analyses and provided technical support for evaluating the energy savings potential of LEDs. Feedback and guidance on technical and contractual aspects were offered throughout the project, especially to better the understanding of the lighting-EPC model. The facilitation service also helped disseminate the project results.



Photos: Escan