



The Streetlight-EPC Project

Triggering the market uptake of
Energy Performance Contracting
through street lighting refurbishment

Despite the great potential, most European regions have not yet seen a significant development of Energy Performance Contracting (EPC) markets.

Due to its lower technical and economic complexity, street lighting is a good "learning and testing ground" for EPC.

The project "Streetlight-EPC", funded by the Intelligent Energy Europe Programme, creates demand and supply for Energy Performance Contracting projects in 9 European regions by providing regional EPC facilitation services and supporting projects towards implementation.

In the frame of Streetlight-EPC, 30 projects have already been implemented using a variety of EPC models and 10 more with other financing or operational models. In total, 20.4 million Euro have been invested so far.

This publication presents 24 of these projects (17 street lighting and 7 indoor lighting) as well as the project approach, key lessons learnt and conclusions.



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



Energy Performance Contracting (EPC) and street lighting

Energy efficiency improvement measures, such as street lighting refurbishment with LEDs, often require significant upfront investments. This is a major barrier for most municipalities in Europe. In many cases, Energy Performance Contracting (EPC) can offer a solution to overcome this obstacle. EPC works best where technologies with short payback times are available.

Energy Performance Contracting is a contractual arrangement between a client (e.g. a municipality) and a service provider, a so-called "Energy Service Company" (ESCO). Typically, the ESCO finances and implements energy efficiency investments, for example the refurbishment of a street lighting system to LED technology. The ESCO guarantees the energy savings in the EPC contract. The annual cost savings are then used to cover the investment and capital costs. After the end of the contract, the client benefits from energy and cost savings.

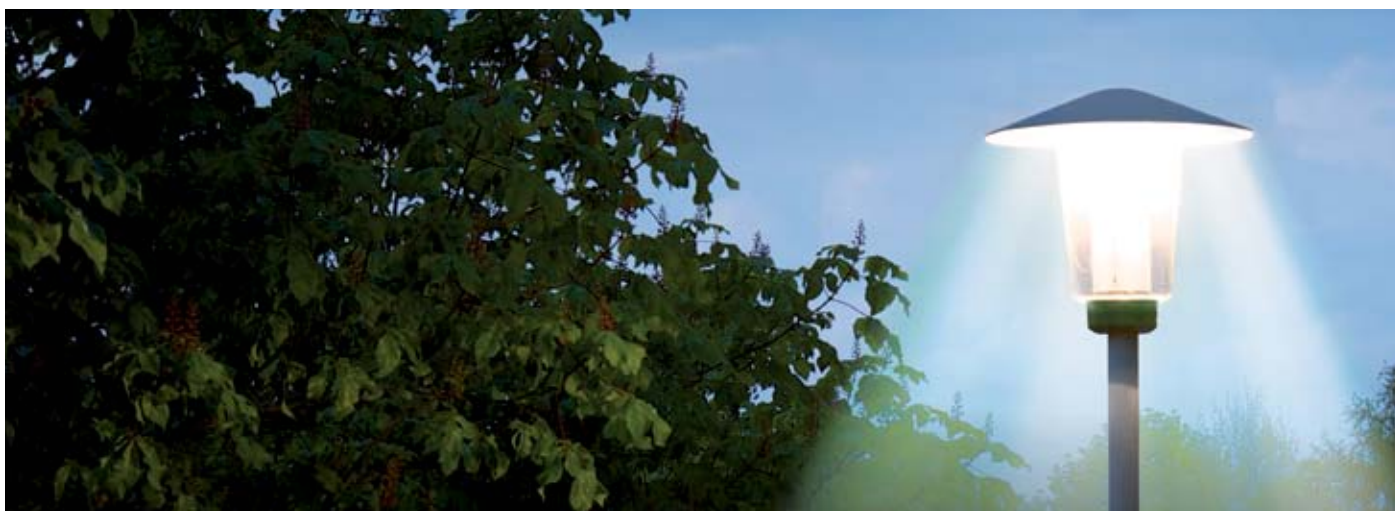
The EPC model can take many forms, making it adaptable to a variety of specific country contexts. Core elements that distinguish EPC from other types of financing schemes are contractually guaranteed energy savings and consequences for the ESCO if these are not achieved.

Street lighting is an important contributor to traffic and public safety. However, assuring good visibility during hours of darkness also requires a substantial amount of electricity and money. For municipalities with older, inefficient systems, street lighting can account for 30-50 % of their total electricity consumption.

Additionally, municipalities are faced with an urgent need to act: nearly 80 % of all street lighting lamps are being "phased out" and will no longer be available for purchase as of 2017.

LED technology has developed very rapidly over the past years. In many cases, it is now an economically very interesting option for street lighting refurbishment, offering high savings with comparatively short payback times. In many municipalities, energy savings potentials reach 30-70 %. However, these benefits can only be reaped if the whole system is well planned.

Due to its comparatively lower technical and economic complexity, street lighting is a good "learning and testing ground" for EPC in those markets where EPC is not yet well established and for new ESCOs entering the EPC market.



The Streetlight-EPC Project

The Streetlight-EPC Project aims at triggering the market uptake of Energy Performance Contracting through street lighting refurbishment projects. This IEE-funded project runs from April 2014 to March 2017. 9 regional EPC facilitation services were established to trigger EPC market development. These services provide comprehensive support to municipalities and ESCOs. Coordinated by the OÖ Energiesparverband, the project team includes 9 regional agencies/organisations, which provide the EPC facilitation services, 9 municipalities and a European network. The 9 regions involved cover over 4,000 municipalities.

| Region | Regional partner | City/county partner |
|----------------------------------|--|----------------------|
| Upper Austria | OÖ Energiesparverband (ESV) | City of Wels |
| North-West Croatia | Regionalna energetska agencija Sjeverozapadne Hrvatske (REGEA) | Zagreb County |
| South Bohemia/Czech Republic | Energy Centre České Budějovice (ECČB) | City of Trhové Sviny |
| Pomerania/Poland | Bałtycka Agencja Poszanowania Energii (BAPE) | City of Gdansk |
| Carlow & Kilkenny County/Ireland | Carlow Kilkenny Energy Agency (CKEA) | Kilkenny County |
| South East Sweden | Energikontor Sydost (ESS) | City of Kalmar |
| Podravje/Slovenia | Energetska agencija za Podravje (ENERGAP) | City of Maribor |
| Macedonia | Centar za energetska efikasnost na Makedonija (MACEF) | City of Skopje |
| North & Central Spain | ESCAN | City of Santander |

Further information and contact details are available on the project website: www.streetlight-epc.eu

Results achieved so far by the regional facilitation services

Facilitation Services were set up in 9 regions in 2014 and have been strongly active in the development of regional EPC markets. The activities of the Streetlight-EPC project have had significant impact so far.

The Facilitation Services have provided support to 75 promising projects and concrete project implementation. 50 street lighting projects and 25 indoor and other lighting projects have been assisted so far.

30 projects have already been implemented using a variety of EPC models. 10 more projects were implemented with other financing or operational models. In total, 20.4 million Euro have been invested. These results demonstrate that facilitation is greatly effective for the development of EPC markets.

Support to market development:

- 52 events held with over 1,500 participants
- 163 quick-checks completed
- over 380 enquiries answered and documented
- more than 255 "FAQs" available
- 51 bi-lateral meetings held with financing bodies
- Support to 75 promising projects and concrete project implementation
 - 50 street lighting projects
 - 25 indoor and other lighting projects
- 30 projects already implemented using a variety of EPC models! 10 more projects implemented with other financing or operational models
- 20.4 million Euro invested so far

(by 31.12.2016)

EPC Facilitation Services

The Streetlight-EPC project creates demand and supply for EPC projects in 9 regions by setting up regional EPC facilitation services. These services provide comprehensive support to both municipalities and SMEs as potential ESCOs by offering, among others, useful tools (quick-checks, guides), running an enquiry service, holding regional events and assisting project development and implementation. As a core activity, the project partners perform real-life procurement of more than 30 lighting refurbishment projects. This creates knowledge and trust in the EPC model. Besides street lighting projects, the learning is also extended to indoor lighting applications.

The facilitation services focus on delivering information and specific support to EPC clients (public and private organisations), (potential) ESCOs and other financing bodies. Working closely with individual clients and ESCOs helps to increase know-how and trust in the EPC model. The presence of a regional facilitation service has shown to be a crucial factor in the positive development of EPC markets. By supporting the development of first EPC projects, facilitation services contribute to setting a basis for future EPC market development.

A strategic approach to facilitation

In each of the project regions, the economic, regulatory and institutional contexts were taken into account to determine the specific needs for EPC market development. A strategic approach was adopted in setting up the facilitation services to maximise the positive impact of the services offered.

Step 1: Increasing internal know-how and preparing tools

- analysis of the current regional situation (challenges and opportunities for the development of the EPC market)
- meetings with financing organisations
- developing tools (quick-checks, guides and FAQs on streetlight-EPC)

Step 2: Identifying and reaching out to potential projects

- holding information events for various target groups, increasing interest and connecting actors and stakeholders
- working with banks and financing organisations to increase the understanding of the EPC model
- distributing the tools to relevant stakeholders
- organising bi-lateral meetings with potential clients or ESCOs
- initial assessment of technical and economic viability of potential projects (e.g. completing and analysing quick-checks)
- identifying the most promising projects

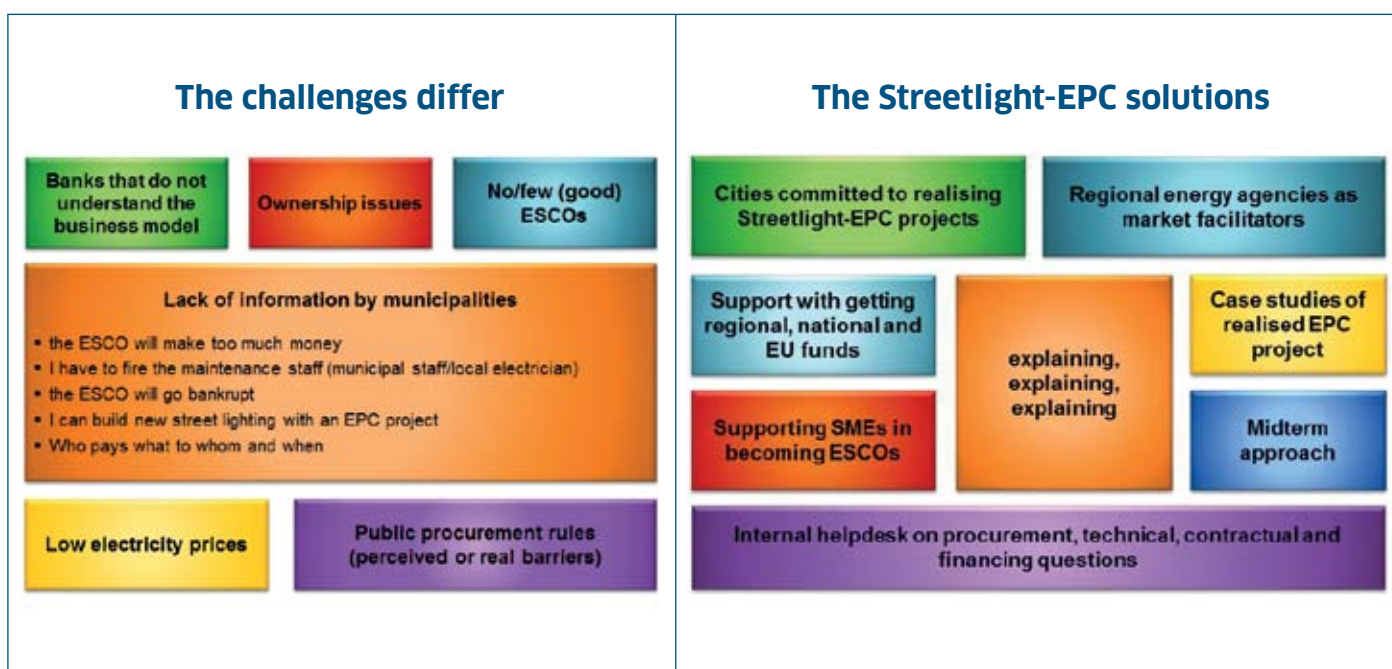
Step 3: Supporting municipalities and (potential) ESCOs in project development and implementation

- advice on technical, financial and regulatory aspects of EPC
- support in project audits
- guidance on procurement rules, contractual and technical issues

Developing tailor-made solutions for each region

The economic, regulatory and institutional contexts of each region differ and generate their own set of challenges. Some challenges observed in the context of the Streetlight-EPC project include the lack of ESCOs, ownership issues, and specific procurement rules.

For example, in some regions, municipalities were interested in EPC and ready to act, but there were no qualified ESCOs on the market. In other regions, it was the other way around: companies were willing to offer ESCO services but municipalities did not yet trust the EPC model. A series of solutions were developed to respond to the variety of challenges encountered.



Key lessons learnt

Experience gathered throughout the Streetlight-EPC project has led to key lessons learnt regarding the development of EPC Facilitation Services and the development of EPC markets.

- **EPC: high interest, low knowledge**

Many stakeholders are very interested in the instrument of EPC. However, significant knowledge gaps on technical and economic aspects exist. Also, prejudices (e.g. "using an ESCO will increase project costs due to the ESCO's profit", "ESCO solutions threaten local jobs") often need to be proactively overcome by a trusted information source. In some countries, this includes also the challenge of integrating EPC in existing funding programmes and not forcing municipalities to choose between either of them.

- **EPC can take many forms**

EPC is a flexible model that can take a large variety of forms. This permits it to be adapted to specific legal, economic and social contexts of each region and project. The core aspects are the presence of contractually guaranteed savings and financial consequences for the ESCO if these are not achieved.

- **Different regions, different challenges**

Different regions and countries face different challenges regarding the development of the EPC market. Depending on the region, hindering aspects can include, e.g. the lack of ESCOs, ownership issues, and specific procurement rules. Many of these challenges can be overcome through facilitation and finding a suitable EPC model, others cannot and require intervention from the political or legislative level.

- **Know-how and trust: key elements for EPC market development**

The ESCO requires expert knowledge in technical, contractual and financial aspects. The client must trust the EPC model and the ESCO.

- **Developing EPC facilitation services**

- It is essential to build up very deep technical, financial and contractual know-how within the organisation
- A successful approach has been to work very closely with individual municipalities, taking them "by the hand" and guiding them through the project steps.
- There is often a minimum investment threshold for a project to be economically viable due to transaction costs. Pooling projects can be a solution to raise the investment level. However, small and not too complex projects are good for new ESCOs and encourage the participation of SMEs in the ESCO market.
- A "quality approach" is best (fewer, but good quality and convincing projects)

- **Good technical project preparation is key**

The right approach in project preparation is key for the success of the project: It is crucial to have a meaningful and accurate inventory of the existing system (while at the same time not so detailed that the costs become prohibitive) as well as a good-quality audit to determine reliable numbers on saving potentials.

- **LED: offers choice, requires knowing your needs**

LED solutions are proven technologies that are suitable for very small and very large projects and that permit high energy savings at high lighting comfort. However, due to their wide-ranging possibilities and the fact that street lighting directly affects citizens and the local business community, determining the optimal solution for different location requires understanding the specific needs and priorities. For example, quality issues such as glare or light colours play an important role in citizen acceptance. Using high quality lamps is greatly recommended.

A variety of EPC financing models

A joint understanding of EPC has been developed by partners in the course of the Streetlight-EPC project. This results from the variety of supported projects in 9 regions. According to this joint understanding, a few core elements distinguish EPC from other financing schemes. These are:

- Contractually guaranteed energy savings
Through the analysis of the existing installation and the design of the new system, a level of energy savings that will be achieved is defined, agreed upon by the client and ESCO and is included in the EPC contract.
- Financial consequences for the ESCO if the guaranteed savings are not achieved. Such consequences can take many different forms, e.g.:
 - Withholding or reduction of the payment to the ESCO according to level of achieved savings.
 - A bank guarantee can be set up, enabling the client to draw this guarantee if the agreed savings are not achieved.
 - Retention of a percentage of the payment for the refurbishment work until an assessment shows the savings have been achieved over time.
 - The ESCO is required to adjust or replace the equipment until the savings are achieved.

Other aspects can vary greatly from one project to another. They are defined in the EPC contract, such as:

- How big the project is: EPC has been successfully used for both rather small and very big projects
- Split of tasks: Who performs the audit, designs the system, conducts the refurbishment work, looks after the maintenance of the system after installation, etc.
- How the investment is financed: Whether the project is completely or partly financed by EPC
- Whether maintenance cost savings are included or not in the contract
- How the ESCO's fee is calculated and the billing schedule (frequency and size of payments)
- How to take into account changes in energy prices in time
- Who benefits from "extra" energy savings, if savings are higher than expected
- The duration of the contract
- Ownership issues after the end of the contract
- Provisions in case of bankruptcy of a contracting party



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

Further information:

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



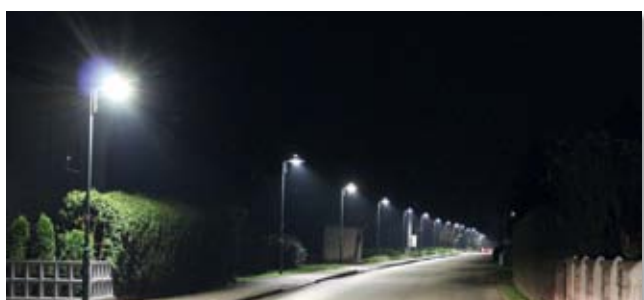
| Project data | Before renovation | After renovation |
|--|-------------------|------------------|
| Total installed electric capacity | 58 kW | 28 kW |
| Total number of lamps | 971 | 725 |
| Number of lighting points (luminaires) | 727 | 725 |
| Main lamp type | HQL | LED |
| Annual electricity consumption | 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.



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

Further information:

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



| 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.



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:

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





Austria

| 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.



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

Further information:

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



Austria

| 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

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:

North-West Croatia Regional Energy Agency
HR-10 000 Zagreb, Ulica Andrije Zaje 10
Telephone: +385-1-3098-315
E-mail: info@regea.org
Web: www.regea.org



| 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.



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:

North-West Croatia Regional Energy Agency
10 000 Zagreb, Ulica Andrije Zaje 10
Telephone: +385-1-3098-315
E-mail: info@regea.org
Web: www.regea.org





Croatia

| 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.



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)

Further information:

Carlow Kilkenny Energy Agency
Unit F06 Burrell Hall, St. Kieran's College
Kilkenny, Ireland
Telephone: +353-56-7790856
E-mail: dkeogh@ckea.ie



Carlow Kilkenny Energy Agency
driving sustainability



Ireland

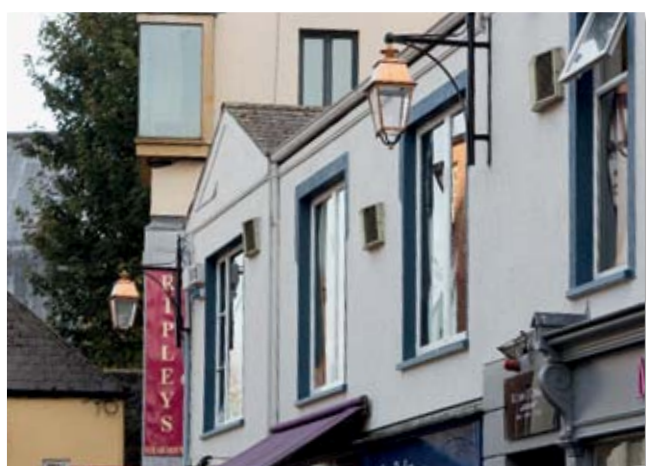
| Project Data | Before renovation | After renovation |
|--|-------------------|------------------|
| Total installed electric capacity | 6.6 kW | 3 kW |
| Total number of lamps | 59 | 59 |
| Number of lighting points (luminaires) | 59 | 59 |
| Annual electricity consumption | 27,700 kWh | 12,100 kWh |
| 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.



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:

MACEF – Macedonian Center for Energy Efficiency
MK-1000 Skopje, Nikola Parapunov 31-local 52
Telephone: +389-2 3090 178
E-mail: macef@macef.org.mk



Macedonia (FYROM)

| 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.



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:

Baltic Energy Conservation Agency
PL-80298 Gdansk, Budowlanych 31
Telephone: +48-347-55-35
E-mail: bape@bape.com.pl



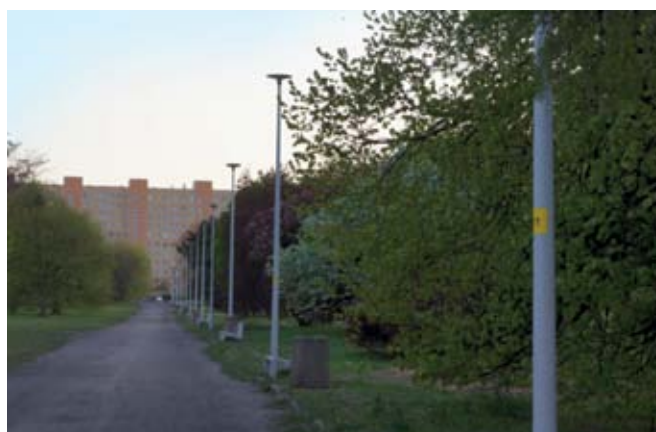
| Project data | Before renovation | After renovation |
|--|-------------------|------------------|
| Total installed electric capacity | 1.68 kW | 1.32 kW |
| Total number of lamps | 24 | 25 |
| Number of lighting points (luminaires) | 24 | 25 |
| Main lamp type | HPS | LED |
| Annual electricity consumption | 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.



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

Further information:

Municipality of Gdansk
PL-80803, Street, Nowe Ogrody 8/12
Telephone: +48 58 526 80 24
E-mail: joanna.zbierska@gdansk.gda.pl





Poland

| 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.



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

Further information:

Municipality of Gdańsk
PL-80803 Gdansk, Nowe Ogrody 8/12
Telephone: +48-58 526 80 24
E-mail: joanna.zbierska@gdansk.gda.pl



| 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.



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

Further information:

Escan
E-28029 Madrid, Ferrol 14
Telephone: +34-91-323-2643
E-mail: escan@escansa.com



Spain

| 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

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

Further information:

Escan
E-28029 Madrid, Ferrol 14
Telephone: +34-91-323-2643
E-mail: escan@escansa.com



Spain

| 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.



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

Further information:

Escan
E-28029 Madrid, Ferrol 14
Telephone: +34-91-323-2643
E-mail: escan@escansa.com



Spain

| 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.



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 €

Further information:

Municipality of Kalmar
S-391 26 Kalmar, Östra Sjögatan 18
Telephone: +46-480-450 000
E-mail: kommun@kalmar.se

The Energy Agency for Southeast Sweden
Telephone: +46-470-76 55 60
E-mail: info@energikontorsydost.se



Kalmar kommun
WWW.KALMAR.SE



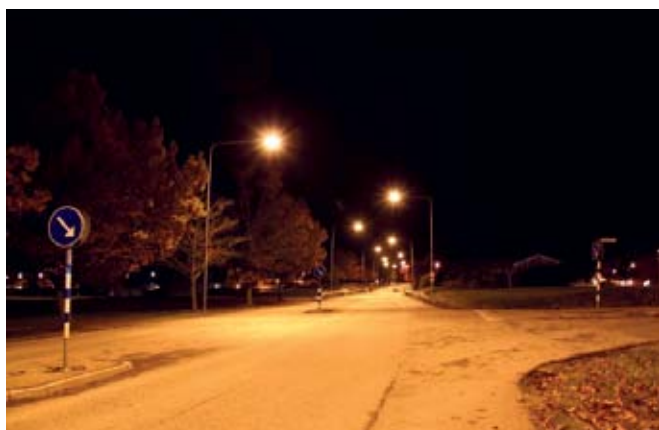
| Project data | Before renovation | After renovation |
|--|-------------------|------------------|
| Total installed electric capacity | 6.4 kW | 1.3 kW |
| Total number of lamps | 39 | 39 |
| Number of lighting points (luminaires) | 39 | 39 |
| Main lamp type | HPS | LED |
| Annual electricity consumption | 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.



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 €

Further information:

Municipality of Kalmar
S-391 26 Kalmar, Östra Sjögatan 18
Telephone: +46-480-450 000
E-mail: kommun@kalmar.se

The Energy Agency for Southeast Sweden
Telephone: +46-470-76 55 60
E-mail: info@energikontorsydost.se



Kalmar kommun
WWW.KALMAR.SE



| 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.



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 €

Further information:

Municipality of Kalmar
S-391 26 Kalmar, Östra Sjögatan 18
Telephone: +46-480-450 000
E-mail: kommun@kalmar.se

The Energy Agency for Southeast Sweden
Telephone: +46-470-76 55 60
E-mail: info@energikontorsydost.se



Kalmar kommun
WWW.KALMAR.SE



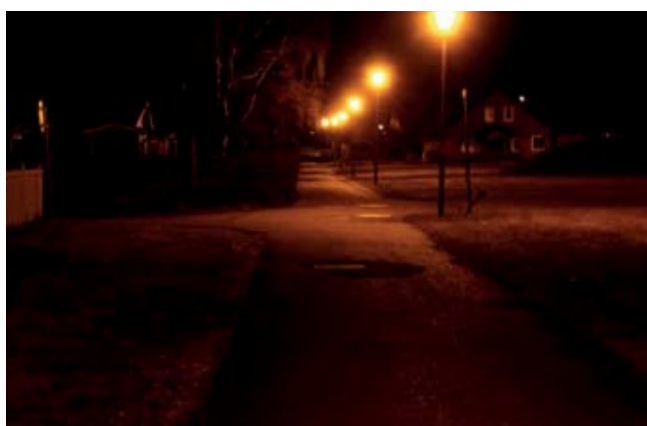
| Project data | Before renovation | After renovation |
|--|-------------------|------------------|
| Total installed electric capacity | 0.66 kW | 0.13 kW |
| Total number of lamps | 11 | 11 |
| Number of lighting points (luminaires) | 11 | 11 |
| Main lamp type | HPS | LED |
| Annual electricity consumption | 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.



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:

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





Austria

| 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



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:

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





Austria

| 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 |

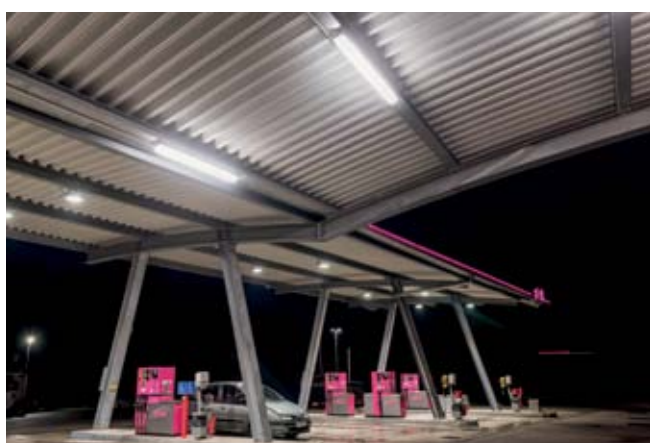
Results

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.



Tennishalle 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 withhold 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

Further information:

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



| 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



After renovation

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, Oroslavje 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:

North-West Croatia Regional Energy Agency
10 000 Zagreb, Ulica Andrije Zaje 10
Telephone: +385-1-3098-315
E-mail: info@regea.org
Web: www.regea.org



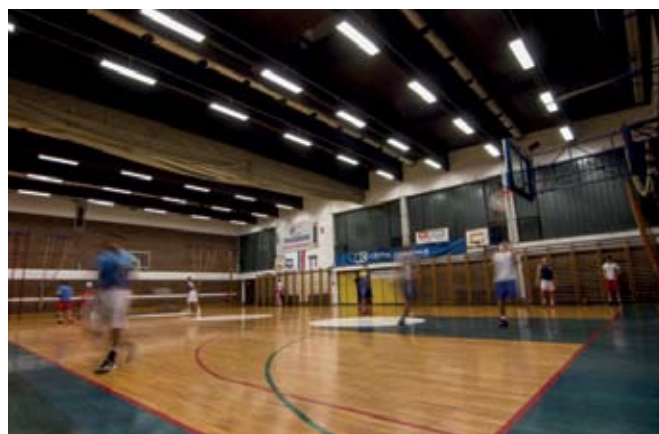
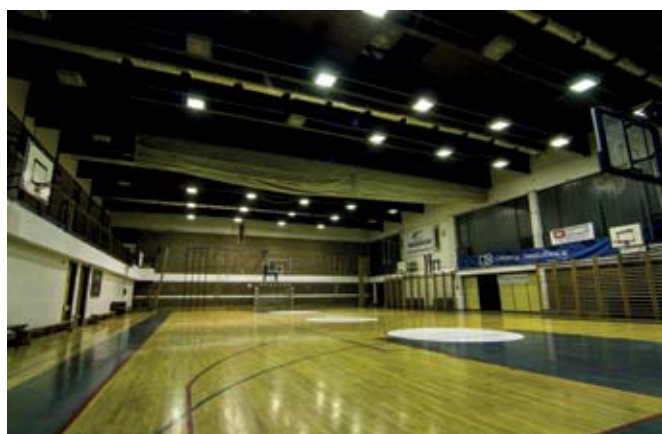
| Project data | Before renovation | After renovation |
|--|--------------------------|------------------------|
| Total installed electric capacity | 151 kW | 83 kW |
| Total number of lamps | 2,334 | 2,242 |
| Number of lighting points (luminaires) | 2,334 | 2,242 |
| Main lamp type | Incandescent 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.



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:

Carlow Kilkenny Energy Agency
Unit F06 Burrell Hall, St. Kieran's College
Kilkenny, Ireland
Telephone:: +353-56-7790856
E-mail: dkeogh@ckeaa.ie



Carlow Kilkenny Energy Agency
driving sustainability

| 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.



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 warranty 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

Further information:

Escan
E-28029 Madrid, Ferrol 14
Telephone: +34-91-323-2643
E-mail: escan@escansa.com



Spain

| 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.



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.

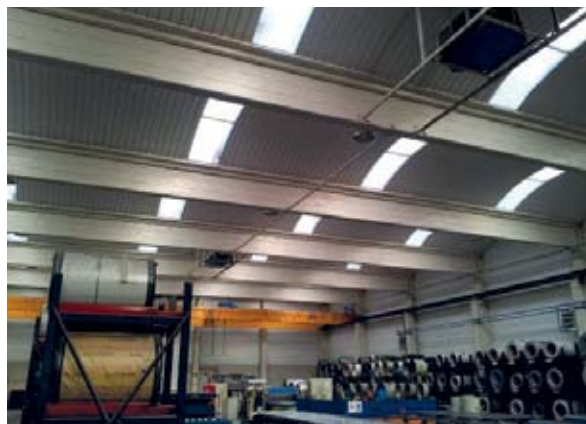
Quality, service and teamwork are among the company's highest values. Special attention is also brought to sustainability and energy efficiency matters.

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 energy 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

Further information:

Escan
E-28029 Madrid, Ferrol 14,
Telephone: +34-91-323-2643
E-mail: escan@escansa.com



Spain

| 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: Ayuntamiento de Santander, Bałtycka Agencja Poszanowania Energii, Centar za Energetska Efikasnost na Makedonija, Carlow Kilkenny Energy Agency, Energikontor Sydost, Escan, Fischer Brot, Håkan Olofsson/Kalmar Municipality, Kilkenny County Council, Marktgemeinde Bad Schallerbach, Marktgemeinde Gunskirchen, OÖ Energiesparverband, Petre Pashoev, Pixabay, Regionalna Energetska Agencija Sjeverozapadne Hrvatske, Siemens, Stadt Wels, Stadtgemeinde Rohrbach-Berg, Urząd Miejski w Gdańsku, UTC-Fischer, www.fotoclubwels.org, Zagrebačka Županija

How can the Streetlight-EPC project be useful for you?

In the context of the EU project Streetlight-EPC, an EPC (Energy Performance Contracting) facilitation service is available in 9 partner regions. Facilitation services can be contacted at the addresses below - we look forward to your questions!

This service supports municipalities and (potential) ESCOs in preparing and implementing streetlight refurbishment projects with EPC. Quick checks, guides, FAQs on streetlight EPC and examples of implemented projects are available in the respective languages and information events are held.

This publication presents 24 projects implemented in the frame of the Streetlight-EPC project as well as the project approach, key lessons learnt and conclusions. It strives to inspire the development and implementation of further EPC projects.

Available at www.streetlight-epc.eu in 10 languages:

- Quick checks for a first initial assessment of the suitability of EPC street lighting, parking lot and indoor lighting refurbishment
- Guide on implementing streetlight-EPC projects
- FAQs on streetlight-EPC
- Description of more than 30 implemented projects



The facilitation service in the project regions can be contacted at:

- Upper Austria (ESV): www.energiesparverband.at/gemeinden/strassenbeleuchtung
- North-West Croatia (REGEA): www.regea.org/epc
- South Bohemia (ECCB): www.eccb.cz/osvetleni-epc
- Pomerania, Poland (BAPE): www.bape.com.pl/streetlight-epc
- Carlow & Kilkenny County, Ireland (CKEA): www.ckeai.ie/streetlightepcfacilitation
- South East Sweden (ESS): www.energikontorsydost.se/energitjanster-epc
- Podravje, Slovenia (ENERGAP): www.energetskiprihranki.si
- Macedonia (MACEF): www.macef.org.mk/?p=57
- North/Central Spain (ESCAN): www.streetlight-epc.es



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