



SUSTAINABLE
ENERGY FOR
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PROGRAMME

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Exploring LED Street Lighting

Introduction

Street lighting accounts for around 24% of the energy consumed by South African municipalities and contributes 28% to the carbon emitted by municipalities in the delivery of local services. Many South African cities have effectively introduced programmes to make street lighting more efficient through replacing traditional Mercury Vapour (MV) lights with High Pressure Sodium (HPS) lights. HPS lights use as little as 50% of the power of MV lights and last up to 6000 hours longer.

Internationally cities are now beginning to investigate and implement programs to try and make public lighting more efficient by replacing traditional High Intensity Discharge (HID) lights with more energy efficient and longer lasting LED Lights. South African cities have begun to investigate the applicability and affordability of this technology in South Africa. Although lifetime costs are yet to be established, this update aims to provide cities with an overview of the technology including advantages and possible challenges. It also outlines steps which cities can take to evaluate the viability of LED street lighting.

LED Technology

LED stands for light emitting diodes and these are very small, solid state lights that are extremely efficient and robust as they do not produce much heat and do not have a fragile filament. Each LED is usually smaller than 0.5cm² so hundreds of them are used in an array to produce enough light for large applications.

Some of the benefits of LED street lights over regular street light fixtures are:

- ✳ Use 30-90% less electricity for a similar light output than HPS lights
- ✳ Have up to five times the life expectancy
- ✳ Light is controllable (dim-mable and can be instantly turned on and off)
- ✳ Light is highly directional, lighting the areas you want and not those you don't
- ✳ Contain no mercury or other hazardous materials

If the City of Cape Town had changed all of its street lighting fixtures to LED's and saved 30% on the electricity, then in 2007 they would have saved 27 million KWh of electricity, which equates to R8 640 000.00 (32c/KWh).

The greatest challenge currently is assessing the financial viability of LED street lighting. To assess this, the entire lifetime costs of both LED and HPS technologies need to be calculated and compared so that the payback times and financial viabilities can be measured. Cities could provide some valuable data on current fixtures, but some testing of LED technologies will also need to take place.

International LED Cities

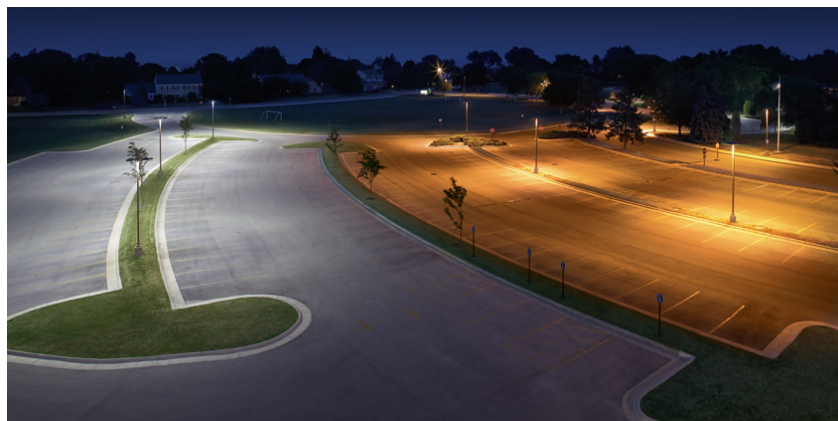
Various international cities have implemented LED street lighting pilot projects to test the real world performance of LED street lights in terms of actual energy consumption, light output and life expectancy. Many of these cities are located in the U.S.A and Canada and include; Oakland, California; Raleigh, New Carolina; Ann Arbor, Michigan; as well as Anchorage and Toronto in Canada, among others. The following summary of the project in Oakland, California is of a similar approach to many of the other cities and offers a useful model for South African cities.

Oakland, California

The city has a program where different LED fixtures are tested. Manufacturers are requested to provide technical information on their products and these fixtures are then tested in modelling software against the city's standard fixtures. Modelling of the fixtures is not essential but does provide some valuable preliminary performance data without having to purchase and test the fixtures physically. It is therefore a way to save time and money in the early stages of a project. Potentially viable fixtures are then physically tested and compared to regular HPS fixtures as well



HPS versus LED lights



International city LED pilot site

The City of eThekweni has embarked on an LED pilot project. Findings indicate that the conventional 40m spacing of public streetlights is too far for optimal LED illumination. This would ideally be more closely spaced and no higher than 6m high. It may be that the technology will be most economically introduced within new urban developments, using completely new approaches and fittings better suited to the technology.

as the provided technical specifications. Once suitable fixtures are identified, the second phase of the project begins. In a residential area of Oakland a test project was setup where fifteen 78W LED street lights replaced 121W high

pressure sodium (HPS) street lights. One street was illuminated with all new HPS lights. A second street was illuminated on one side with HPS lights and on the other side with LED lights and a third road was illuminated with LED Street

lights only. Both the LED lights and the HPS lights were tested for actual consumption and actual light output at various distances from the fixture. Public perception and acceptance is also gauged through surveys.

Piloting LED in your city

The LED City Program

The LED City initiative is an expanding collaborative group of government and industry working towards the implementation of various LED lighting projects in various cities around the world. Becoming an LED City provides technical and practical support through their partners and also helps create awareness of the initiative internationally.

How to become an LED City

- ✳ Identify a pilot LED lighting installation.
- ✳ Contact LED fixture manufacturers with solutions for the pilot application selected.
- ✳ Select, purchase and complete installation of LED lighting products for the initial pilot project.
- ✳ Contact Deb Lovig, Cree LED Programs Manager, at [HYPERLINK "mailto:deb_lovig@cree.com"](mailto:deb_lovig@cree.com) deb_lovig@cree.com to discuss joining the LED City/University program.
- ✳ Get agreement from the mayor's office as well as the municipal manager.
- ✳ Confirm energy savings, energy cost savings and maintenance cost savings as compared to the traditional lighting solution.
- ✳ Plan an announcement of your participation in the program.

