EFFICIENT LIGHTS: EVALUATION CRITERIA

Contents

1. Background

This document details some of the very important criteria which should be considered in evaluating various lights but specifically LED lights. These all have a role to play and interact thus determining the true value of the specific solution. The criteria are listed below:

- Relative light output in target area.
- Electricity saving: kW and kVA (power factor).
- Retrofit.
- Cost.
- Safety tested: SABS / other.
- Listed as Eskom incentive products.
- Temperature of LED's.
- Light maintenance.
- Local manufacture / assembly.
- Easy of changing / fixing afterwards.
- Warrantee.
- UV rays.
- Environmental implications of manufacture.
- Availability of backup / spares.
- Later change to other technology / lights.
- Modularity of lights.
- Safety.
- Vibration tolerance.
- NPV of proposal.

Each of these criteria will be discussed briefly in the sections below.

2. Relative light output in target area

It is important to compare the Lux light output achieved in the target area. It is therefore not enough to only consider the total Lumen output of the light. This should be compared with the target / legal requirement or with the existing level. It is important to do these measurements during worse case – when it is dark.

3. Electricity saving: kW and kVA (power factor).

It is important in doing comparisons not to compare the electricity usage by the rating on the respective globe but it should be by the power taken from the network / system. For many lights the power used is 25% more than the lamp rating.

The second factor to consider is the power factor which effects the kVA. Electricity tariffs for large customers mostly charge for kWh and for the maximum kVA during the month. The difference between the kW and the kVA relates to the power factor. Power supplies for LED lights usually make use of switching power supplies which cause a very bad power factor. It is thus critical to ensure that the power factor of the total light installation be included in the value assessment.

4. Retrofit.

The reason why retrofit should be used as a criteria is because of the following:

- The existing fitting be retained thus minimising waste and being more environmentally friendly.
- With retrofit, it means that the system is modular and either the globe or power supply cab be changed individually.
- Furthermore it holds the advantage that in time, as technology changes / improves once can simply upgrade to a new technology without again changing the whole fitting.
- Retrofit models also make it much easier to change when they do go faulty or need to be changed at the end of its functional life.

5. Capital cost

The cost of the lights are obviously important. The capital cost plus installation cost should be considered. The ease of installation is obviously as important as it could affect production / outage times OF THE CUSTOMER.

6. Safety tested: SABS / other.

It is obvious that the lights installed need to be certified by reputable testing authority. Lights that do not qualify the safety test should be disqualified. One of the issues that are tested on LED lights internationally is the light output. This is not currently done by SABS. It is believed that this is not required. The Eskom approach is that the customer must be happy with the light output achieved at the target area.

7. Listed as Eskom incentive products.

The current SPP (Eskom Standard Product Project) requires that the equipments needs to be registered with Eskom in the toolkit to qualify for this incentive. The SOP (Standard Offer Project) has been suspended for the time being. Indications are that only equipment that has been listed on the Eskom list may be used on this project as well. Listing on the Eskom list of approved products thus become a minimum requirement.

8. Temperature of LED's.

The most critical factor in the life and light maintenance of LED's relate to temperature. It is thus critical that this parameter be verified and be used in assessing the products. A common mistake made by some entities is to apply the thermal strip / measure directly to the top of the LED. This will yield an incorrect reading as the light output of the LED can affect the temperature reading. It is thus recommended to measure the side of the Led or the heat sink immediately adjacent to the LED. Temperatures over 80°C will in time cause problems. The lower the better. Obviously in enclosed fittings the expected temperatures will be higher.

9. Light maintenance.

The light output of LED's reduce over time. The rate of deterioration is directly related to the temperature of the LED's. It is thus critical that the level of light output at the target life of say 40 000 hours be checked at the relevant temperature.

10. Local manufacture / assembly.

The installation of efficient lights throughout South Africa holds great economic and financial benefits. If however all equipment are imported, South Africa will continue to export raw materials and import finished goods making us poorer. There are obviously some goods that are not made in South Africa. The extent of local manufacture / assembly should thus be valued.

11. Easy of changing / fixing afterwards.

No lights are infallible. Some will fail during its normal expected life. It is therefore important to be able to change these lights quickly and easily. Where the whole light is an integrated unit, it obviously means the whole light needs to be changed. After the warrantee period it may require that a new light be purchased until the original once can be repaired. If a retrofit methodology is used it may be possible to only change the light or the power supply which could be done by storing spares and removing the light from the ground using a telescopic stick (in respect to high bays).

12. Warrantee.

Obviously the longer the period of warrantee the better. A too long warrantee period could however lead to an escalated price and could simple lead to the supplier going bankrupt because it made promises it could not keep. It is also important that the guarantee specifies not just that the light burns but the light output level during the warrantee period. The warrantee period must at least cover the minimum period required by Eskom.

13. UV rays

Some industrial processes such as breweries, are disturbed by UV rays. Some LED lights and other lights such as Metal Halide have high UV ray output. These lights should obviously not be used in these applications.

14. Environmental implications of manufacture

One of the main objectives of installing more efficient lights is to reduce the electricity consumption thereby making a contribution towards a clean environment. It is therefore also important to check the environmental implications of manufacturing / sourcing the new lights. Factors which need to be looked at specifically are:

- Retrofit vs new. In case of retrofit existing fittings can be used.
- Large heat sinks. The amount of energy required to manufacture and transport large heat sinks need to be considered.

15. Modularity of lights - Availability of backup / spares

Where the new lights are made up of one unit, it is obviously more problematic when these fail as the whole unit will have to be removed. Where the light, fitting and power supplies are separate units, only the faulty un it can be changed by the customer / electrician and spares can be held.

16. Later change to other technology / lights

Where lights are not retrofit – a whole new light will need to be purchased when new technologies / improved technologies become available. With a retrofit unit is used, the latest technologies can be used when the lights fail at the end of its economic life.

17. Safety

Safety has to remain a priority. Many people are still being electrocuted. LED lights that use Voltages below 50 V (considered safe) should be considered more safe and these would also allow changing of the light or cleaning while on without presenting any safety hazard.

18. Vibration tolerance

Many industrial environments are exposed to ongoing vibration. Some of the current HID lights suffer much reduced life due to these environments. LED lights should be able to handle these vibrations better provided it is manufactured soundly.

19. NPV of proposal

If a full net present value assessment is done it is important to build in the following factors which most have been addressed above:

- The capital cost of the light plus installation cost.
- Any lost production due to long times to do installation.
- Any incentives from Eskom or otherwise.
- The electricity savings achieved plus impact of price escalation.
- Possible maintenance, replacements during the economic life.
- The life of the assets.
- Improved sales / production due to better light, less lights out.

- Achieving power savings and better environmental ratings.

20. Conclusions

It is clear that the move towards more efficient lights is a complex one. The criteria detailed here should assist users to make an informed and logical decision.
