



White Paper

LED lighting retrofits: factors that affect costs, savings and payback



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If you've looked carefully at the light fittings you come across in your everyday life – on streets, in shopping centres, offices, hotels, airports – chances are you've noticed that the lights are different from those you saw a few years ago. They are likely to give whiter light and better colour rendering than their predecessors. The new lights are likely to be LEDs, and there is a lighting mini-revolution underway.

If you're responsible for building maintenance, energy or cost management, then you are likely to have heard some people say the retrofit was free, others talk about paybacks ranging from 3 years to 12 years. How can there be such a wide variation on paybacks, and what are the factors that will affect the cost, savings and payback of your installation?

PowerTherm Solutions was established in 2002 and provides energy consultancy, project management and energy management services to the public, commercial and industrial sectors. We have extensive experience surveying facilities, identifying and quantifying energy savings, preparing a specification of requirements, managing public procurement, supervision of works, and measurement and verification of savings. We also have expertise in financial analyses, measurement and verification of savings, and Energy Performance Contracts.

We succeed by providing a quality and professional service, using qualified and trained engineers, which results in us becoming the energy consultant of choice for our clients. By implementing energy projects we have superior knowledge of project costs, which provides valuable feedback for energy surveys. By undertaking measurement and verification of energy saving projects, we have a superior knowledge of potential savings which provides valuable feedback for energy surveys. We have a staff of 7 people, including 6 engineers, and are based in Blackrock, Co. Dublin, Ireland.

PowerTherm Solutions has been specifying, procuring and supervising lighting retrofits since 2006, and LED retrofits in particular since 2015. Last year we surveyed over 20,000 light fittings, managed LED retrofits in 4 large buildings and 1 external car park with investment budgets exceeding €1.2million, and we measured and verified 1.7 GWh of lighting-related energy saving credits. This paper discusses the considerations we have found affect the costs, savings and paybacks for LED retrofit projects.



1. *The longer the annual operating hours, the shorter the payback* - This is a factor that affects the payback of all projects: generally speaking, the longer the annual operating hours, the shorter the payback. Lights in less used areas, such as stores and plant rooms, cost the same or more than those in corridors, but will have long paybacks due to their short operating hours.
2. *Replacing the lamp or the fitting* – This is a key choice for you. Replacing the lamp is far cheaper than replacing the fitting, but depending on the age of the fitting and control gear, it may be time to renew it. Otherwise you have new lamps in old fittings that you will probably end up replacing in any case. If you bite the bullet now and replace the fitting you can at least have energy savings to show for it; but if you replace the lamps with LEDs and go looking for funding in 5 years for new fittings, the energy savings will be insignificant.

3. *Feature lighting and unusual fittings* – What to do with these fittings is a trickier decision, as the cost of replacing the fitting can be very expensive and have an excessive payback. Feature lights typically only incorporate a portion of the overall lighting installation, but can drive up overall



project costs and payback. Also there is a lot of time spent sourcing new, but similar fittings. For feature lights we suggest examining the possibility of replacing the contents of the fitting. For unusual fittings – such as extra long fittings, it may be possible to get the manufacturer to make a special fitting based on their standard design and this should be reasonable cost-effective where the number of fittings is in the hundreds.

4. *Emergency lighting* – Generally one can replace a fitting incorporating an emergency batter pack with an LED fitting and adjacent emergency pin spot without needing recertification. But if there are a lot of emergency fittings and depending on the building layout, redesign of the emergency lighting and recertification may be more cost-effective because it may allow less emergency fittings.
5. *Fitting selection* – not all LED fittings are the same; some will consume less power but deliver a similar, or acceptable, lighting level. The more efficient fittings may attract a cost premium which should be evaluated to see if they are worth it.
6. *Controls* – Lighting controls have come a long way and, thankfully, lighting management systems appear to have disappeared. Controls can switch or dim lights in response to daylight and occupancy. Controls will add cost to the project but increase the savings. Whether or not the controls will be cost-effective in their own right should be considered, along with whether or not you are likely to get funding to subsequently retrofit controls.
7. *Maintenance* – LED lamps typically have a rated life of 50,000 hours, versus 12,000-20,000 for fluorescent lamps. Also, once you do the retrofit your lamps are new and shouldn't need maintenance for at least 6 years. So if you factor the maintenance saving into your calculations, this will improve your payback.
8. *Competitive procurement from suitable contractors* – Some electrical contractors are geared up for LED retrofits, others are general electrical contractors. Those that focus on the sector are likely to be better organized, faster and, if you undertake competitive procurement, they will be cheaper.
9. *Manufacturer reputation and warranty* – LED lighting has matured rapidly and there are less concerns today about their failing prematurely than even 2 years ago. However, the fittings being manufactured today have simply not been around long enough to be certain of their life. To address this people tend to rely on manufacturer reputation and warranty, but this intangible is likely to add to the project cost and payback.
10. *Energy Efficiency Obligation Scheme* – Energy savings associated with your project can be captured as energy credits under SEAI's EEOS. Energy suppliers will support projects – often the consultancy costs associated with the specification, procurement and delivery of your project – in return for the energy credits.