

White Paper: Sustainability benefits of LED UV curing

[LED UV curing lamps](#) are swiftly gaining popularity as a replacement for mercury arc lamps. Their rise in use reflects their process benefits, such as instant on/off and consistent intensity for thousands of hours. In addition to these, there are environmental advantages at play, such as reduced energy consumption, decreasing a business' carbon footprint, and enabling long-term cost savings.

In our White Paper, [**Sustainability benefits of LED UV curing**](#), [Simon Gibbs](#) uses real-world figures to crunch the numbers on the sustainability advantages of LED UV curing systems and explains how they can add meaningful value to your business's bottom line.

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Introduction

LED UV curing lamps are gaining popularity as a replacement for mercury arc lamps when curing light curable materials. Their rise in use reflects their process benefits, but there are additional environmental advantages. The reduced energy consumption of LED UV systems can decrease a business' carbon footprint while achieving return on investment (ROI) and enabling long term cost savings.

Perhaps the most obvious environmental advantage of LED UV systems is their reduced energy consumption. Comparing a high intensity, broad spectrum UV spot curing lamp based on a mercury arc bulb with a comparable LED-based UV curing unit shows about a 80% reduction in power consumption when in use – 250 W against 55 W.

There are significant further savings with LED UV systems because they are used differently. Mercury arc lamps require warm up time before they are at optimal power, and cool down time before they can be re-ignited, and so users run them continuously during production hours – they can't be turned on/off on demand. Frequent on/off cycles are also detrimental to bulb life. When the lamp is on, but not in use for curing, manufacturers use mechanical shutters to shield the light source; in consequence, energy is used when the lamp is not productive. LED UV lamps, on the other hand, have no warm up time and are instant on-off. The LEDs are switched on as and when required, and no shutters are needed. Power consumption of the unit when the powerful LEDs are switched off is about 2 W.



Figure 1 – LED UV curing lamps turn instantly on and off as required during production, drastically reducing energy consumption

If we consider an eight hour shift, and high volume automated production where the LED-based UV lamp is on for half of the time, off for half the time, then the overall power savings is about 89%. For many UK manufacturers, a more likely scenario is that the UV LED lamp is only on for a maximum of 10% of the time, and then power savings is greater than 97%. With the average price cap unit rate as of October 1, 2022 of £0.52 per kWh, this represents an

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