

ECO SYNAGOGUE

Replacing Halogen Bulbs with LEDs Things to Consider

This resource is being used to support the following Audit question: -

Section 4 Land, Buildings & Consumables BUILDING

Q:12-The lighting in our Synagogue building(s) use energy-efficient light bulbs in our:

a) main sanctuary; b) our halls; c) our offices and classrooms.

*With huge thanks to **Menahem Briskman** part of the Environmental Impact Team at **Ruislip United Synagogue** for his generosity in sharing this information.*

Any companies mentioned in EcoSynagogue resources is for information only, it is not a recommendation. Each community should do their own research into the best fit for their own needs

Why are we changing our lightbulbs?

Lighting is a major contributor to energy usage and CO₂ emission in public buildings and homes. Traditional bulbs heat a filament to glowing temperature to generate light, but most of the energy is then wasted as heat. LED bulbs generate light directly, using about a fifth of the energy for the same illumination. Conventional tungsten bulbs have been banned for some time, and the halogen variety will be banned from September 2021.

The table below illustrates the savings that are made by changing from Halogen to LED bulbs:

Halogen bulb power consumption - Watts	28 W	42 W	105 W
Amount of light produced in lumens	320 ln	600 ln	1800 ln
Comparable LED bulb power consumption - Watts	4 W	9 W	17 W
Amount of light in lumens	300 ln	700 ln	1700 ln
Reduction in energy consumption - Watts	24	33	88
Electricity saved in 1000 hours – kW.hr	24	33	88
Cost saving per 1000 hours at 15 p/kW.hr	£3.60	£4.95	£13.10
Typical price per bulb (TLC Electrical)	£1.88	£1.88	£3.30
Payback in hours of use	520 hrs	380 hrs	250 hrs

The examples show that LED bulbs use a fraction of the energy of older bulbs. They also demonstrate that at current prices, replacement bulbs would pay for themselves in quite a short time. LED bulbs last a long time, with 15,000 – 50,000 hours claimed compared with 2000 for halogen, so there is also a considerable saving in bulb replacement costs

What should you consider when replacing your light bulbs?

If we are satisfied with the present level of lighting, then we need to ensure that the replacement bulbs provide the same amount of light. The lighting power of a bulb is measured in lumens, so you need to replace the bulb by an LED unit producing about the same lumens. Some manufacturers refer to "equivalent Watts", but this is confusing, because it relates to the wattage of older, non-halogen lamps, which have been out of circulation for some time.

The table below may help in estimating the lighting output of your present bulbs:

Halogen bulb Watts	18	28	42	70	105
Older tungsten bulb Watts	25	40	60	92	130
Light output - lumens	220	320	600	1100	1800

Dimmer switches:

If dimmer switches are installed, it is essential to purchase LED bulbs that are stated to be dimmable. Even then, some older dimmers do not work well with dimmable LEDs, and you may be forced to change the dimmer. You may choose to replace the bulbs controlled by one of the dimmers first and observe the result. Typical problems are flickering at some settings, and non-linear control.

Circuit breaker:

Although LED bulbs use considerably less electricity, they run at very high electric currents for a small fraction of a second when switched-on. In most cases this should not cause a problem. However, where a Shabbat switch turns-on all the lights in the building simultaneously, the circuit breaker ("fuse") may trip, leaving you in darkness. If this happens, an electrician would need to fit a higher current breaker, or a slow acting, type C breaker, or both.

The lighting manufacturer may be able to specify the breaker for you. However, some have been caught by this phenomenon by surprise, and have not yet assembled the required information.

Low voltage bulbs:

Most light bulbs use standard mains voltage (230 V), but some are designed for much lower voltages, in conjunction with a transformer. When replacing these bulbs by LED, you would need to ensure that the same voltage is used, and that they can be fitted as a direct replacement, without additional/replacement components.

Colour of the light:

Traditional bulbs produce a reddish light, unlike the daylight that is much whiter. LED bulbs are available in a range of colours, expressed in °K. 2700 – 3000 °K is equivalent to traditional bulbs. 5000 – 6000 °K represent daylight.

Fluorescent tubes:

Complete strip light fittings are available in LED, and it is now also possible to buy replacement LED to fit into an existing fluorescent unit. Fluorescent lighting is much more efficient than halogen, so the energy gain in replacing them by LED is not large. It does make sense however to choose LED when replacing blown tubes or obsolete fittings

Beam angles:

Lamps produce more light in some directions than in others, and manufacturers produce diagrams showing the light distribution. In most cases this is not an issue when replacing bulbs, but when designing new lighting for a hall, this helps when trying to get uniform lighting throughout.

Detailed information:

There are plenty of lighting vendors, but you may find the [TLC Electrical web site](#) useful for detailed information or specifications for light bulbs.