



Transition Bath
community | food | energy | future

Replacing Halogen Downlights with LEDs



Economics

- A halogen GU10/MR16 uses 50W
- An equivalent LED uses 5W
- The annual saving for a light running 2 hours per day is $(50W - 5W) * 2 \text{ hrs} * 365 = 33 \text{ kWh}$
- 33 kWh at 16p/kWh is a saving of £5.30/year
- The cost of replacing a halogen with an LED is between £1 and £10
- For an average home with 15 halogens, the saving is £78/year



Down-lighter types

- GU10: mains 240C AC



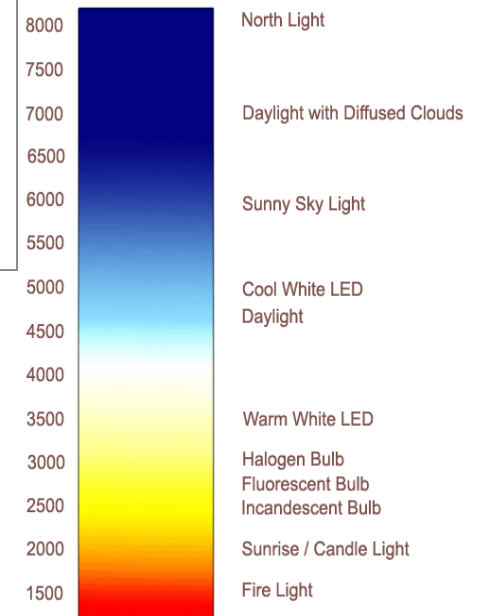
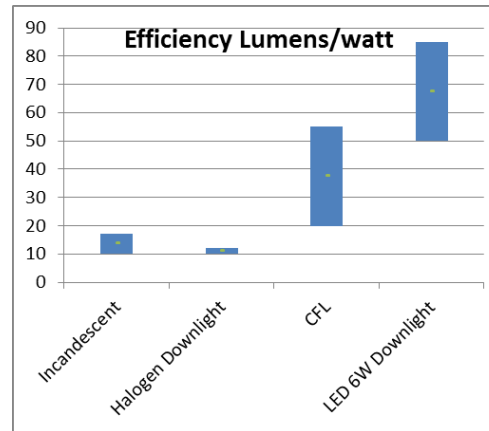
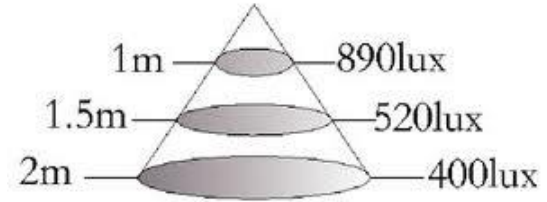
- MR16: 12V DC
 - uses a transformer





Terminology

- Lumens: measure of light output
- LUX (Candela) – Lumens/m²
 - Output on surface: depends on distance and “beam angle”
- Lumens/watt – efficiency of light
 - Halogen GU10/MR16 – typically 50W/ 35⁰/500 lumens
 - Kitchen LUX: 300, 750 for worktop
 - Bathroom LUX: 300 lumens/watt
- Colour temperature
 - Warm white 2700K
 - Pure white 5000K





Types of LED

- **SMD** Surface Mount (lot of small LEDs)
 - Older type
 - Wide beam angle
 - Careful of electrical safety – needs glass/plastic front cover
 - Generally lower power but more compact as without heat-sink
- **COB** Chip on board (1 large LED)
 - More modern package
 - More Diffuse light
 - More expensive
- **Standard** (1 to 10 LEDs)
 - Cheapest
 - Widest range
- **Complete Package**
 - Most efficient/long life as not forced into halogen packaging, more room for heatsink



Special Dimmers and transformers for LEDs

- Dimming LEDs
 - If you want to dim your LEDs, you need:
 - Dimmable LEDs
 - Special Trailing Edge Dimmer Switches
 - Dimmer compatible transformer if using MR16s
- Transformers (if using MR16s)
 - Existing halogen transformers will need to be replaced as they are generally limited to a minimum power of 20W (can be paralleled up); needs a dimmable transformer if dimming



Legal Requirements

- You are allowed to rewire/install new lighting in all rooms apart from bathrooms and gardens
- In bathrooms it depends on how far lights are from water, lights should be IP65 or similar rated
- If lighting protrudes into mineral wool insulation (1st floor ceilings) then fire ratings should be considered
- If in doubt consult a qualified electrician
- Look out for CE & RoHS marked bulbs



GU10/MR16 Replacement - what is required/cost/benefit

	Non-Dimmable GU10	Dimmable GU10	Non-dimmable MR16	Dimmable MR16	New built-in fitting	Replacing Non dimmable MR16 with GU10
Work required	<ul style="list-style-type: none"> • Check light depth • Replace bulbs 	<ul style="list-style-type: none"> • Check light depth • Replace dimmer & bulbs 	<ul style="list-style-type: none"> • Check light depth • Replace bulbs & transformer 	<ul style="list-style-type: none"> • Check light depth • Replace bulbs & dimmable transformer 	<ul style="list-style-type: none"> • Need to check on depth and diameter • Enlarge hole in ceiling • Wire in new light 	<ul style="list-style-type: none"> • Check light depth • Remove transformer, replace light socket, replace bulbs
Cost (15 bulbs + extras, 2 rooms)	£15 to £120	£45 to £150	£75 to £180	£105 to £210	£30 to £150	£30 to £135
Saving/year	£79	£79	£79	£79	£79	£79
Payback/months	2 to 18	7 to 23	11 to 27	16 to 32	5 to 23	5 to 21