

LED BUYER'S GUIDE

Save energy, time and money with the right LED purchase

LED technology has rapidly evolved in the past seven years and is now quickly gaining popularity in the household, representing up to **90% in electricity savings**. There are some excellent LED products available now. However, the wide range of products available now as well as variation in product quality means consumers should be well informed before purchasing.

Low quality LEDs may be unsafe, not provide sufficient light, flicker when dimmed, change colour over time, fail prematurely, or not fit into an existing fitting.

Buyer's Quick Reference Checklist

<input type="checkbox"/> Does it have an RCM ?	
<input type="checkbox"/> Correct cap type ?	e.g. Bayonet Edison Screw GU 10 MR 16
<input type="checkbox"/> Suitable brightness ?	250 to 1500 lumens
<input type="checkbox"/> Suitable colour temperature ?	Warm (3000 K) Cool (4000 K) Bright White (5000+ K)
<input type="checkbox"/> Beam angle fit-for-purpose?	<i>Downlights only</i>
<input type="checkbox"/> Appropriate colour rendering index ?	Greater than 80
<input type="checkbox"/> Dimmer compatibility?	<i>Consider individual needs</i>

Brightness Comparison Guide

Traditional Incandescent lamps	Equivalent Halogen lamp	Equivalent CFL lamp	Equivalent LED lamp	Brightness in lumens (approximate)	Usually used in
100 W	70 W	24 W	15 W	1400 lumens	Large rooms
75 W	52 W	20 W	12 W	1000 lumens	Medium rooms
60 W	42 W	15 W	8 W	700 lumens	Small rooms
40 W	28 W	12 W	6 W	400 lumens	Floor lamps
25 W	18 W	7 W	4 W	200 lumens	Desk lamps

How much cheaper are LEDs per year?

Standard Lamps

Average annual operating cost per household lamp

Traditional incandescent
(60 W) *



\$27.16

Halogen incandescent
(42 W)



\$20.83

CFL
(15 W)



\$8.37

LED
(8 W)



\$4.44

* Incandescent lamps (40 W – 100 W) are no longer available for purchase but may still be in use.

Downlights

Average annual operating cost per household downlight

Halogen lamp
(50 W) #



\$23.50

Halogen lamp
(35 W)



\$16.79

LED downlight lamp
(7 W)



\$3.26

50 W downlight lamps are no longer available for purchase but may still be in use.

Don't know what kind of lamp you currently have?

Traditional incandescent lamps create light by running electricity through a filament that glows hot. These can easily be identified by checking for a thin, metallic strand in the lamp.



Halogen lights create light by running electricity through a filament surrounded by halogen gas. These lamps have a secondary container in the centre.

Compact fluorescent lamps (CFLs) work by passing electricity through mercury containing gas and a fluorescent coating on the inside of the lamp tube. CFLs are either spiral or linear in form.



LED lamps rely on an electrical component called a diode. These are often arranged behind a diffuser to distribute the light from the individual LEDs. A wide range of colour temperatures and lamp types are now available.



Considerations When Buying LED lights

Safety and Performance



The Regulatory Compliance Mark (RCM) is an important safety mark from Australia's electrical safety and electro-magnetic compatibility regulators and should be visible on the product. This mark shows that the product complies with relevant safety and performance standards. In addition, the product must be registered on the [National Equipment Registration System](#). Unmarked equipment should not be purchased.

Brightness (think lumens, not Watts)

When buying new LEDs, you should check the lumen output of each LED lamp or fitting. Lumens, which are a measure of total light output, should be listed on the product packaging. Higher lumens mean brighter light. The following comparison table will help you find a suitable replacement for older technology.

Traditional Incandescent lamps	Equivalent Halogen lamp	Equivalent CFL lamp	Equivalent LED lamp	Brightness in lumens (approximate)	Usually used in
100 W	70 W	24 W	15 W	1400 lumens	Large rooms
75 W	52 W	20 W	12 W	1000 lumens	Medium rooms
60 W	42 W	15 W	8 W	700 lumens	Small rooms
40 W	28 W	12 W	6 W	400 lumens	Floor lamps
25 W	18 W	7 W	4 W	250 lumens	Desk lamps

Downlight lamps – MR16 type	Equivalent LED lamp	Brightness in lumens (approximate)
50 W	8 W	700 lumens
35 W	6 W	450 lumens

Downlight lamps – GU10 type	Equivalent LED lamp	Brightness in lumens (approximate)
50 W	5 W	350 lumens

Lamp efficiency

Even though LEDs are a very efficient lighting technology, the efficiency of LEDs can vary considerably. Lumens per Watt (lm/W) is the measure of LED efficiency and the higher this number, the more efficient the product.

Colour temperature and colour rendering

Personal preference, mood and application should be the primary considerations when choosing LED colour temperature.

- Warm white light is shown as **2700 K** to **3000 K**, is close to traditional incandescent and halogen lamp colour and is typically used in living rooms, bedrooms and hallways to create relaxed, warm ambience.
- Cool white light is shown as **4000 K** and is typically used in the kitchen, study, bathroom, cupboard, office (for alertness) and retail displays.
- Daylight light is shown as **5000 K** and above, and is typically used in commercial applications, hospitals, retail displays and art studios.



Pictured: 2700 K, 3000 K, 4000 K, 5000 K and 6000 K colour temperatures

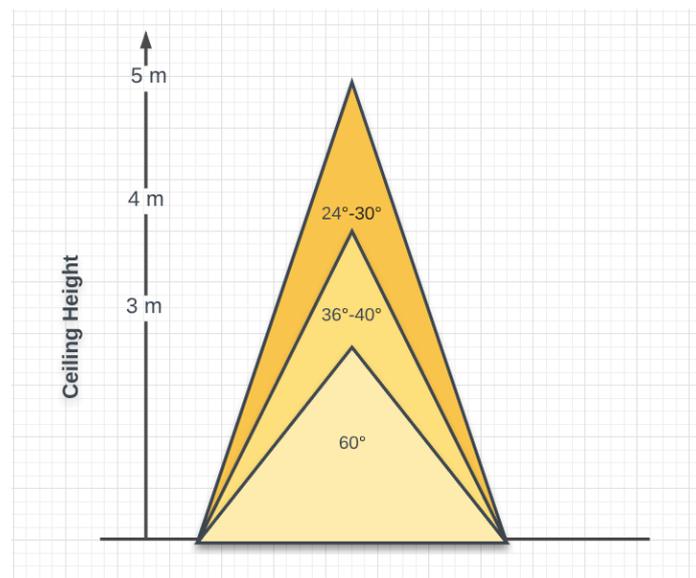
The Colour Rendering Index (CRI) of a lamp or fitting is a measure of a light source's ability to show object colours realistically or naturally. Choose products with a CRI of at least 80.



Pictured: Comparison of CRI 90 vs CRI 60

Beam angle

The angle of the beam of light emitted from the lamp or fitting can be important for your application. Check to see if you require a wide or narrow beam angle. A wider beam angle gives a more even spread of light and a **beam angle of 60°** or more is recommended for general lighting from downlights. A narrow beam angle can result in bright spots and shadowing which is not usually desired; however, a narrow beam can be suitable for highlighting a picture, display piece or other feature, or should be used with high ceilings to maximise useful light.



Pictured: Different beam angles from varying ceiling heights

Compatibility

Check the fitting type, size and dimming compatibility of your new LEDs.

- **Take an old lamp** to compare with the new LED. Check the type and size of the base (e.g. Edison screw vs Bayonet), beam angle, voltage, overall size and shape of the lamp. Some LED replacement lamps are larger than traditional lamps and may not be fit with some fittings.
- Dimmable LED lamps, fittings and downlights are available. **“Dimmable”** should be marked on the product packaging.
- Compatibility between existing wall switch dimmers and dimmable LED lamps, fittings or downlights cannot be guaranteed. **Older manual dimmers are generally not compatible** with LED lamps, meaning dimmers may need to be replaced by an electrical contractor. Consult your LED supplier to determine compatible dimmers.
- Some LED downlights may flicker when coupled with old transformers and dimmers. **Test a replacement lamp** in your home to ensure compatibility before widespread replacement.

- Halogen downlights can be replaced with completely integrated LED fixtures. Ensure these downlights are the correct size for the ceiling hole and are compatible with any transformers or dimmers. All work on 240 V mains supply must be carried out by a licensed electrical contractor.

Lighting tips

Follow these tips to keep your lighting costs down.

- Switching to LEDs is one of the fastest and easiest ways to cut your energy bills. Switching to LEDs will reduce growth in Australia's energy demand and avoid carbon emissions.
- Use task lighting (e.g. table and floor lamps, directional lighting, etc.) to supplement general lighting when needed.
- Lightly coloured walls appear brighter and better lit than dark surfaces.
- Turn off lights when rooms are not being used. Some lamps have enabled wireless control from a smart device and so may be switched on and off from the device.
- Control outdoor lights with timers, motion sensors or photocells so that lights are not on all night or during the day. If outdoor lights are used for long periods each night, the use of LEDs in these fixtures can save significant energy. LED flood lights are available (check the beam angle you require). Wireless control of lamps is now also available.
- By replacing your five most used incandescent or halogen lamps with LEDs, you can save up to \$110 per year in electricity.
- LEDs are available in sizes compatible with most fittings and they provide the greatest savings when used in fittings that are on for the longest periods each day.
- Dimmers save electricity when lower light levels are set. Not all dimmers and dimmable LEDs are compatible. Reputable LED suppliers provide compatibility charts listing dimmer brands and types.
- Low voltage does not mean low energy use.

Lifetime and warranty

There are many factors that determine the lifetime of a LED lamp or fitting including light loss and possible failure of components. Reputable manufacturer claims are based on rigorous testing and are reliable.

A warranty is a voluntary promise of a manufacturer's confidence that the product will achieve an expected life. Check the warranty conditions and note that any warranty offered with a product is in addition to other rights the consumer may have under the Australian Consumer Law.

The Australian Competition and Consumer Commission (www.accc.gov.au) has information on consumer rights, guarantees and warranties.

Use electrical contractors to install fittings

Apart from lamp replacement, a licensed electrical contractor is required to repair, service or install any light fitting, driver (power supply) or dimmer that is attached to the 240 V mains power. Electrical contractors are responsible for installation safety and must refuse to install non-compliant products. Sale and installation of non-compliant products or installation by unqualified persons can result in electric shock, fire, penalties and fines.

Calculating the Average operating cost per household light fitting, per year

Standard lamps

	Traditional incandescent (60 W)	Halogen incandescent (42 W)	CFL (15 W)	LED (8 W)
Lamp price	(phased out 2009)	\$2.50	\$6.50	\$8.45
Estimated lamp life in hours		2000	6000	15000
Estimated lamp life in years	\$0 (can't replace)	1.37	4.11	10.27
Annual lamp cost	\$0 (can't replace)	\$1.83	\$1.58	\$0.82
Annual kWh of electricity	87.6kWh	61.32kWh	21.9kWh	11.68kWh
Annual cost of electricity	\$27.16	\$19.01	\$6.79	\$3.62
Total annual cost (electricity + lamp)	\$27.16	\$20.83	\$8.37	\$4.44

**Traditional Incandescent lamps (40W – 100W) are no longer available for purchase but may still be in use.*

Downlight lamps

	Halogen downlight lamp (35 W)	LED downlight lamp (6 W)
Lamp cost	\$3.50	\$8.00
Lamp Life (operating hours)	2000	15000
Estimated lamp life in years	1.37	10.27
Annual lamp cost	\$2.56	\$0.78
Annual kWh of electricity	51.1	8
Annual cost of electricity	\$15.84	\$2.48
Total Annual cost (electricity + lamp)	\$18.40	\$3.26

Estimates are based on 4 hrs/day of usage, 31c per kWh and including the annualised cost of the lamps (initial cost divided by the lamp life in years) - shown in Australian dollars.

About Lighting Council Australia

Lighting Council Australia is the peak body for Australia's lighting industry. Its Members include manufacturers and suppliers of luminaires, lighting control devices, lamps, solid state (LED) lighting and associated technologies. Lighting Council's goal is to encourage the use of environmentally appropriate, energy efficient, quality lighting systems.

See <http://www.lightingcouncil.com.au/> for more information.