

RAINBOW POWER COMPANY LTD

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Living with Solar Course
These courses are held regularly.

Next course is on the weekend 24th-25th March. 2007

Registration by Friday 16th March. 2007



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Low Voltage Lighting FAQ

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Using Solar DC Lighting In Your Home

1) General principles of 12 Volt lighting

Lighting is a 'personal' issue. Over the years, I've learned that what is attractive to some is ugly to others; what is light to someone is considered dull by someone else. The effectiveness of a light also depends on several other factors:

- How close the light is to the area to be lit - The colour of the walls etc - light shiny colours reflect light; dull dark ones absorb it. - Diffusers and shades over the light - Reflectors to direct the light - Your age (as you get older, you tend to need brighter lights to read by etc.)

When I'm serving people in our shop who want to fit out a whole house, I often suggest they first purchase a few different ones to try out. They can then see which ones best suit their requirements.

I sometimes surprise customers when I tell them they should have a lot of lights for a solar system. This is different from suggesting they should all be on for lengthy periods! You need to look at overall efficiency. So having a low and a high wattage light for the same area means you can use the lower one when you don't need a bright light. In general terms, dimmers are not recommended for most types of lights.

Task lighting is a concept whereby you only light up the area you need. For example why use a 100W to light a whole room when a 20W desk lamp will do the job?

Try to bring your lights reasonably close to where you need them. If your ceiling is high (eg: cathedral style) suspend your light lower down, closer to where you require it. Use a reflector type shade to direct the light downwards.

Diffusers over fluoro lights make them look nicer. However, they can restrict some of the light output, they can often collect bugs inside and in tropical climates they can decrease light output by up to 20% by causing the tube to overheat.

For outdoor lighting consider the use of PIR motion detectors to turn the light on and off automatically (usually adjustable between 1 - 10 minutes). Delay switches can turn off lights, in say public toilets, several minutes after being switched on (so they don't get left on all night).

We sell 4 main types of lights. Listed in order of decreasing efficiency, there are

Fluoro, LED, Halogen and Incandescent lights.

2) Fluoro lights 12 and 24V DC

FLUORO LIGHTS: These are some 3 times more efficient than an incandescent bulb - eg: a 20W fluoro is roughly 3 times brighter than a 20W bulb. Today most modern fluoros do not emit that rather cold blue light that was the norm 10 - 20 years ago. Most types, particularly the more modern PL type (often U-shaped) come in a variety of warm colours. We generally suggest using fluoros for most of your lighting requirements due to their high efficiency. Their light output decreases after several thousand hours of use when they should be replaced.

3) LED lighting

LED LIGHTS: We sell a single LED night light (LED-005 and LED-006) which draws 20mA on 12 and 24 Volts. This is mounted on a BC adaptor (which plugs into a standard 'Aussie' lamp fitting).

The Rainbow LED (LED-002) contains 15 multi-coloured LEDs in a BC fitting. We suggest this is suitable as a background/ TV/ party type light.

We have a 12 LED light in a Dichroic MR16 fitting. (LED-004)

We also have a range of LED torches. Let me know if you want more information.

4) Halogen bulbs

HALOGEN BULBS: These bulbs use special materials which enable them to be run at higher temperatures than a standard incandescent bulb. They are about 30% more efficient than a standard incandescent bulb and produce a whiter light similar to daylight. For this reason they are often used in art galleries and jewellery shops to bring out their 'natural colours'. They are long lasting, usually rated at 2000 hours. Dichroic halogens have a special reflector around the bulb.

'Life Expectancy of Halogen Bulbs'

(This FAQ is already on the site linked to LIT-007, LIT-008, etc.)

The halogen bulbs listed below that we sell are the high quality German made Osram brand. They have 'UV Stop' to filter out most harmful UV rays and they are dimmable.

24V - - 20W - - 1000 hrs
24V - - 50W - - 2000 hrs
12V - - 5W - - 4000 hrs
12V - - 10W - - 2000 hrs
12V - - 20W - - 2000 hrs

The indicated life expectancy is a guide only and can be influenced by a number of factors - mainly operating voltage.

These bulbs are made to operate in 12.0 or 24.0 Volts and not on typical battery voltage (about 12.6 Volts for a fully charged 12V battery). According to one authoritative source, life expectancy is decreased to 50% by 5% over voltage (eg: 0.6V on 12V) and by about 75% by 10% over voltage. On a 'normal' solar system this is usually not too big a problem because with line losses, the operating voltage on load at night will probably be down to around 12.4 Volts or less. On the other hand, if you turn on these lights during the day (when the solar panels are charging), or if you have a wind, hydro or generator back up at night, you could be subjecting the bulbs up to say 15.0 Volts!

If you run your halogens off a relatively cheap/old transformer type converter from 240V, you can get over voltage if one bulb burns out or you use less wattage bulbs than specified by the transformer. Replace any failed bulbs promptly!

5) 12 Volt incandescent bulbs

INCANDESCENT BULBS: These are the cheapest and least efficient type of bulb. Examples are your standard 240V light bulb and 12V automotive globes. They produce a very yellow light and are usually rated for 1000 hour life span.

Besides the four main types of lights, there are several other types with specialised applications such as street lights, factory lighting etc. Please feel free to contact us for assistance in designing your lighting needs.

6) AC versus DC lighting in your home

Another aspect of choosing your lighting is whether to use 12/24 volts DC lighting run directly off your battery or whether to use 240 volt AC lights run from your inverter. This debate has been somewhat ongoing in the industry over the years. There are some advantages and disadvantages of both.

The advantages of DC lights include:

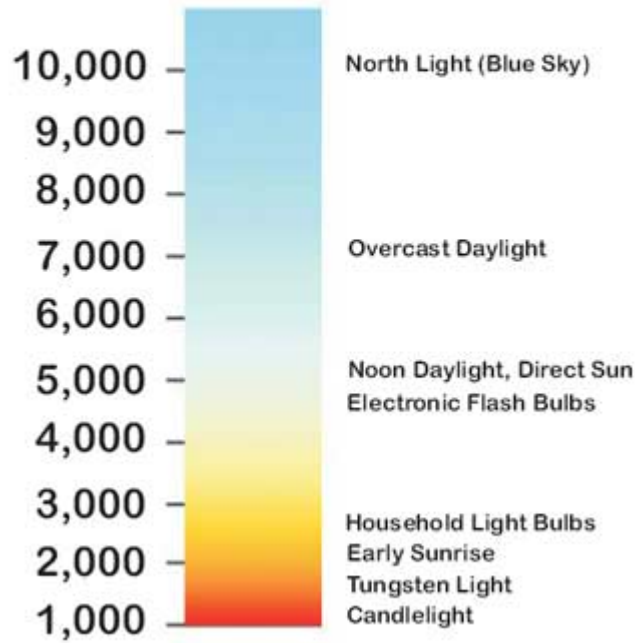
- They are generally more efficient. DC incandescent lights have shorter thicker filaments making them more robust and able to be run at a higher temperature.
- There are no inverter efficiency losses. These could be substantial if you are running a single light off your inverter (without any other loads on at the same time). However, if you have the TV or other electrical loads on anyhow, then this efficiency loss will be quite small.
- They are more reliable in the sense that they do not require an inverter to run them. Possibly your inverter might fail at some stage and it could take some days to have it repaired depending on the brand and where you live.

The advantages of AC lighting are:

- They are widely and cheaply available from a multitude of shops, shopping centres etc. There is a huge selection of lamps, luminaires, fittings etc.
- Being a higher voltage, a smaller cable size is required. This could be a significant cost saving in very large homes or other buildings.
- Local electricians are very familiar with how to install them and won't undersize the cable etc.

To conclude, I'd suggest that if you have a small system in a modestly sized building, you should use DC lighting. On the other hand, if it is for a larger system in a building with several or more rooms, then you may want to use AC lighting, particularly if you feel there will be a number of lights or electrical loads running simultaneously off the inverter. However, if you opt for AC lighting, we'd still suggest putting in a few DC lights so you still have some light in the unfortunate situation of an inverter failure. A DC light in your battery/generator room is very handy when you have an inverter or battery problem.

Light Output Comparisons Colour Temperatures in Degrees Kelvin



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