Making sure your home is not an energy sink

When it comes to using energy around the home, people seem to be getting the message that it's important to 'switch off and save'. The next step is understanding how much energy is used by different activities, so we know which to tackle first, advises **Peter Seligman**.

Some modern appliances use more energy on standby than doing their job.

It makes no sense to turn off a light when you leave a room in which an electric heater has been left on. The power used by the light is 100 watts (W), while a heater typically draws 2000 W.

How big a yardstick is 100 W? Let's assume that we leave a 100 W light globe on every night for six hours, which adds up to 2200 hours a year.

To calculate the energy used – measured in watt-hours – over the year, we simply multiply the hours by watts, which in this case is 220 000 watt-hours (Wh). As we know, 'kilo' means 'thousand', so a more manageable way of expressing this figure is 220 kilowatt-hours (kWh).

To most people, including me, a number like 220 kWh doesn't mean much, so let's convert it into something familiar – say litres of petrol – as an energy equivalent.

The best efficiency that can be achieved by burning brown coal to generate electricity is 25 per cent. This means four times the energy that comes through your electricity meter or power point is required to produce the energy you use in your home.

Taking the above example: 4 x 220 kWh, or 880 kWh, is required to produce that amount of electricity.

If we go a step further, a litre of petrol contains about 10 kWh of energy. Thus, the 880 kWh equates to 88 litres – enough for the average car to drive 880 km, or from Melbourne to Sydney. That's just to run one light globe each night for a year!

Hot showers drain hot water five times faster than the time taken to heat it.

The case for shorter showers

Ready for another surprise?

You turn on the taps and jump into the shower. Let's not ponder over how long you stay in there, but rather look at how many light-globe-equivalents of power are used.

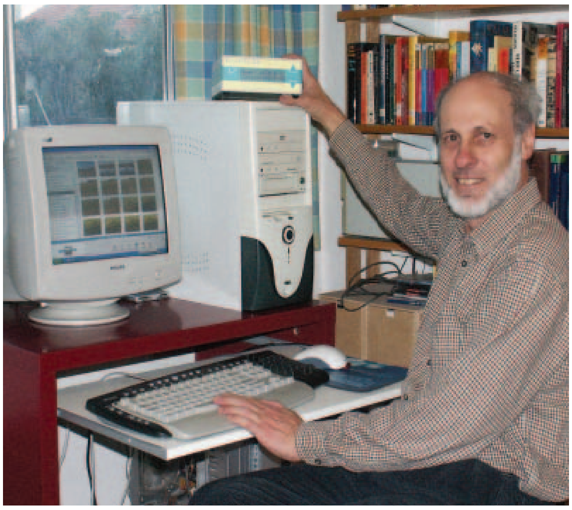
An electric hot water service element typically draws around 4800 W. Translating this into 100 W units (4800/100), we get 48 light-globe-equivalents.

Now let's look at how quickly that water can be used.

If you showered until the hot water ran out, let's assume it would take an hour to drain your hot water service. An electric hot water service generally heats water at night over about five hours. In other words, while you have the hot water tap running, you are using hot water five times faster than you are able to re-heat it.

So the hot water going down the drain is the energy equivalent of – wait for it – 5 x 48 kWh, or 240 light globes.

I suspect that many people might take much shorter showers if they could see the 240 light globes while the hot water tap was on!



Peter Seligman uses a power meter to monitor the energy use of appliances around the house.

A closer look at fluorescent lights

How many of us have heard that fluorescent lights are efficient? While it's true that fluorescent lights are more efficient than incandescent lights, the problem is the sheer numbers of lights installed.

A typical one- or two-person office might have four double-tube fittings. The tubes may be 36 W, but the complete fitting – which includes a transformer-like object called the ballast – uses closer to 45 W. That's about 90 W for each double-tube fitting, so the office is using the equivalent of almost four 100 W incandescent light globes.

Have you heard the myth that it takes more energy to switch lights on and off than leave them on? It isn't true. Its origin can be traced to a time when fluorescent tubes were new, expensive and their life was shortened by frequent switching. But in terms of energy used by modern tubes, an hour switched off is an hour's energy saved.

It's not that fluorescent light tubes are inefficient. In fact, they are more efficient than compact fluorescent lights (CFLs). The problem is in the way they are used and overused.

One new Tri-phosphor tube can adequately light a kitchen or small office. However, boxed lights with diffusers waste a lot of the light. Newer fittings with reflectors and no diffusers are much better. A very cheap and simple solution is to take a quarter of the tubes out. Three new tubes produce the same light output as four of the older type.

More power myths around the home

Now to low-voltage downlights, another energy 'blind spot'. Many consumers take low voltage to mean low energy, but this is not so. These lamps not only light small areas, they use a lot of power. Because of the transformer, each downlight – rated at 50 W – actually uses about 60 W.

The main problem with these lights, apart from their inherent inefficiency, is that too many must be installed to get adequate lighting. It is not uncommon to find six or more in a kitchen – around 400 W.

Fortunately, new compact fluorescent downlight replacements only use about 11 W.

Desktop computers are another power hog. How many of us have a desktop computer churning away all day, maybe all night too?

Home computers typically use about 120–160 W, although this drops to about half if the monitor switches to standby. Nevertheless, an average home computer might use 100 W for six hours per day. Think in terms of that Melbourne–Sydney drive!

The good news is that laptop computers use only about 20 W, even less on standby. LCD monitors use much less power than the older CRT types.

Standby power

You may have heard that some appliances use power all the time, even when they are switched off. Until recently, appliance designers didn't worry about this. Electronic control circuits need a fraction of a watt instead of the many watts they draw, but some modern appliances use more energy on standby than doing their job.

For example, when our washing machine is on standby – not even displaying any panel lights – it uses about 5 W, which is 24 x 5 = 120 Wh per day. However, the machine only uses about 50 Wh (not counting the energy to heat the water) to do a load of washing. Our solution? Turn it off at the power point.

The sheer numbers of these appliances causes the problem – microwave ovens, TVs, VCRs, DVD players, all with individual clocks and displays. A typical house might have 10 such units. So unless it actually has time-setting functions that you need to program, switch it off.

Finally, let's look at solar. A photovoltaic solar panel costs about $10 to provide 1 W when the sun is shining directly on it; this is its 'peak' power.

However, you also have to take into account varying sun angles, night-time and weather. For Melbourne or Sydney, the average power is about one-seventh the panel's peak power. So an average watt costs about $70. Frames, installation, wiring, etc cost about double that again.

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But changing an incandescent globe to a compact fluorescent saves on average 20 W (80 W saving for, say, six hours out of 24). Cost to make the change? About $7 replaced 10 times over 20 years – say $70.

Compare that to the cost for a solar system to provide an average of 20 W: 20 x $70 = $1400. Or if the government is paying half, about $700.

I hope I haven't depressed you too much but the good news is that the potential for saving energy around the house really is huge – if you just understand where that energy is going.

Dr Peter Seligman, a biomedical engineer, was a key member of the team that developed the Cochlear multiple-channel cochlear implant. A focus of his work over the past 24 years has been the development and improvement of speech processors. He is a qualified electrical engineer, holds 25 patents and has been involved in the design of photovoltaic solar energy and solar heating systems.