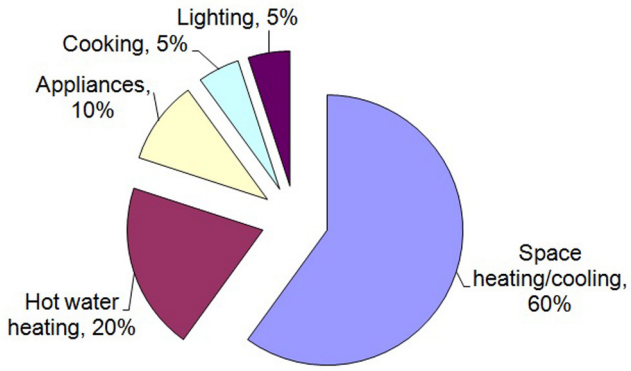
UNDERSTANDING ENERGY – BASICS FOR HOMEOWNERS

FACTSHEET 07

The most powerful tool you can use to reduce your energy consumption and maximise your energy efficiency is to understand energy, especially how it is measured, and how quickly particular appliances and activities consume it. Understanding the basics of energy will give you power over your energy consumption.

HOUSEHOLD ENERGY CONSUMPTION

In a cold region like Googong – technically referred to as a 'heating climate' – most household energy consumption goes to space heating, followed by hot water heating. Combined, these two activities typically account for 80% or more of a household's total annual energy consumption. Appliance use, lighting and cooking make up the rest.



The best way to think about household energy consumption is to break it down into two components:

1. **passive household energy consumption,** the rate at which the building use energy due to its design, level of insulation and draught sealing, and fittings; and the efficiency of the heater, hot water heater, lighting, appliances and standby power consumption; and,
2. **active household energy consumption,** which derives from occupants turning things on (and off!), and is based on household behaviour and level of energy consciousness.

Minimising passive household energy consumption is about designing and building your home so that it passively uses less energy than a typical house for important tasks like heating and cooling, hot water heating, lighting, refrigeration, cooking, clothes washing, and entertainment. This involves investing in the most efficient building and appliances you can afford.

Minimising active energy consumption is all about conscious behaviour towards energy -using devices: using heating moderately and only when you are benefiting from it (i.e. not overnight or during the day if you are not there), using hot water consciously, turning off lighting and appliances when they are not in use, turning off appliances at the socket to minimise standby power, etc.

HOUSEHOLD ENERGY CONSUMPTION – SOME DETAIL

There are some important units of measurement that you may have heard of but may not understand. They are explained below.

Watts (W) and kilowatts (kW): the **RATE** at which an appliance uses electrcity (or a photovoltaic solar panel produces electricity). A kilowatt is 1000W, just like a kilogram is 1000g or a kilometre 1000m. So, if you know the wattage of an appliance but need the kilowattage, divide the wattage by 1000!

Kilowatt hour (kWh): a **TOTAL QUANTITY** of electricity. The number below the 'kWh' column on your electricity bill tells you how many kilowatt hours were consumed by all of the appliances used by your household during that billing period. The price of electricity currently ranges from about 20-40c per kWh depending on your location and contract.

If you know the wattage of an appliance, and how long

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it is on for, you can roughly calculate the total quantity of electricity used by the appliance using these equations:

rate (W) x ***time*** (h)= ***total*** (Wh)
rate (kW) x ***time*** (h)= ***total*** (kWh)

Examples:

- a 100W appliance, such as a small-medium sized LED television or laptop, running for 10 hours, would use (100x10=)1000Wh or 1kWh
- a 1000W hotplate running for one hour would use (1000x1)=1000Wh or 1kWh;
- a 4kW heater running for 15 minutes would also use (4x0.25=)1kWh.

Megajoules (MJ): a total quantity of energy. The number below the 'MJ' column on your gas bill tells you how many megajoules of gas were consumed by all of the gas appliances used by your household during that billing period. The price of a megajoule of residential gas currently ranges from about 2.2-3.0c per MJ depending on your location and contract. The rate at which gas heaters consume gas is quoted in MJ/hr.

If you need to, you can convert between kilowatt hours and megajoules since they are both quantities of energy:

1kWh = 3.6MJ

Greenhouse gas emissions: as a rough rule of thumb, 1kWh of electricity from the grid generates about 1kg of carbon dioxide in NSW/ACT. This number varies from State to State depending on the predominant source of the power generation (black coal, brown coal, natural gas, hydro, wind, solar). If you choose to buy Green Power, this number drops to close to zero carbon dioxide emissions because you are effectively buying your power from the share of the grid that is renewable.

R-value (and U-value): Every building element – ceiling, walls, windows, doors, and floor – has an R-value: its *resistance to transmission of heat*. *The higher the R-value the better* because that translates to more resistance to heat loss in winter (and conductive gain in summer). In this climate, some desirable R-values are:

ceiling batts – R5
wall total – R3 (R2.5 batts +wall itself)
floor batts – R2.5
windows – R0.33 (double glazed, low-conduction framing
doors – most doors do not quote R-values in specifications

U-values are the inverse of R values (U=1/R): they measure how quickly heat is transmitted through a building element. U-values are typically quoted for windows, while R-values are usually quoted for everything else. The lower the U-value, the less heat is transmitted through a window, so when shopping for windows the lower the U-value the better.

Standby power: many appliances use power even when they are NOT ON! Every 10W of standby power around the house equates to about 80kWh/yr[1] (about $32/yr[2] in Googong!) of electricity consumed for no benefit, so it is a good idea to turn off all appliances at the power socket when not in use. If you cannot reach the socket, try using wireless remote switches or timer switches.

1 (10x24x365) = 87.6kWh/yr, -10% for operational time
2 80x0.40c=$32