

Deep cuts in household greenhouse gas emissions

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Would you like to contribute in a practical way to reductions in greenhouse gas emissions? Perhaps you are tempted to buy green power, or a photovoltaic panel. Before you do this, however, there are a range of measures that you can adopt that will reduce greenhouse gas emissions from your home by two thirds - 10 tonnes of carbon dioxide equivalent per year - at modest cost. Even if you don't live in a modern solar efficient home, you can radically reduce your greenhouse gas emissions.

Many of the measures described below cost little or nothing to implement, but can make major reductions in CO₂ emissions. Before we start, I'd like to provide some background information. The unit of electrical power is watts (W). If I use an electric light bulb with a power of 100 W for 10 hours then 1,000 watt-hours, or 1 kilowatt hour (kWh) of energy will have been consumed. If it were left on for a whole year (8,760 hours) then 876 kWh of energy would be consumed. Generation of one kWh of electricity requires the emission of about 1 kilogram (kg) of carbon dioxide (CO₂) by a coal fired power station. ActewAGL currently charges 14 cents for each kWh of electricity. Carbon pricing will increase this to at least 17 cents per kWh within a few years. ActewAGL's gas and electricity bills tell you how much greenhouse gas you are emitting each quarter.

You can measure how much power each appliance consumes by borrowing a power meter. Alternatively, switch off nearly everything and go outside to the fuse box. The metering dials should be scarcely moving. Now turn on each appliance in turn and note how fast the dials turn in response, to work out how much power it consumes.

Suppose that a family of two adults and two children owns a typical 20 year old brick veneer house with electric off-peak water heating and ducted gas space heating. Energy consumed in their house results in the emission of 15 tonnes (15,000 kg) of CO₂. The house is cold in winter and so the gas heater works hard for 6 months per year. The house is hot in summer and they are considering installing air conditioning to make it more bearable. Here is how to avoid the need for air conditioning while saving money and reducing greenhouse gas emissions to less than 5 tonnes per year.

Low cost measures

1. Modern low flow shower heads deliver a satisfying shower while consuming only half the water (8 litres per minute) and half the energy to heat the water compared with a conventional shower head. Installation of a low flow shower head is an effective low-cost measure available to house owners and tenants alike. If your water is heated using electricity then savings of several tonnes of CO₂ and hundreds of dollars per year can be made by this very simple measure!
2. Incandescent light bulbs will be phased out over the next few years, but if you do it sooner then you will save a substantial amount of greenhouse gas and money. Replacing your eight most frequently used incandescent light fittings with compact fluorescent lights will reduce your lighting bill by three quarters, saving around 600 kg of CO₂ and \$100 per year.
3. Turn your television off at the set (or at the wall), and not by using the remote. My TV consumes 87 W when running, 82 W when switched off at the remote and zero power when switched off at the set. Turning off my TV at the set saves 600 kg of CO₂ and \$100 per year.

4. A computer and monitor consume 100-150 W while running. In the Microsoft Windows operating system there is an option to automatically place the computer in hibernation when it is not used for an extended period (“power options” in performance & maintenance tasks on the control panel). The state of the machine is exactly restored when the computer is woken up. Similarly, the monitor can be programmed to automatically shut off after 10 minutes or so of non-use. This can save 100-300 kg of CO₂ per year.
5. Electronic devices such as computers, monitors, printers, speakers, HiFi systems, DVDs, VCRs and digital clocks typically consume 2-6 W when nominally off. It is often convenient to run many of these devices from a single power board. Switching off the single power board eliminates standby power consumption from many devices. Savings of 20W by this measure will reduce CO₂ emissions by about 150 kg per year.
6. If you are a Transact customer then you probably have a Set Top Box illuminating and warming the room 24 hours per day. The set top box consumes about 33 W and produces about 300 kg of CO₂ per year. Requests to Transact by many customers might induce them to find a Set Top Box that consumes far less power.
7. Your heated towel rack consumes 200W, equivalent to 1,600 kg of CO₂ per year!
8. West facing windows allow the fierce summer afternoon sun to pour into your house. Blinds and awnings can prevent this. Alternatively, heat-rejecting plastic films professionally applied to your windows at a cost of \$60 per m² can reduce heat gain by 70%, while lending an air of elegance to the windows.
9. An electric dryer produces 2-3 kg of CO₂ over a typical 60-90 minute drying cycle. A solar clothes dryer (also known as a clothes line) produces no CO₂.
10. Point-heating and zoning in winter can substantially reduce the running time of your ducted gas heater. By closing doors you can confine the heating to the main living area. An electric blanket only consumes 15-30 W for a few hours, and substantially reduces the temperature that your bedroom needs to be for you to feel comfortable. A Tastic in the bathroom does a similar job.
11. When looking to buy a fridge, clothes washer, dishwasher, TV, stereo, computer and other electrical equipment, buy 5 star energy rated machines wherever possible. You can make substantial savings in both CO₂ emissions and money in this way.

These measures together cost less than \$1,000. They will save one third of your greenhouse gas emissions – 5 tonnes of CO₂ per year – and will also save about \$700 per year in energy costs. The next set of measures cost more to implement. However, you will get your money back within a few years.

Water heating

In a typical household the largest source of greenhouse gas emissions is water heating. If you have off-peak or instant electric water heating then this will be causing emissions of 5-8 tonnes of CO₂ per year. A normal (high flow) shower head exacerbates the problem.

You can switch to solar water heating with electric boosting to obtain savings of more than 70%. However, gas boosted solar does even better because gas is much less greenhouse intensive than electricity, and will deliver CO₂ savings of more than 90%. A gas boosted solar water heater will cost several thousand dollars more than a conventional electric water heater, but will pay for itself through energy savings over 3-5 years, particularly by taking advantage of rebates now being offered by Government.

Once you have your gas boosted solar water heater in place, you can connect your clothes washer and your dishwasher to the hot tap (if manufacturer’s instructions permit this). This will deliver CO₂ savings of 90% per cycle because most of the energy consumption is for heating the water. This measure will save an additional 600 kg of CO₂ per year.

Space heating and cooling

Heating and cooling houses is a large source of CO₂ emissions. Taking the following steps can halve your heating bills. You are also likely to find that you don't need air conditioning after all.

First, heat your home with gas, not electricity. Electricity is far more greenhouse intensive.

Second, draught-proof your home. Visit your hardware store to view the wide variety of door and window seals to stop air leaking into and out of the house. Cover up any ceiling vents that are not needed, to stop your winter warmth rising up them like smoke up a chimney. Install a draught stopper (available from your hardware store) on the remaining vents. These are simple plastic boxes with hinged flaps that are placed above the vents in the ceiling space, and are closed until the vent fan is turned on. Some designs have motorised flaps that can be connected to a fan or light switch. This allows the hole in the toilet window to be closed off, so that the toilet is considerably less freezing in winter.

The next thing to do is to ensure that there is plenty of insulation above the ceiling, with a rating of at least R4. Rock wool can be injected into the walls of the house between the brick and the internal gyprock to greatly reduce heat transmission through the walls, and also reduce noise transmission. Insulation bats can also be placed underneath the floorboards between the joists using chicken wire to support it.

The remaining weakness in the thermal defences of your home is the windows. A single pane of glass offers little resistance to heat loss and heat gain, and often leaks air around the edges of each window. Double glazing fixes this problem, although it is relatively expensive. Alternatively, secondary glazing can be installed on the sill in front of the existing windows and is quite effective. Curtains, preferably with pelmets, add additional thermal resistance. Focus on the windows in the living areas where the air is warmest and the heat loss greatest. Double glazing makes your home quieter.

Once you have taken all of these measures you will have a much more comfortable and quieter house. Your gas and electricity bills, and associated greenhouse gas emissions, will have been reduced by two thirds. Now if you want to invest in green power or photovoltaic panels, you will be able to offset the remaining CO₂ emissions from your house at modest cost. An additional 1 kW photovoltaic system will feed enough electricity back into the grid to offset the emissions of an efficient car travelling 10,000 km per year.

As you can see, making deep cuts in personal greenhouse gas emissions is neither difficult nor expensive. Your house can be made greenhouse-neutral at modest cost.

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