



GREENFORM ENERGY

Sustainable Building Consultants

*“Experts in compliance,
advanced energy modeling and
sustainable building design”*

Home Living Guide

How to Live ‘Efficiently’, ‘Sustainably’, & for ‘Optimal Health’ in your Home



INTRODUCTION

‘Efficiency’, ‘sustainability’ and ‘health’ are three buzz terms heard ever more in modern times. They are critically important, but how can they be implemented into our daily lives? In a world where generations of destruction, over consuming and irresponsibility have left our very existence in the balance, every single person must decide to create a sustainable future, today, and this is achieved through our actions.

Modern society and lifestyles are similarly causing ill health in populations due to stress, over-working, toxic chemicals, synthetic food, electromagnetic radiation, poor sleep, and the list goes on. Countering this is not only important for high-performance professionals or elite athletes, but also those wanting to generally stay well and perform to the best of their abilities. Harnessing the power of your habits, daily routine and local surroundings is key to promoting health, wellbeing and longevity.

This is a practical guide for all households and individuals to live efficiently, sustainably and for optimal health. The three parts, when combined, form a powerful synergy for creating a better way of living that will dramatically benefit the planet as well as supercharge your wellbeing.

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1. HOW TO LIVE 'EFFICIENTLY'

This section is a practical guide specifically on 'how' to live 'efficiently' in your home. These simple measures can be implemented by any household and will help save money, materials and reduce environmental impact.

1.1 Heating / Cooling

- Clothes; dress appropriately- 'put a layer on' or 'take a layer off', before resorting to air-conditioning.
- Windows and Doors; close all external openings when the air-conditioner is running. Also, close off internal areas of the house that are not being occupied.
- Thermostat Settings; set at a reasonable temperature. As a guide, summer between 24-27°C, and winter between 18-20°C. Bedrooms however should be cooler and can be set between 13-18°C overnight.
- Filters; clean air-conditioner filters regularly to keep units running efficiently.
- Fans; use ceiling or pedestal fans before resorting to switching on the air-conditioner.
- Air-Conditioner; switch on air-con only after all exhaust fans are turned off, and doors/windows are closed. Always turn off the air conditioner if the house is not being occupied for an extended period of time.
- Portable Heaters (plug-in); never use. Typically, they are rated at 1000-2400W and are <100% efficient, compared to splits systems which can be >400% efficient.
- Curtains/Blinds; operate according to the weather. In summer, close blinds during the day to block excess heat, and open at night to allow night purging. In winter, open blinds during the day to let warmth in, and close at night to prevent the heat escaping. Details matter;- adjust the angle (e.g. venetians, vertical blinds, etc) that allows the sun's rays to directly hit internal thermal mass.
- Pelmet; these will further improve the above measure by reducing air movement against the glass, or for curtains, a cheaper alternative is to place a heavy blanket or towel on top of the curtain rod.
- External Shading Devices; operate according to the weather, more so for reducing heat gain.
- Thermal Mass; utilise thermal mass (e.g. floor slabs, internal brick walls, etc) to regulate the indoor air temperature. E.g. allow mass to absorb heat during a hot day- keeping the house cool, then open the windows at night to cool the slab back down again, ready to repeat the following day.
- Insulation; ensure it is all lying flat on the ceiling lining. It could have been moved by wind, rodents, tradies doing renovations, and various other causes throughout the home's lifetime.

1.2 Ventilation

- Windows/Doors; open windows on opposite walls to rapidly increase natural ventilation.
- Flyscreens; install to allow operation of windows/doors in all conditions, e.g. to keep the fly's out!
- Mild Weather; is the optimal time to ventilate a house, avoid doing so in extreme hot or cold weather.
- Ducts, Vents, Grills, Flues, Chimneys; seasonally or permanently seal all ducts, vents and grills not being used. Note- do not seal these if you have a flueless gas heater.
- Exhaust Fans; operate these ideally before turning on air-conditioning. E.g. this may mean having a shower beforehand, to prevent all the precious conditioned air being exhausted straight back out of the house.
- Mechanical Heat Recovery Ventilation (MHRV); where fitted (generally only fitted to houses constructed to be air-tight, i.e. <5 ac/h @50 Pa), operate the system according to the current



conditions. MHRV systems are generally to remain 'on' constantly, except when external windows/doors are open (e.g. in mild weather when the house is open) or when controlled infiltration vents are open for passive ventilation. MHRV systems may be activated (with all external openings and vents closed) for purposes of air quality control such as humidity, mould prevention, filtering pollen, smog, pollution, smoke, crop spraying chemicals, etc. This may help occupants with allergies and respiratory conditions, as well as promoting improved general health by breathing cleaner air. Where MHRV systems are turned off or a house is vacant and requires some trickle ventilation, select a few windows/grills/vents etc (as appropriate) to open just enough to allow for air movement.

1.3 Kitchen

- Cooktops; turn off just before the meal is finished cooking- the retained heat in the cooktop and the pot/pan will keep the food cooking until done. Electric cooktops are roughly 75% efficient (typically 800-2000W rated), but efficiency can be improved by using pans that are flat and that cover the full cooktop area. Induction is only marginally more efficient at 80%+, but draws an enormous current (typically 1200-3000W) and is therefore noticeably quicker for example boiling water.
- Lids (Pots & Pans); keep lids on pots & pans while cooking for a faster cooking time and to keep water vapour from escaping, or use a rangehood exhaust fan- however remember that your conditioned air (if heating or cooling is on) will be exhausted outside.
- Baking; do baking together or sequentially; e.g. roast dinner, cake, then biscuits to save power re-heating the oven.
- Meals; prepare hot meals on cold days, and cold meals on hot days.
- Toaster; select models with individually controlled pockets. Toast multiple pieces of bread together or consecutively, to make use of the thermal inertia (i.e. the wires remaining hot).
- Kettle - Energy; only boil the amount of water required at the time for use. The wattage rating (e.g. 1800W or 2400W) has no bearing on the energy consumed to boil water only the time taken, however boiling 2Ltrs of water versus 1Ltr, will use exactly twice the amount of energy.
- Kettle - Water; If you have an efficient HWS with fast hot water response times from your tap (i.e. short pipe runs to avoid wasting cold water), fill the kettle with hot water to reduce 'self-heating'. E.g. 1000W Kettle, 1Ltr cold tap water (e.g. 14°C), heated to 100°C uses approx. 100Wh of energy directly from the kettle. Alternatively, boiling the kettle using pre-heated water (e.g. 60°C) uses approx. 46Wh of kettle energy + the energy from the HWS system to pre-heat that water to 60°C at 10Wh (based on a Sanden HWS with Cop of 5), thereby using a total of 56Wh. That cuts the power used by approx. 50%!
- Sandwich press; cook sandwiches together where possible or consecutively, to make use of the thermal inertia (i.e. the plate remaining hot).
- Fridge; Each 5°C increase in ambient room temperature increases fridge energy use by 30%. Therefore, position fridges and freezers in cooler parts of the house, do not heat the rooms overnight or when not occupied, and avoid positioning next to ovens/cooktops or in direct sunlight. Also, keep fridges about 2/3 full to allow plenty of room for air circulation. Open the door for a short time only, avoid placing items directly over air circulation vents. Keep door seals in good order.
- Freezers; Keep freezers as full as possible for maximum efficiency. Fill extra space with ice cubes or freeze water in empty drink bottles, etc.
- Defrost; take food to be defrosted from the freezer and place into the fridge for 'free' cooling.
- Dishwasher Model; single connection models can use a huge amount of power due to heating water, motors, and hot air for fast drying. Select a dual connection (hot and cold water) model- this can save



up to 80% of power consumption when drawing hot water from an electric heat pump hot water system.

- Dishwasher Use/Cycling; always run full loads, however balance this with leaving room for water jets to spray onto dishes and face the dirtiest parts of the dishes towards the jets. Try to keep bowls, spoons and other dishes with identical shapes separated to prevent them nesting together. Low water use and low temperature 'eco' cycles conserve power and water. Use the dishwasher at a time of day when water pressure is high (i.e. no other water being used such as from washing machines) for better cleaning and also during the daytime in order to utilise available solar power. A trick is to turn off the cycle when drying starts to the load to air dry instead.
- Collect water from the kitchen sink with a container (e.g. after washing vegetables) and use for watering plants, etc. The 'Hughie' is a simple Aussie innovation to do specifically this, but any container works. Use this approach in other areas such as the laundry, shower, etc.

1.4 Laundry

- Washing Machine; always wash on a full load or alternatively use appropriate settings where available to reduce water level, run time, etc for smaller loads. Wash clothes in cold water as default. There is little performance difference in non-whites, however you will need to do a hot wash occasionally to clean the actual washing machine.
- Washing Machine Hot Water Connection; connect 'dual mode' washing machines directly to the main hot water supply (especially if an efficient type of HWS is available) to avoid the appliance 'self-heating' the water via resistive elements. If required, use a warm wash cleaning cycle, but finish with a cold rinse cycle- this is generally better for reducing creases too.
- Drying Clothes; dry clothes in open and well-ventilated areas (this can also provide evaporative cooling on hot days) and avoid drying clothes in small 'closed-up' rooms to prevent mould growth and bad air quality. As default, hang clothes on a clothes horse or outdoor clothesline, reserving the dryer only for when necessary. When using the dryer add 'wool dryer balls' or similar to help speed up the drying process and hence reduce appliance running time.

1.5 Bathroom

- Taps; turn taps off when not in use, e.g. whilst brushing teeth, shaving, etc, or even use a glass/cup.
- Shower Duration; showering for less time will save both a considerable amount of water, but also energy from heating the water. Aim for 4-5 mins, you can keep track using an 'in-shower' timer.
- Shower Head; utilise instant shut-off taps when applying soap/shampoo/etc. These devices can also be retrofitted, such as the 'shower saver'- a great Aussie invention.
- Shower Timing; shower prior to switching on heating or cooling, this prevents all your freshly conditioned air being exhausted back outside! Alternatively, seal the door to the bathroom, and open an external window in the bathroom for ventilation.
- Bath; keep the hot water warm for longer by adding bubble-bath (natural or home-made version of course) when running the water. The bubble layer will keep the heat in for longer to minimise hot water top-ups.



1.6 PV Solar Panel Systems

- Appliances; use appliances (or any power-hungry devices) at separate times, rather than simultaneously. Solar panels and batteries can only supply a limited maximum current, and anything beyond this is drawn directly from the grid. In off-grid situations, doing this will also increase battery life and charge levels, as batteries work more efficiently at lower rates of discharge. And where a generator is available it may be a good idea to run it 'pre-emptively' whilst using high amperage equipment such as ovens, multiple electric cooktops or arc welders.
- Timing; aim to schedule household power use to daylight hours when solar arrays are producing power at their maximum output. Occupancy patterns can make this difficult, however this can also be achieved by using timers for appliances, or by organising to do household tasks over the weekend or spare days through the week.
- Clean; clean solar panels regularly to ensure they are running at peak efficiency and generating maximum yield. Every 3-6 months would be advisable, however this is environment specific, e.g. coastal locations may be exposed to heavy salt spray, or mining areas heavy dust, each requiring increased frequency.
- Maintenance; keep your system maintained, generally an inspection every 12-24 months by a solar electrician is recommended. This can add years to the service life of a system, and increase yield over its lifespan.

1.7 Hot Water System (HWS)

- Taps; keep mixer tap handles in the full 'cold' position as default, this will substantially reduce hot water 'draw-off' (i.e. hot water unintentionally flowing and then going cold in the plumbing).
- Hot Water; use hot water directly from the tap to fill kettles, pots, etc, instead of heating water from cold using the appliance/cooktop only (which can be inefficient). Electric resistive appliances (e.g. kettles) are 100% efficient at best, however efficient HWS's (e.g. solar boosted or electric heat pump systems) can be up to 500% efficient.
- Power; for systems with a storage tank, turn your HWS 'off' when going on holidays. On return, heat the water back to above 60°C for at least 35 minutes prior to use, to kill any harmful bacteria that may have grown.

1.8 Electronics / Lighting

- Standby Power; can account for up to 10% of household electricity bills. To address this, turn-off electronics/equipment (at the power point if necessary) to cut standby power consumption. For example, even a central gas heater system will use electrical power on standby mode and simply unplugging it for the non-winter months could save 40-50kWh/year! This is approximately equivalent to charging a smart phone over 4,000 times or driving a car 140km.
- Recharging; many electronics (e.g. phones) are powered using lithium-ion batteries. To get the longest lifespan out of your battery and keep it running efficiently, avoid discharging below approx. 40%. To be precise the sweet spot for battery levels is between 65-85%. You can also charge your devices up to 100%, however continual charging overnight can also wear down a batteries capacity.
- Task Lighting; make use of task lighting and lamps (even opening blinds/curtains during the daytime) instead of turning on all the lights in the room/house being occupied.
- Light Bulb Efficiency; buy globes with a higher efficiency. Formula is Efficiency= Lumens/Watts. E.g. 80L/W is good, >100L/W is excellent.



- Light Fittings; keep all light fittings clean and free of dust (particularly indirect 'up' lights or strip lighting directed upwards) to ensure maximum light output and reduce the number of lights required to be switched on.

1.9 Gardening

- Gardening; design and maintain your garden so that it works with you in terms of house energy efficiency. Examples include; letting larger trees grow to the west to protect from hot afternoon summer sun, pruning overgrown plants or removing evergreens to the north that are blocking winter sun access, planting and maintaining deciduous vines to grow over seasonal eaves/awnings on the north, and natural water ponds where breezes flow into the home for natural evaporative cooling.
- Electric Garden Equipment Use; plan to use electric-powered garden equipment when battery power can be used most efficiently. E.g. mow lawns when they are dry, as wet grass is extremely heavy and will drain batteries quickly, and consequently use more power for the same area of lawn.
- Electric Garden Equipment Charging; re-charge batteries during the day to utilise home-generated solar power.

1.10 Rain Water Tanks

- Roof and Gutters; ensure that gutters, first flush diverters and tank inlets/strainers are clean, free from debris and not holding stagnant water. This will increase both the quantity and quality of the rainwater harvested, a lower reliance on mains water and hence lower utility bills.
- Water Tanks; clean RWT's every 3-5 years, or as conditions require. Preventing debris build-up in the bottom of a tank reduces debris being filtered and thereby increases filter cartridge lifespan. It also increases pump life with less abrasive materials flowing through.



2. HOW TO LIVE ‘SUSTAINABLY’

This section is a practical guide specifically on ‘how’ to live ‘sustainably’ in your home. These simple measures can be implemented by any household and will help save money, materials and reduce environmental impact.

2.1 Recycling

- Recycling Process; firstly reduce the need for recycling, but where unavoidable, organise a process for recycling systematically. This may include more than the standard set of categories like red, yellow and green bins, but further divided into composting (organic/food waste e.g. for use in the garden), soft and hard recyclable plastics separately, electronics (E-waste), etc.
- Containers; set-up stainless steel or timber containers (not plastic) at home, and line with newspaper if required, to sort items into different categories. See table below.

ITEM	EXAMPLE	RECYCLE
Hard Plastics	Tupperware, milk bottles, etc	Yellow Bin
Soft Plastics	Cling wrap, cereal box liner, plastic bag, cellophane, chip packets, etc	Special Bin- Take to Collection Point, e.g. REDcycle bins at supermarkets
Organic Waste	Fresh produce, food, grass clippings, weeds, etc	Worm Farm, Neighbours Chickens, Home Biogas, Green Bin, etc
Mobile Phones	Phones, tablets, smart watches, chargers, etc	Mobile Muster Recycling Program
TV's and Computers	TV's, computers and associated electronics, etc	The National Television and Computer Recycling Scheme
Printer Cartridges	Colour cartridges	Planet Ark Recycling Program
Batteries	All types of batteries	Batteryworld participating stores
Toothpaste tubes	White toothpaste tube	TerraCycle organised local community collection points
Chemicals/Liquids	Engine coolant, paints, pesticides, oils, inks, farm chemicals, etc	Chemwaste

- Facilitate; prepare recyclable items so that they can actually be recycled, e.g. empty/clean food containers, remove metal lids from glass jars, etc.
- Packaging; buy products with no packaging or with re-usable packaging that can be re-filled or re-purposed, this eliminates the need for recycling in the first place. And where unavoidable, choose products with the least amount of packaging possible, or bring your own containers.
- White Goods; fix/repair if possible (consider embodied energy of buying new) - e.g. new seals on an otherwise perfectly good fridge. Sell or gift items to charity, the manufacturer/retailer if they pick-up whilst delivering new appliances, second-hand dealers or metal recyclers, and local council recycling programs.
- Chemicals/Liquids; toxic chemicals and liquids should always be disposed of at an appropriate facility and never let into the natural environment where they cause severe damage, contamination and sickness to animals, plants and people.



2.2 Kitchen

- Food: eat seasonally. Plentiful produce is cheaper, there's less resources required to grow/harvest/transport when grown locally, and perfectly naturally ripened produce means peak nutrition.
- Food Storage/Shelf-life; ensure your cupboards and pantry are dark all day long by closing all doors, windows, blinds, etc, to exclude light- this helps preserve fresh produce longer. There are many other food specific preservation techniques, e.g. keep cheese longer by wrapping it in a vinegar-soaked cloth or paper towel to prevent mould. And as applied with many items- place in an air-tight container and store in the refrigerator.
- Food Waste; throwing away food waste into landfill creates methane gas emissions. Better uses include starting your own worm compost for use in the garden, saving the scraps for neighbours' chickens, or putting them in with your green waste (where local council programs permit). To prevent smells, food scraps may be stored temporarily in the fridge. Also utilise services such as 'ShareWaste', where 'food scrap providers' and 'composters' are matched.
- Cooking; use natural and unpackaged foods and cooking inputs- e.g. corn from a cobb rather than from a can, olive oil from a glass bottle rather than from a spray-pack which requires gaseous chemical propellants for operation, etc.
- Freezing Food; store food in heat-stable glass containers (e.g. Pyrex) or stainless steel, avoid plastic.
- Bin Liners (newspaper); see Appendices for folding instructions.
- Bin Liners (plastic); biodegradable or any single use bin bags should be avoided as these often end up in waterways and break-down into small pieces of micro-plastics that then kill many smaller marine life species. If necessary, at all, compostable bags that are 100% plastic free are the only single-use bags that should be thought of as environmentally friendly.
- Utensils/Pots & Pans/Equipment- buy only quality items made from quality materials. These are cheaper in the long run, more likely to be recycled, and longer service life means energy and resources are saved. E.g. Timber or 304/316/18-8 stainless steel dish racks will last a long time and can be recycled, whereas chromed or plastic-coated steel can rust within 3 months and end up in landfill.
- Utensils; timber utensils, chopping boards, etc are a healthier option, harbour less bacteria than plastic, are easier on knives and can be maintained for years of service with natural remedies (see Appendices).
- Pots & Pans; the following options may be considered for sustainable and healthy cookware. Also consider your cooking style e.g. 'seasoned' iron is good for oil/fat based frying, grilling, etc, whereas stainless steel is more suited to liquid boiling, slow cooking, acidic sauces, etc.
 - o Wrought (pressed) Iron- half the weight of cast iron, very long life spans, can be made from one-piece of wrought iron, perpetually recyclable.
 - o Enamelled Wrought or Cast Iron- the convenience of non-stick without the maintenance of 'seasoning' such as with uncoated iron.
 - o Pure Ceramic- all natural and comes without the mining and energy-intensive manufacturing processes of metallic cookware, instead using renewable raw materials such as pure clay.
 - o Stainless Steel- very long life spans, perpetually recyclable.
- Washing Up; natural dish washing liquid (see Appendices) combined with natural cloths/sponges (e.g. sea sponge, loofah, cotton, hemp, etc) can be a natural and sustainable way of cleaning without any chemicals, plastics or rubbish generated.



- Dishwasher Detergent; use natural dishwasher detergent (see Appendices) rather than toxic chemical based commercial products. Clean and freshen the dishwasher (kettle too) by running a cycle using only bicarb soda. Running vinegar through both appliances on a monthly basis is another way to keep them clean and free of residue.
- Dishwasher Use; make sure items stacked for washing are dishwasher safe- things like timber, cast iron, fine china, crystal or hand-painted dishes should only be washed by hand. Also in particular, do not mix steel and silver items as different types of metal in contact within a humid environment give the perfect scenario for galvanic corrosion. Also take caution with the bottom dishwasher rack, especially if using the hot drying cycle, as the heating element could melt some plastics.

2.3 Laundry

- Laundry Detergent; use natural or home-made detergents for washing clothes (see Appendices).
- Soap Berries; these leave no residue on the fabrics, they can be used without activating the rinse cycle, thereby saving water. If you are using grey water in your garden, there really is no better choice than soapberries (see Appendices).
- Pegs; stainless steel is the best choice for pegs, particularly the formed 'wire style'. These are simply stainless steel wire wound into shape, will last a lifetime and are perpetually recyclable. Choose the correct grade for your situation and habits, e.g. 316 marine grade would be the only choice for coastal homes where the pegs are left outside, however a lower grade such as 201 may suffice for inland locations and where the pegs are stored inside.

2.4 Bathroom

- Personal Care Products; make your own natural products (see Appendices), or alternatively buy from bulk stores with re-fillable containers. This can be applied to liquid soap, shampoo, conditioner, detergent, skin cream, etc. Many ethical brands are now making their products available in bulk for this very purpose.
- Personal Grooming; buy quality items for personal grooming that will last a long time and can be composted or recycled at the end of their life, rather than disposable and sent to landfill. E.g. stainless steel nail clippers will last a lifetime, plus can be totally and perpetually recycled. Apply this same principle to scissors, shavers (e.g. 'Leaf' shaver- all metal, uses replaceable razors, no plastic), etc, or alternatively buy compostable items, e.g. bamboo toothbrushes with natural bristles may be composted at the end of their useful life. This is full-circle, closed-loop sustainability perfection.
- Maintenance; extend the life of products by keeping them maintained. E.g. keep metallic items dry and not sitting in water to prevent corrosion. Clean soap sponges/loofahs/etc by soaking them for a day in equal parts vinegar and water.
- Deodorants; use only natural or home-made (see Appendices) products in liquid form or solid form and avoid synthetic deodorants (e.g. spray packs)- these contain propellants, VOC's and other toxic chemicals that are harmful and can cause degradation of Earth's ozone layer.



2.5 Cleaning

- Preparation; to clean sustainably the ingredients are only half the issue, the other is the packaging, utensils, etc that are used to carry out the cleaning tasks! Ensure the packaging is either compostable or perpetually recyclable such as cardboard or re-usable glass bottles. Applicators should be glass spray-packs, timber and natural fibred brushes, and natural hemp/cotton etc fabrics and natural sponges. Buckets, containers, etc should be glass, stainless steel or timber.

2.6 Gardening

- Natives; plant native flora to preserve natural and local plant species. This also helps create habitat for native fauna and insects which are adapted to these native plant environments and can feed on the fruits (e.g. mammals) and nectar (e.g. native bees and small birds), etc.
- Insects; around the world insect populations are in enormous decline and under attack from human activities like pesticide/crop spraying, chemicals in water ways, automatic bug killers switched-on 24/7, etc. Insects are the base food source of the entire land-based food chain and removing bugs would lead to a collapse of the entire ecosystem. Insects indicate a healthy environment and we must do all we can to promote more insects and provide a friendly environment around the house for them.
- Insect/Bee Hotels; native bee's live in holes approx. 3-10mm in size (no bigger) and live in solitary (but close together) or in groups of 3-12 bee's. There are about 2,000 native bee species in Australia and you can help them thrive by building a timber bee hotel e.g. using stacked bamboo or drilling holes into solid timber, to provide them with habitat. In return they will help your native plants flourish, and the whole local environment will benefit.
- Landscape Supplies; organise to buy in bulk and collect (or have delivered) gardening products such as mulches and manures, instead of purchasing in packaging like plastic bags. Bulk order with neighbours if required.
- Supplies; use what you have around the home before purchasing pre-made items, e.g. cut-up old towels or sheets and use these to tie back vines and plants.
- Cultivating; start from scratch, i.e. instead of buying seedlings in plastic pot plants, buy seed and start growing these into your own seedlings and into plants.
- Water; use water wisely. There are many ways to increase your collection of water and efficiency of its use. Collect from inside the house in buckets such as when waiting for hot water from a tap, use thick layers of mulch in garden beds to prevent evaporation of water in soils, use water-efficient garden beds such as wicker beds, etc.
- Compost; collect organic waste and food scraps, etc for composting and when broken down into rich soil this can be added to gardens to improve soil structure and produce healthier plants and more nutritious food harvests.
- Edging; an effective garden edge (e.g. to separate plants from lawn) can be as simple as a "spade edge". Simply dig into the ground with a spade at 90dg on the lawn edge, to a depth about the width of your hand, then meet this with a 45dg angle cut on the garden bed side. It looks great and can be recut every 6 months or Spring/Autumn to maintain. Tip- apply this sustainable thinking (deduction) to other scenarios, and you may find they too can be solved using less.



- Weeds; prevention is the best cure. Cover bare soil with ground covers and mulch with organic sugarcane or pea straw. Densely planting garden beds will also leave little room for weeds. Weeds are known to thrive not only in poor soil, but also in soil with an extreme pH range. So, test your soil (ideally between 6-7 pH) and if it's too acidic (common in Australia), apply lime, dolomite or poultry manure to correct, and if it's too alkaline, add compost, leaf litter or mulch. In addition, you can improve soil quality with manure, compost, seaweed formula, etc. Then your plants will thrive, and any weeds will struggle to compete.
- Weed Killer; There are numerous 'healthy' ways of killing weeds without resorting to toxic chemicals that poison the surrounding soil and plants and humans- in the case of edible gardens. Firstly however, build soil profile for resilient plants, outsmart the 'bad' bugs by organising nature to work for you such as by companion planting, avoiding mono-culture, attracting pest bug predators and planting plants that deter pests (buy a permaculture book for more info). If this doesn't work, the following or similar may be considered.
 - o Boiling water; is good for weeds growing through hard surfaces and cracks such as driveways or concrete paths.
 - o Salt; apply salt to weeds in a salt-water spray. Be very accurate however, as salt will kill everything and prevent new growth in the same patch of soil if sprayed. It can also erode concrete, so keep it away from driveways, etc, or rinse very well afterwards. Use a 2:1 water to salt ratio. Apply twice, a few days apart for greater effect.
 - o Vinegar; use household vinegar, although more concentrated horticultural vinegar (20% acetic acid) can be used for a faster result. This works well when the sun is shining, rain will wash it away, but also be careful that the acidic vinegar doesn't lower your soil pH. Alternatively combine vinegar and salt for a powerful solution. Use a 1:8 salt to vinegar ratio, and add a splash of dishwasher detergent (surfactant power) to penetrate the weed faster.
 - o Borax; apply borax to weeds in a borax-water spray. As with salt, keep overspray away from other plants and avoid spraying the soil. Don't let it contact bare skin. A good ration is 10g of borax to 300mL of water.
 - o Newspaper; starve the weeds of light and they will wither away.
- Insecticides & Pesticides; terms used to describe chemicals that control insects around the home and pests on conventionally grown food. At an individual scale, chemicals may not seem so detrimental to the environment, however when scaled up globally where there are billions of people spraying billions of litres of chemicals into the environment, the problem quickly becomes catastrophic. Pesticides not only contribute to human illness, but are a major factor contributing to the world-wide extinction of insects which would cause a total collapse of land-based ecosystems.
- Automatic Vermin Killers; never use automatic bug/insect or rodent killing devices. We have waged war on anything 'living' for too long and it will take a monumental human effort to bring our destroyed ecosystems back from the edge of collapse. Bugs are the backbone of land-based life, like krill is to ocean life, and careless killing of bugs (particularly outside of homes) not only diminishes bug life, but all the species further up the food chain such as birds, therefore plants, and the effect keeps spreading. Native marsupials can inadvertently be killed by automatic rat/mice killers, so if you are going to kill animals, use capture traps and kill only targeted species rather than blanket killing all life in and around your home.



2.7 Shopping

- Out & About; always be ready to be sustainable on the go by carrying a re-usable water bottle, coffee ('keep') cup, straw and cutlery, and you'll never be caught out having to use single use plastics.
- Shopping Bags (Re-usable); supply your own sustainable re-useable shopping bags. Natural hessian or jute are the most recommended considering the lower embodied energy from production and the ability to be composted. Alternatives such as calico (cotton) and 'green bags' (recycled PET) are not recommended or sustainable, due to the amount of water and chemicals used in their production. In fact, it would take roughly 130+ uses for them to have less environmental impact (in terms of embodied energy) than single-use plastic bags.
- Shopping Bags (Single-Use); biodegradable or any single-use bags should be avoided as these often end up in waterways and break-down into small pieces of micro-plastics that then kill many smaller marine life species. If necessary, compostable bags that are 100% plastic free, are the only single-use bags that should be thought of as environmentally friendly, however re-usable compostable bags (e.g. jute) are the best option.
- Containers; bring your own re-useable containers. Glass, stainless steel and timber are recommended. Use toughened and heat stable glass containers (for durability and option to freeze, e.g. Pyrex) or stainless steel or timber.
- Packaging; avoid buying food with ANY packaging, and where unavoidable, ensure it is perpetually recyclable or compostable.
- Online Ordering; if buying goods from overseas, choose or specify (if possible) that your goods be freighted by the most environmentally friendly method, note this may not be as quick. E.g. transporting goods by ship generates 177 times less emissions than by air.
- Purchases; buy products that are durable (for a long life), perpetually recyclable (over and over again), or compostable (degrades into soil). Consider the supply chain as different priorities apply to different products. E.g. cotton is a natural product and a good choice over synthetics for clothing, however it uses scandalous amounts of water in its production (by an Australian context) and therefore it may be more sustainable to ensure your item was manufactured using cotton grown from overseas.

2.8 Rain Water Tanks

- Exterior; Wash your tank all over periodically to remove accumulated corrosives such as salt (chlorides), air pollutants. Best results are with (natural) soap or cleaning agent and warm water, then washed off with cold water. This is particularly important for stainless steel tanks and those near the coast or highly polluted areas around heavy industry.



3. HOW TO LIVE FOR ‘OPTIMAL HEALTH’

How to live for optimal health is a fundamental knowledge source for people who want to perform at their peak ability such as elite sports players, focussed business minds, and indeed anyone who wants to be the healthiest version of themselves. This section is also critically important for pregnant mothers and parents with young children to ensure that healthy development of their young is not undermined by damaging living habits and local environmental factors.

There are many health problems that are rapidly increasing in our modern population including autism, type two diabetes, infertility, etc. In the 1970's about 4 in 10,000 children were diagnosed with autism, whereas now in the 2000's it is 1 in 35. These problems are being driven by a number of factors such as;

- Diet (eating too many synthetic foods and additives, not enough fresh produce).
- Eating/drinking/breathing/absorbing chemicals from food, water, air, skin products, clothes, etc.
- Electromagnetic fields (EMF's) and radiations (EMR's).
- Screen time and 'blue' light.
- Anti-social designed society (communications tech, poor urban layout and poor home design).
- Exercise patterns.
- Living in artificial environments, disconnection from 'place' and environment.

In simple terms, the further humanity deviates from nature and the natural world order, the further we deviate from health- and it may not be an episode or event from a single factor that triggers a health issue or illness in the body, but more commonly a cumulative effect over time that suddenly surfaces. Therefore, to stay in peak condition, the aim is to form habits only that contribute to improving your health.

3.1 Electromagnetic Fields and Radiation

- Exposure Standards; there are huge discrepancies between official government standards and scientifically researched standards that are advised for maximum exposure to electromagnetic fields and radiation. Internationally there are numerous standards and reports, however perhaps two of the most prominent are Building Biology- a practice developed by Prof. Anton Schneider in the 1970's with extensive records and subsequent standards set over the last 50 years, and the BioInitiative 2012- the most comprehensive report ever compiled on the biological effects of exposure to radiation. Unfortunately, our Australian government official limits are many thousands of times over the proven safe levels for long-term exposure, and with the available bandwidth frequencies ever expanding, and the power densities ever increasing, the health effects are only worsening for those who are exposed.
- Health Effects; the effects are varied and extensive and can include, but are not limited to, the following- headache, fatigue, appetite loss, insomnia, nausea, anxiety, memory impairment, damage to blood brain barrier, clumping of blood cells, less oxygen available to the body, nose bleeds, infertility, autism, Alzheimer's, neurological disorders, etc.
- Health Strategies; firstly eliminate sources of EMF/EMR from inside your home and surrounding areas where possible. Where impractical, the following basic theory will help to mitigate and take measures to minimise your exposure. Note, it is also recommended to consult a building biologist for your specific scenario.
 - o Magnetic fields generally cannot be shielded, except for point sources such as meterboards, generally magnetic fields permeate virtually all materials.



- High frequency radiation (phones, Wi-Fi, etc) can be shielded by metallic materials, whether the material is grounded or ungrounded.
- Electric fields and dirty electricity (from power cabling, made worse by electronic devices) can be shielded by metallic materials, but only if that metallic material is grounded or earthed.
- Shielded Clothing; quality shielded fabrics generally contain silver plated PU coated ultra-thin copper thread that is cocooned in polyester. Higher thread-count fabrics can block frequencies typically up to 3GHz, but may not shield against 5G as the allocated bandwidth frequencies in Australia are 3.5-3.6GHz, 26-28GHz, and in the future will be even higher. These could only be shielded by solid sheet metal (not woven metal). Quality garments (with coated metal to prevent corrosion over time) can't be grounded, and therefore will only block RF radiation. Additional measures would need to be taken to shield from other EMF's such as electric and magnetic fields.
- Earthing; 'Earthing' or 'Grounding' is the act of being coupled to the Earth and connecting to its natural energy through your feet, body, etc. It allows electrons to flow and helps the body relieve and recover from many ailments by neutralising free radicals in the body. Here is the complicated part- in a completely natural world, being earthed 100% of the time is great for your health, however 'Earth' is negatively charged and thereby attracts positively charged electromagnetic radiation (EMR). This EMR comes from power stations, mobile phones, internet, telecommunications, Wi-Fi, bluetooth, electric fields, etc. Therefore, when you are 'earthed', you become a conductor or an earthing point for these radiations that are looking for the fastest path back to 'earth'. Hence, in a highly charged electroclimate such as a city or a home with numerous electrical and wireless devices, being earthed may cause severe health problems due to the body's unbalanced and increased natural state of charge putting it into a stress state. The implications of being grounded therefore are derived from the local context and can only be known by testing with electromagnetic radiation testing devices such as those used by Building Biologists. Do not attempt to ground yourself and also note that electroclimates change over time with infrastructure and development. Example of a beneficial earth situation is walking in a forest barefoot, and a negative situation would be grounding someone in an office or grounding a bed where there are Wi-Fi devices in an apartment above.



- Magnetic Fields; and specifically alternating current (AC) magnetic fields are a type of EMF proven to have significant negative biological effects, and as it is not practical to shield from, avoidance is the best solution. See the below guide on magnetic field strengths of different household items and the required distance to keep clear of the fields.

Item	Magnetic Field Strength (nT)	Distance to 'Safe' Level (at 30nT)	Notes
Desktop computer towers	<5,000 nT	30cm	Use hardwired plug-in keyboard & mouse
Laptops	<5,000 nT	30cm	Do not use on lap
TV	30-150 nT	30cm	-
Appliance Displays	30-50 nT	-	Avoid contact
Washing Machine	>1,000 nT	1.0m	-
Fridge	>200 nT	50cm	-
Slow Cooker	>2,000 nT	1.5m	-
Kettle	>4,000 nT	1.0m	-
Toaster	>5,000 nT	1.2m	-
Ovens	>10,000 nT	1.5-2.0m	Applies to both fan bake & grill functions
Microwave	>19,000 nT	1.0m	>17,000 when on standby, ie not cooking- just from display panel!
Meterboard	>2,000 nT	1.5m	Result highly variable with amperage drawn. E.g. lights/tv <75cm, oven on >1.5m
Vacuum Cleaner (Corded)	>20,000 nT	1.5m	Use a standard barrel type vacuum, with a long hose
Vacuum Cleaner (Handheld Battery)	>20,000 nT	1.2m	>5,000 operation exposure
Electric Coil Cooktop	<4,000 nT	1.5m	Induction cooktops can be twice as intense

3.2 Electrics & Electronics

- Grounding; electrical equipment can be grounded to reduce exposure to dirty electricity and electrical fields. Note, devices with 3-pronged plugs already have a ground connection, and additional grounding connections may not be needed or may not result in any further improvements. Grounding kits may also come with built-in resistors to stop 'flow-back', however if your home's wiring is run correctly, this feature should not be necessary and would only reduce the effectiveness of connecting to the home's existing grounding wire.
- Earphones; use 'air tube' type earphones to stop radiation being emitted directly to your head, such that occurs from conventional earbuds/phones. To avoid electric fields, AC magnetic fields and in the case of wireless earphones- Wi-Fi radiation, air tube earphones solve this by transporting sound up air tubes.



3.2.1 Appliances

- Furniture/Appliance Layout; arrange furniture to position couches, desks, beds, etc to be at least 1.5m away from appliances drawing current such as fridges, stereos, printers, TV's, etc. This ensures safe distances from AC magnetic fields (which generally cannot be shielded against) and also electric fields.
- Digital Displays; displays on appliances such as microwaves, dishwashers, ovens, etc should be minimum 0.5m away from where extended time is spent, e.g. from kitchen benchtops where food preparation is done.
- Appliance Models; buy appliances without digital displays if possible, or with the ability to turn them off easily. Many are still available with manual knobs and dials, these are also more reliable and easier/cheaper to fix.
- Cycles; avoid running appliances overnight such as dishwashers, washing machines, or any other electronic devices. Not only do these have AC magnetic and electric fields surrounding the appliance itself, but even when located away from bedrooms, the wiring circuits throughout a home that are powering the appliance may transmit increased electric and magnetic fields and these impact on quality of sleep. As the general electroclimate becomes quieter, so too sleep quality improves.

3.2.2 Wiring & Power Cables

- Demand Switches; all circuits fitted with 'demand circuit breaker switches' at the switchboard/meterboard will automatically cut all power to the circuits they supply when there is no electricity being consumed. This eliminates voltage and therefore electric fields within those wires. To maximise the potential benefits of this feature and particularly for bedrooms, ensure that all power points, lights, fans, etc are turned off overnight at the switch. Electronics with standby power such as chargers, will continue to draw electricity and cancel out any potential health benefits from demand switches.
- Grounded Plugs; use grounded (i.e. '3-prong') connections/plugs for protection from electric shocks, however also to shield/reduce dirty electricity and electrical fields generated from the power cables and the connected appliances/devices.
- Cable Arrangement; run and position cables neatly, together and away from occupants. E.g. in offices around desks, cables from computer and electronic equipment can be run along the back of the desk from a power board. Note- a person's feet have important energy meridians so cables should not be run directly under foot. To further reduce exposure, cables could be run through grounded metal (e.g. copper) pipe and/or grounded mesh laid over powerboards, cables, etc.
- Dirty Electricity (DE) Filters; these can be 'plug-in' type filters or mains filters where they are installed to the switchboard. Exercise caution with their use however, and possibly consult your electrician/electrical engineer and building biologist first. DE filters can in some cases make matters worse, increase magnetic fields or have other unintended consequences. They also can consume very large amounts of energy and so, although addressing health issues, may not be acceptable from a sustainability perspective.



3.2.3 Computers

- Computer Use; computers and just about every electronic device emit various electromagnetic fields and the best way to limit your exposure is to simply limit screen-time whenever possible.
- Blue Light; screens from electronic devices typically emit very high levels of blue spectrum light when operating on default settings. Melatonin is a hormone in the human body that is critical to human health and exposure to this blue light, particularly after sunset, suppresses melatonin production. For humans, this impacts directly on the immune system, fertility and quality of sleep. EMF exposure has a similar impact on the melatonin hormone. To stay healthy, reduce exposure to blue light by avoiding screens (particularly at night-time), configure screen settings to filter-out and minimise the blue/green light wavelengths and reduce overall screen brightness. Wearing purpose made 'orange' (blue-blocker) glasses to wear may also be an option.
- Laptops; keep laptops away from the body such as on a bench or desk, rather than on your lap to avoid exposure to intense AC magnetic fields that directly surround these devices. Shielding mats are commonly for sale, but use caution as used incorrectly these mats could greatly worsen the situation by grounding the user, reflecting Wi-Fi radiation back up at the user, etc.
- Hardwire; always use hard-wire corded connections to accessories for computers such as ethernet, keyboards, mice, speakers, printers, etc. This will greatly reduce exposure to high-frequency radiation, which can improve concentration and productivity in the office, reduce anxiety and ultimately improve occupant health.

3.2.4 Personal Infrared (PIR) Heating

- PIR Heating Devices; have very intense magnetic and electric fields which are generated as they convert electrical energy into heat energy. They are available in the form of seat warmers, electric blankets and even heated clothing. This is detrimental to the human body and we strongly advise against using PIR devices categorically, however if required the only 'safe' operation would be to pre-heat the device, disconnect at the power point and then use. For e.g. electric blankets, preheat the blanket, but switch-off at the wall before hopping into bed. Every living organism, including the human body, communicates and controls its functions via very delicate bioelectrical signals, so enveloping it in an electromagnetic storm (i.e. electric blanket) is one way to send the signals haywire.

3.3 Communications

3.3.1 Phones

- Landline Phones; use non-battery low-emission corded phones, in preference to mobiles or cordless phones. NBN may no longer allow this however, as the 'line' connection no longer doubles as the power source as it was with copper landlines.
- Mobile Phones; always face the back of a mobile phone away from your head and body at all times (whether talking or not) as the built-in aeriels that send and receive telecommunications are designed to direct the most intense radiation away from your brain, which can be 2-3 times more intense on this side of the phone.
- Flight Mode; set mobile phones on 'flight-mode' when possible, but especially overnight whilst sleeping, as a bare minimum.



- SAR (Specific Absorption Rate) Ratings; use 'low-emission' type mobile phones and check the SAR rating before choosing a new phone. Note that signal output strength will also vary according to the level of reception- although better reception means higher 'ambient' radiation exposure, it also means that the exposure to very high 'acute' radiation directly from a phone that is struggling to communicate, is much reduced.
- Shielding Pouches; use these with your mobile phone to minimise direct exposure to RF radiation, ensuring the 'shielded' side of the pouch is between you and the phone!
- Phone Internet; ethernet adapters can be used to hard-wire connect your phone directly to an ethernet port, providing internet access whilst eliminating Wi-Fi exposure.
- Shielded Rooms; do not use mobile phones within a shielded room. They work fine on minimal receiving signals however, to send out a signal requires the phone to produce a very large radiation burst in order to communicate with the nearest telecommunications tower.

3.3.2 Wireless devices

- Wireless Devices; avoid wireless devices and replace with hard-wired alternatives, or disable the wireless function whenever possible. In the event there is no alternative, exposure may be reduced with temporary shielding- e.g. an internet router may have a piece of aluminium foil placed over one side, however ensure no-one is behind the other side as the power density can approximately double due to radiation reflection. Do not fully enclose a Wi-Fi emitting device.
- Wireless Charging; exposure and health effects is dependent on the technology type. Magnetic field induction type charging (i.e. 'resonance' charging) produces electromagnetic fields that are very concentrated and small, but keep a minimum arms distance from your person at all times. This is typical of electric toothbrushes, phone stations, or similar electronics in direct contact with the charging device. Remote wireless type charging stations however, do not require direct contact for charging as they utilise radio frequency radiation which permeates out in all directions around the device, and therefore should not be used at all.
- Hard-wire; use hard-wired ethernet connections in preference to Wi-Fi without exception. Phones, laptops, computers, etc can all be connected via ethernet ports or with the use of adapters.

3.4 Lighting

- Circadian Rhythm; the brightness and spectrum of light received by the brain through the eyeballs directly affects the bodies circadian rhythm (sleep and wake cycle), cortisol and hormone levels. By comparison to our biological history, the modern western lifestyle causes many people to receive too little sunlight during the day (brain not receiving full daytime signals) and too much light at night (brain not receiving full night-time signals) leading to low energy during the day and restless sleep at night. Melatonin is released into the body at night-time to sleep and rest/repair, however it is suppressed by light. Rising and sleeping with the natural patterns of the sun is the theoretical ideal, however it is possible to somewhat replicate this. E.g. making sure you receive sunlight during the day and using dimmer lighting at night-time before bed to activate the correct sleep hormones, low-level light options (even a dim red light bulb) in bathrooms for night-time 'loo stops' allows melatonin to continue to flow through the brain for deep restorative sleep. Avoid screen time of any sort before bed (even checking your phone for a few seconds can activate 'day-time' mode in the brain), etc.
- Light Bulb Colour; the optimal colour range for residential lighting is 2700-3000K. This provides a nice 'warm' feeling light, below this feels too orange/dull and above this creates a blue 'hospital' or sterile feeling.



- Colour Rendering Index (CRI); buy LED lighting with an Ra >90 index for good quality light that will prevent eye strain and cognitive confusion. This brings out the true colour of surroundings for a more 'natural' visual perception as it emits a wider spectrum of light.
- Lighting Design; avoid harsh overhead downlights that cause glare and shadows, instead use diffuse lighting for a more 'natural' and 'at-ease' feeling for occupants, and use task lighting in specific places for reading, working, cooking, etc.
- Lighting Placement; place lights, lamps, etc giving consideration to reflections and direct sight lines of occupants. E.g. lights directly in line with the TV can cause screen glare and eye discomfort. E.g. when lighting a desk area, shine light from the sides so that light bouncing off the page is not directed into the person's eyes or, if overhead, have the beam carefully angled so as to illuminate the desk area via reflection but without causing the person to shadow their own work.

3.5 Air Quality

- Outdoor Air Quality; when outdoor air quality drops due to e.g. bushfire smoke, pollution, smog, etc, keep homes fully closed and switch-on air filtration systems if available. If the air quality is at hazardous levels from e.g. a local factory fire, chemical spills, etc, relocate until it has passed.
- VOC's (Volatile Organic Compounds); are a group of carbon-based chemicals that evaporate easily at room temperature and cause a staggering range of health effects such as headache, nausea, eye/nose/throat irritation, confusion, fatigue, and in acute responses in poorly ventilated areas can be fatal. Reduce exposure by carefully screening what items are allowed indoors such as furniture, spray packs, deodorants, and replace all with natural and non-chemical alternatives.
- Air Filtration; eliminate pollen and indoor air pollution to help occupants with allergies and respiratory conditions. Clean up indoor air by using air filters, also lay out trays of tea leaves to absorb indoor air pollutants.
- Holidays; leaving a house unoccupied and locked-up may contribute to a 'stale' air smell. Prevent stale air and moisture build-up by allowing some form of trickle ventilation, e.g. leave a couple of awning windows open just enough so that the seals aren't pressed together.

3.5.1 Mould

- Mould Health Effects; can have devastating health implications on the lungs, respiratory tract, nervous system, microbiome, liver & kidneys. Mould generates mycotoxins and also aflatoxins- which can be genotoxic, meaning they can damage DNA and cause cancer in animal species and liver cancer in humans.
- Mould Remediation; Do not touch mould with bare hands, do not get mould spores in your eyes, do not breath in mould. It is advisable to get a consultant to find the cause of the mould problems, as treating the symptoms is only a short-term fix in most cases.
- Water Damage Remediation; throw out items that cannot be recovered from water damage such as mattresses, cane furniture, straw baskets, etc. Also carpet, drapes, stuffed toys, upholstered furniture and ceiling tiles unless they can be recovered by steam cleaning, hot water washing and thorough drying.
- Bathrooms/Wet Areas; ensure wet areas such as bathrooms, laundries, etc are not allowed to stay damp and wet for extended periods. Mould, bacteria and fungi can start to form in as little as 12-24hrs in ideal conditions. Switch exhaust fans 'on' whilst showering and run for 5 minutes after.
- Dehumidifiers; use dehumidifiers if required, to lower relative humidity (RH) of indoor air. The acceptable default for RH is approximately 50% indoors. If dry bulb temperature is optimum, then 30-65% may be tolerated. Sweating normally occurs at above 70% relative humidity. Below 35% and



static electricity may be generated between shoes and carpets. Below 20% is very uncomfortable for respiratory systems, eyes, etc.

- Humans; the human body produces approximately 3Ltrs of water vapour per day from breathing and perspiration. We are one of the highest indoor moisture contributors in the home.

3.6 Furniture

- 'Low VOC'; buy low-VOC rated furniture that is made without formaldehyde, constructed from natural materials and no other added chemicals.
- Bed Frame; use timber bed frames- these are not conductive like metallic bed frames and will therefore create an electrically 'quieter' space during sleep.
- Bed Mattress; inner spring mattresses are 'okay', but perhaps could be replaced with non-metallic alternatives such as natural latex. However, there are other important quality of sleep factors to consider, e.g. if you are a 'hot' sleeper, innerspring mattresses may give you an overall benefit due to ventilation and cooling, whereas latex or micro coil mattresses can make some people uncomfortably hot.
- Static Electricity; select fabrics that are organic and natural wool, hemp and/or cotton, rather than synthetic. Mixing of synthetic and natural materials creates a mixed electrostatic environment and fully synthetic materials will often raise body voltage levels as static builds from contact.
- Carpet; is never recommended for any home as they are the perfect breeding ground for bacteria and almost impossible to clean to a satisfactory level when living for optimal health.
- Rugs & Mats; it is preferable to use rugs in place of permanent carpet. Select natural rugs, without formaldehyde, xylene, toluene or other chemicals to reduce off-gassing of VOC's and improve indoor air quality.
- Timber; solid natural timber is preferable over manufactured timber products for all furniture, to avoid the inherent glues, chemicals, VOC's associated with manufactured products.

3.7 Bedroom

- Sleep Preparation; start your sleep routine well before going to bed to ensure a good night's sleep. Eat dinner well before and exclude ingesting any stimulants such as caffeine (e.g. coffee) or highly sugary foods/drinks (e.g. energy drinks). Minimise/eliminate screen time and have screen settings tuned to 'night' mode to minimise blue/green light wavelengths (these signal to your body to prepare for daytime activity). Reduce lighting to ambient levels with diffuse lighting, lamps, etc, rather than harsh bright 'sunlight' type lighting.
- Bed Canopies; that are radiofrequency radiation (RF) rated, should be fully closed at night-time for protection from high frequency radiation. This does depend on the scenario however and may not be required in a rural setting and where the house itself is designed to be electrically quiet but would undoubtedly apply to most houses in suburbia. Pulsating radiation is much more stressful and 'awakening' to the body than constant field exposure whether higher or lower considering most houses are fitted with Type 4 smart meters (that pulse every 30-40 sec's, rather than Type 4a non-communicating), this alone is one major reason to use shielded bed canopies.
- Magnets; are often used therapeutically to treat pain and discomfort. They come in many shapes and forms to treat localised areas of the body or even as blankets and underlays for mattresses. In the short-term, magnets can be useful, however magnets have strong magnetic fields and affect bio-electric systems, meaning long-term exposure can begin to have a negative overall affect.



3.8 Bathroom

- Skin; Our skin has a naturally occurring acid mantle layer, formed by sebum and sweat, which protects the body from bacteria, fungi, infections, etc. The ability of this function is highly affected by its pH level (on the scale 1 is highly acidic, 14 is highly alkaline, 7 is neutral) and skin is slightly acidic at 5.5 pH. Therefore, to maintain skin/scalp health, any personal grooming product should be carefully researched to ensure its pH level is equal to or below this level.
- Deodorants; use only natural or home-made (see Appendices) products in liquid form or solid form and avoid synthetic deodorants (e.g. spray packs)- these contain propellants, VOC's and other toxic chemicals that can be inhaled into the lungs, absorbed by the skin and impregnate the wall/ceiling linings of homes.
- Shampoo; many commercial shampoos contain harmful surfactants and antistatic/lubricating agents and detergents that will strip natural oils from your hair/scalp causing the skin to start over-producing oils to compensate. To restore the balance try using natural or home-made (see Appendices) alternatives. Examples include clay rinses, vinegar conditioner, soap berries, shampoo bars based on saponified oils (soap) rather than harsh detergents. Note, if using high pH products such as bicarb soda (pH 9), then a low pH conditioner such as vinegar (pH 2.4) should be applied so that besides lubricating, the electrostatic forces can be neutralised, the frizz effect eliminated and cuticle scales may be sealed again to ensure healthy hair. It can take six weeks for your hair to transition to natural products, where it will stop becoming too oily and become much healthier.
- Hard/Bore Water; hard water with high mineral content or even mains water with added chlorine can affect the health of your hair and skin (note chlorine can be filtered if required). Using a wooden hairbrush with natural bristles can also help distribute the protective oils from your scalp to the ends of your hair.
- Personal Products; nail polishes, perfume, hair spray, etc are all highly toxic products made from numerous synthetic chemicals that release large quantities of VOC's into the air. Avoid these completely and instead use natural equivalents or alternatives like essential oils.

3.9 Laundry

- Detergent; use only natural products and avoid chemicals, foaming agents, surfactants, synthetic fragrances, formaldehyde, etc, to keep both your body and home healthy. Natural detergent may be bought or home-made using just a few simple ingredients (see Appendices).
- Soap Berries; or 'soap nuts' as they are commonly called are the seed pods of a berry containing a very high percentage of saponins, a natural surfactant, which means they are nature's own ready-made cleaner. They are hypoallergenic, antibacterial, antifungal and odourless and great for sensitive skin, allergies, babies and children. They can be used for laundry detergent, but also dishwasher liquid, shampoo, hand wash, all-purpose cleaners, and more (see Appendices for further info and various recipes).
- Nappies (re-usable)/ Soiled Clothes; heavily soiled clothing and reusable nappies should be washed in a bucket, rather than a washing machine. This is particularly important where grey water systems use recycled water in gardens, however it can also depend on the type of grey water diversion or treatment system.
- Washing EMF Shielded Clothes; special care must be taken to wash EMF (electromagnetic field) shielded clothing, and this can vary depending on the fabric type and if protective coatings cover the metal threads in the fabric. There are specific EMF washing powders available, however poor water quality can also damage these metal threads. In particular sulphur, high fluoride, and low pH will react strongly with silver and destroy conductivity and shielding performance. As a precautionary action,



contact your supplier or test your tap water on a small fabric swatch before washing your garment, or alternatively use distilled, de-ionized or reverse osmosis water. Test the pH of water too with litmus paper.

3.10 Cleaning

- Cleaning; virtually all household cleaning tasks can be done with a few basic and natural ingredients including bicarb soda, vinegar, lemon juice, plant-based (e.g. castile) liquid soap, soap berries and essential oils (e.g. tea tree oil, eucalyptus oil, lavender oil, etc). Once you have these, any cleaning product can be created just by varying the ratio's, ingredients and application method. See the Appendices section for specific recipes, and remember to do your own research/experimentation, as their collective uses are unlimited!
- Anti-bacterial Products; avoid 'anti-bacterial' types of products- whilst they kill bad bacteria, their indiscriminate effect means good bacteria are also inadvertently killed. The microbiome is a complex system of good and bad bacteria held in a delicate balance that is vital for health in human beings. Specific 'anti-bacterial' products disrupt this balance and thereby can make people more susceptible to becoming ill, despite the reduced overall number of bacteria in the local environment.
- Vacuum Cleaners; barrel type vacuum cleaners are good for reducing EMF exposure- it keeps the intense magnetic fields of the motor further away from the operator, as opposed to other configurations such as hand-held. Use water or HEPA filtered vacuums only to avoid fine dust particles being thrown back into the air and utilise heads with mechanical pile agitation for a thorough clean.
- Robot Vacuum Cleaners; these can potentially help with reducing EMF exposure even further, however ensure that the model selected communicates with its base station via infrared only (like a TV remote) and never via Wi-Fi or radiofrequencies.
- Dust Testing; it is possible to test dust from vacuums to ensure that there are no unknown contaminants, chemicals, heavy metals, etc within a home. There are free programs such as the Macquarie Universities 360 Dust Analysis program.
- Tap Aerators; water efficient taps work by combining air into the water stream. This water saving process generates aerosol (air borne water particles), and if the water or aerator itself has a biofilm build-up that is harbouring bacteria, this could potentially be inhaled. Keep aerators clean by soaking the components in vinegar overnight and scrub with a toothbrush and possibly needle to unblock the small holes. Vinegar will also help remove any mineral deposits (scale).
- Pests & Vermin; as first priority, avoid attracting insects and vermin inside your home by keeping it clean and dry, and try all other options such as deterrents (e.g. essential oils), relocating, etc before resorting to killing. To address unresolved issues, never use chemicals or toxic substances (e.g. baits, poisons, etc which have detrimental flow-on effects to non-targeted species) and instead use natural or mechanic extermination methods for e.g. boiling water, mechanical traps, etc. Never kill 'pests' outside of the house- this disrupts the natural food chain and is completely useless for controlling internal issues.
- Vermin; Never use automatic vermin killers, and especially never outside of the house! These devices are indiscriminate and will kill not only mice and rats, but all types of small native marsupials that are already on the brink of extinction. Instead use non-toxic food baits in cages and catch rodents so they can be positively identified as a 'pest' species before being exterminated.
- Shared Electronics; items such as mobile phones, keyboards and TV remote controls are some of the highest bacteria yielding items. Keep excessive germ spreading under control by regularly cleaning with rubbing alcohol.



3.11 Chemicals

- Fragrances / Scents; use natural oil fragrances, and timber skewers as natural disperser. Never use spray packs or dispensers loaded with synthetic chemical fragrances.
- Insect Killer Spray; avoid ever using or spraying insect killing chemicals. The world is drowning in toxic chemicals and causing declining insect numbers, which form the base for all land-based life. The dead chemical ridden bugs then enter the food chain, affecting prey birds, then plants that rely on the birds, and the pattern of death continues. A few bugs are okay and represent a healthy environment.
- Anti-bacterial Products; avoid 'anti-bacterial' types of products of any sort (e.g. antibacterial soap, disinfectants, etc)- whilst they kill bad bacteria, their 'blanket' effect means good bacteria are also inadvertently killed. Sterile environments are not good anywhere except hospitals.

3.12 Kitchen

- Crockery; the best materials for pots and pans include wrought iron, cast iron, enamelled iron, stainless steel and pure ceramic. These are all highly stable alloys and materials. Avoid other materials such as aluminium (which can leach aluminium into food, especially with highly acidic items like tomatoes, vinegar, citrus, etc) and polytetrafluoroethylene (i.e. 'Teflon', a chemical coating that is toxic in production and is harmful to ingest).
- Materials; always use quality materials for all items in the kitchen such as timber, stainless steel, iron, ceramic and silicone. Plastics are petrochemical based products with numerous additional nasties and toxic production processes, plastic is always the absolute last resort.
- Equipment; buying quality is generally better in the long run, in terms of cost (longer life spans and often repairable), health (by effect of quality of materials) and environment (less resources used from cheap disposable products).
- Food Containers; Use only glass or stainless steel containers for storing food. Some glass types can be used in the freezer also, such as Pyrex.
- Hygiene; keep the most bacteria prone items in the kitchen frequently well cleaned. Deep clean the fridge approx. once per month, the benchtops and rangehoods frequently and soak the dishwashing brush in white vinegar or lemon juice overnight to reduce bacteria numbers. Top tip for overhead cabinetry- rather than scrubbing away built-up grease, place newspaper over the top and simply replace as required.
- Cooktops (Electric Resistive Coil); good for cooking food but can be slow for boiling water. This conventional type of cooktop is the most reliable, safe, and sustainable when powered by renewable electricity.
- Cooktops (Biogas); good for cooking food and for boiling water. This is produced with a home biogas digester, fed by organic and green waste. It is perhaps the 'greenest' cooktop option, however in cool climates may need supplementing with electric resistive cooking. Note- biogas is not the same as natural gas or LPG which are non-renewable, mined commodities that produce greenhouse emissions. Timber-fuelled cooking is also good where emissions are filtered and timber grown renewably on-site.
- Cooktops (Induction); good for boiling water only. Induction technology heats food with intense alternating current (AC) magnetic fields, with fields up to 20,000nT strong, whereas 'safe' levels are broadly accepted at 20-30nT before biological effects can be seen. Never use induction if possible, otherwise follow these precautions:



- Keep your body as far away from the cooktop whilst cooking and only stand next to it when tending to the meal being prepared. This is particularly critical for pregnant women, infants and children whose heads are at benchtop level. Use the rear cooking fields.
 - Use correctly sized pots/pans and perfectly centred to avoid intense stray magnetic fields.
 - Avoid touching the pot/pan or using metallic spoons, etc, to prevent leakage currents running through your body. Occupants with pacemakers should check with their doctor to ensure their device will not malfunction from the electromagnetic field interference.
- Appliance EMF's; whilst being operated, all electronics have electromagnetic fields of varying strengths and spread, and it is advisable to keep some distance as a buffer. E.g. step-away from the toaster while it is on, prepare food on another bench while the oven bakes, etc.
 - Digital Displays; on kitchen appliances such as microwaves, dishwashers, ovens, etc should be a minimum 0.5m away from where you prepare food and your body should never be pushed up against them whilst standing at the bench. Select appliances without digital displays to avoid having to dodge these 'hot spots'.
 - Microwave Ovens; work by generating radiation at approx. 2.4GHz in frequency which is absorbed by water molecules, causing vibration/friction which produces heat. You are what you eat, and people pursuing optimal health and peak performance should never eat microwaved food due to the many known effects to food, operational hazards, and resulting health risks. In the event of using a microwave, ensure it is never operated whilst empty, open the door away from your person to prevent full frontal absorption of stray microwaves, and never put anything metallic inside, and preferably no plastic containers which can add carcinogenic substances to the food in contact.

3.13 Physical

- Microbiome; is a complex system of good and 'bad' bacteria, but in a healthy adult these bacteria are held in a perfect balance as the 'microbiome'. Like a forest, it takes time to develop, yet gut flora diversity and the broader microbiome can be devastated by products that attack bacteria such as anti-biotic medicines, anti-bacterial liquid soaps, ingested chemicals, multi-purpose cleaners, anti-bacterial appliances, etc. Thereby people can become more susceptible to illness, despite the reduced bacteria count in the local environment. True health is about enhancing and promoting the good, rather than attempting to destroy the bad bacteria and unbalancing the natural order.
- Pets & Animals; can be a source and a 'vehicle' to transport bacteria, pests and debris from outside to the inside of homes. Ideally animals stay outside, however for those pets allowed inside, ensure they are kept clean and that they do not go into bedrooms or on mattresses. Flea collars, flea tablets, etc contain chemicals to kill bacteria, i.e. they are not formulated to promote human health and should be carefully managed or avoided, and potentially substituted with natural alternatives such as lime.

3.13.1 Diet/ Food

- Organic; to avoid chemicals and genetically modified 'non-foods', buy organic or grow your own produce, especially the more delicate varieties such as green leafy vegetables, grapes, stone fruits and berries. Varieties less prone to absorbing the toxins from non-organic farming includes bananas, avocados, pineapples, onions and peas. If organic is unavailable, soak your produce in a salt and water



solution (10% salt) or use bicarb soda (1%), for approximately 20 minutes and then rinse before eating/cooking.

- EMF's; electromagnetic fields (EMF) and radio frequency radiation (RF) can damage the body through triggering oxidative stress, resulting in the production of free radicals, the health effects of which are extensive and well documented. Studies have also shown that it is possible to counteract the effect of free radicals by taking antioxidants such as vitamin E, vitamin B9 (folic acid and folate) and melatonin.
- Pesticides; a term used to describe chemicals that control pests on conventionally grown food. They can cause birth defects, cancer, genetic damage, immune dysfunction, hormone imbalances and are one of the most difficult poisons for the body to process whilst protecting its organs.
- Water/Hydration; a person's sex and the specific body part varies the exact percentage of water but overall an average healthy adult is between 55-70% water. Dehydration is one of the main contributors to ill health across the planet. It is imperative therefore to keep fluids up so that the body can maintain itself in optimum health. Drinking at least 1.5-2 litres a day is necessary and a glass of water with some fresh lemon (alkaline) added is a great way to start each day. Note- distilled water is not good for drinking as it leaches minerals from the body.

3.13.2 Exercise

- Routine; exercise regularly to keep a good general level of fitness. This benefits the body not only in a physical sense, but also contributes to keeping the brain and the mind thinking positively. Mix up your routines often (every few weeks) so the body can constantly be stimulated preventing it from going into habit.
- Location; exercise well away from main roads and pollution, especially particulate matter from truck routes (diesel) and heavy industry (metal dust, chemicals, cleaning agents, VOC's, etc).
- Body Type; all bodies are different and this means different exercise types, routines and intensities will be more or less suitable depending on a person's anatomy and physical make-up. Considerations may be cardio, weightlifting, speed, repetitions, endurance, stretching. Personal experience and learning how to read one's own body are fundamental, however advice from chiropractors, physiotherapists, dietitians, etc will also help to build knowledge and to keep your body in peak physical condition over the long term.

3.14 Pregnancy & Infants

- Local Environment; the settings of a home environment are never more critical than for pregnant women, babies and young infants. This is the developmental phase and therefore any interference, be it from chemicals, electromagnetic fields, radiofrequency radiation, air quality, diet, lack of natural light, sleep patterns, physical activity, water quality, etc, will impact more greatly than on adults.
- Baby Monitors; pregnant women and young children/babies in a delicate phase of development are at most risk of harm from EMF and RF radiation. Avoid (wireless) baby monitors, electronic baby nappies, Wi-Fi baby wraps/patches or any other devices which electronically monitor your baby. Exposure risks include autism, childhood leukemia, behaviour problems, poor sleep and ultimately a range of developmental problems.
- Sleep & Light; a good night's sleep is key to health and wellbeing and allows the human body to rest and repair. A consistent time and pre-bed routine will help the body wind-down and be ready for



sleep. Light is also important and infants are often scared of the dark, however to maintain sleep quality, any introduced light source should be a warm colour (e.g. 2700K- like a sunset or campfire) and not blue white (i.e. 3000K+) which is biologically 'awakening' to the body. Alternatives to night lights may be glow in the dark stars or shapes on the walls and ceilings.

- Shielded Canopies; that are radiofrequency radiation (RF) rated, can be used to protect infants from high frequency radiation. Night-time is the most important and pulsating radiation (e.g. smart meters, phones, Wi-Fi, etc) is biologically very stressful and awakening to the body. RF exposure may not be a concern in rural areas, if the subject home itself has specifically been designed to be electrically quiet and healthy. Market available fabrics can shield frequencies up to 3GHz, however effectiveness will reduce with higher frequencies (e.g. 5G), and therefore warrant different materials/approaches.

3.15 Gardening

- Permaculture; is a way of working with nature in order to live sustainably. In an agricultural sense it harnesses the power of natural processes to replace human effort and smart farmers utilising this approach reap much greater rewards such as higher yields, climate resistant crops and improved property values. Indirectly the environment benefits from no chemicals, improved soils, greater biodiversity and drought proofed land. It is the approach where all stakeholders win.
- Insecticides & Pesticides; always avoid using toxic chemicals in and around your home and garden. Pets, shoes, etc spread these chemicals around which are then absorbed by the body through the skin, inhaling, ingesting, etc. They can cause birth defects, cancer, genetic damage, immune disfunction, hormone imbalances and are one of the most difficult poisons for the body to process whilst protecting its organs. The environment is an interconnected web, nothing is in isolation and everything comes back full circle. For e.g. poisoning insects not only kills that target species, but the birds that eat them, and so on. Use permaculture principles instead, plant plants that deter pests or ones that invite predatory insects that naturally clean-up the 'problem' insects.
- Grey Water to Garden; if you are using grey water in your garden such as from the laundry, shower, basins, etc, it is critical that only natural cleaners, detergents, shampoos, etc are used in the household. This may change depending on the type of grey water diversion or treatment system installed however, the above measures will prevent any toxic chemicals reaching the garden, thus ensuring a healthier diet, digestive system and whole body.
- Soil Testing; can be carried out by Macquarie University, where they run a 'vegesafe' program that provides soil sample testing for heavy metals. This is a very worthwhile check to ensure the quality of home-grown produce and therefore the health of anyone eating the produce.

3.16 Rain Water Tanks

- Roof and Gutters; ensure that gutters, first flush diverters and tank inlets/strainers are clean, free from debris and not holding stagnant water. This will increase the quality of the rainwater harvested.
- Water Tanks; clean RWT's every 3-5 years, or as conditions require. Preventing debris build-up in the bottom of a tank reduces debris being filtered and thereby increases filter cartridge lifespan and the purity of the water being supplied. Cleaner water means healthier bodies and less risk of illness.



- Filtration; for drinking water supply use a two stage filtration system with a coarse and a fine filter, and preferably with a UV sterilising tube as the final stage process to kill any water-borne bacteria. Inspect filters regularly and replace as necessary.
- Water pH Levels; is the 'pondus hydrogenii' unit and indicates a solution's acidity or alkalinity. On the scale from 0-14pH, acid is 0-7, alkaline is 7-14 and 7 is neutral. Natural water typically ranges from 6.5-8.5, and 7pH being optimal for drinking water. Plants and vegetable gardens however, prefer slightly more acidic water between 5-6.4pH. It is possible to alter pH levels if necessary, by using additives such as lime, soda ash, nitric acid, bicarb soda, etc, however care is required. You can test the pH of water with litmus paper or a pH meter.



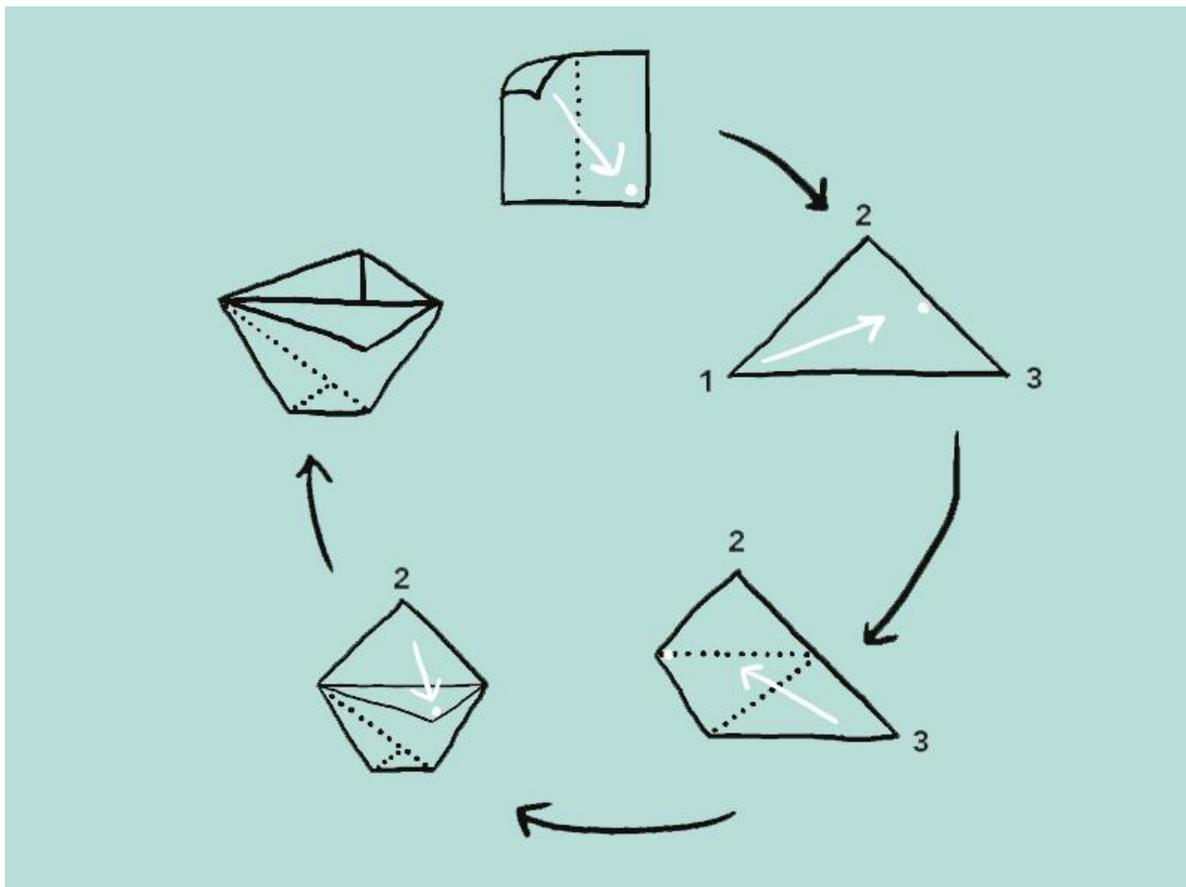
6. APPENDICES / FURTHER REFERENCES

This section provides information, guides and recipes for how you can live environmentally friendly, sustainably and for optimal health.

6.1 General

6.1.1 Bin Liner – Newspaper

How to fold a newspaper bin liner. Use two sheets for extra strength and fold as per diagram:



6.1.2 Glass Cleaner

- Ingredients:
- 1 cup distilled water (or boiled and cooled)
- 3/4 cup rubbing alcohol (isopropyl)
- 1/2 cup white vinegar
- 5 drops peppermint essential oil
- 5 drops lemon essential oil
- Method:
- Add all ingredients in a bottle with atomiser, and shake well.
- Spray over glass and wipe off.
- Store in a cool place away from heat. Label clearly.



6.2 Kitchen

6.2.1 Cooktop Cleaner

Bicarbonate of soda and vinegar have almost unlimited cleaning applications. Firstly, bicarb soda is a mild alkali meaning it can cut through dirt and grease, as a powder it can scour surfaces. Being a natural product and a food, it is completely safe to use in the kitchen. It also neutralises odours e.g. on carpet, furniture or left open in a box in the fridge. Secondly, vinegar is an acid type liquid that makes an effective cleaner, disinfectant, deodoriser and stain remover. Despite being a natural product and food safe, some caution is needed with where it is used e.g. natural stone can become etched and hardwood floors damaged by the acidity. Each cleaner is great on its own or when combined can be dynamite for a very short time, however not long after the reaction 'fizz' has taken place between the two ingredients, there is nothing left but salty water- not much cleaning power.

- Ingredients:
- Bicarbonate soda
- White vinegar

- Method:
- Sprinkle bicarb soda over the cooktop.
- Spray vinegar over the bicarb soda, which will cause a 'fizzing' reaction, then wipe off with a cloth or paper towel.

6.2.2 Drain Cleaner Bomb

The reaction between bicarb soda and vinegar may help clear away built-up debris in the pipes, plus it's gentler on the plumbing and the environment than harsh chemical drain cleaners.

- Recipe:
- 1/2 cup bicarb soda
- 1 cup white vinegar

- Method:
- Pour 1/2 cup of bicarb soda into the drain. Then, pour in 1 cup of vinegar to initiate the reaction. Other quantities, in the same ratio, may be used. After the fizzing stops, run hot water down the drain to clear it out.



6.2.3 Timber Chopping Board Cleaner

There are different ways to clean a chopping board and additional processes based on what has been on the chopping board.

- Recipe 1: (Bicarb Soda)- Cleaning
- 1 tbsp bicarb soda
- 1 tbsp salt
- 1tbsp water
- Method:
- Mix all ingredients into a paste and then scrub the chopping board.
- Rinse thoroughly with hot water and dry.

- Recipe 2: (Vinegar)- Disinfecting
- White vinegar
- Method:
- After washing with bicarb soda as above, disinfect the board by giving it a wipe with full-strength white vinegar.

- Recipe 3: (Lemon & Salt)- Deodorising
- White vinegar
- Method:
- After disinfecting with vinegar as above, you can also deodorise the board by cutting a lemon in half and rubbing over the board. Add salt to absorb odours. Alternatively sprinkle bicarb and spray with white vinegar and leave for 10 minutes. For either method, finished by rinsing, wipe clean and leave to dry.

- Recipe 4: (Hydrogen Peroxide)- Meat
- 3% hydrogen peroxide in water
- Method:
- Additional cleaning may be desirable after chopping raw meat. Spray enough hydrogen peroxide over the chopping board for it to get into the cuts and rub it in with a clean cloth. Rinse with water and then dry.

- Recipe 5: (Oil & Wax)- Conditioning
- Food grade oil (e.g. linseed, sunflower, etc)
- Food grade wax
- Method:
- Apply food grade oil (combined with beeswax is recommended which helps protect the timber) and let it soak overnight. Wipe excess oil away the next morning and it's ready to use.



6.2.4 Carpet Cleaner

- Recipe:
- bicarb soda
- White vinegar
- Method:
- Dampen the spot with vinegar, then sprinkle a generous amount of bicarb soda over the top.
- Leave overnight or until the spot has dried up completely, then vacuum up.
- Notes:
- It's always a good idea to test any carpet-cleaning method on a small spot first to make sure it doesn't damage the fibres.

6.3 Laundry

6.3.1 Laundry Detergent

- Recipe 1: Liquid
- Ingredients:
- 1 cup borax
- 1 cup washing soda
- 1 cup liquid castile soap (omit for cloth diapers)
- 10 – 15 drops essential oil (optional)
- 17 cups water (4.25L)
- Method:
- In a large saucepan, bring 6 cups of water to a slow boil. Once the water begins to boil, turn off the cooktop and add the borax and washing soda. Stir to dissolve.
- In a large bucket, combine the remaining 11 cups of room-temperature water and the castile soap.
- Add the essential oil, then pour the hot borax mixture from the saucepan into the bucket and stir.
- Pour the completed mixture once cooled into the desired storage container.
- Notes:
- Over time the mixture may form into a gel or have liquid and gel separation, but simply stir or shake to restore (gel will dissolve in washing machine). Use 1/8-1/4 a cup of soap per load of laundry. Small amounts can be used directly on stains.
- Soap must be omitted from the recipes for cloth diapers to prevent build-up which will repel moisture, and eventually need stripping out. Finishing with a vinegar rinse after washing can also help.

- Recipe 2: Powder
- Ingredients:
- 4 cups borax
- 4 cups washing soda (sodium carbonate)
- 2 cups bicarb soda (sodium bicarbonate)
- 4 cups grated lye or castile bar soap (2-4 bars) (omit for cloth diapers)
- 10 – 20 drops essential oil (optional) (tea tree good for cloth diapers)
- Method:
- Grate soap bars with a fine cheese grater as finely as possible.
- In a bucket with a lid, combine the borax, washing soda and bicarb soda and shake vigorously to combine.
- Stir in grated/powdered bar soap, then stir in essential oils.
- Store in an airtight container.



- Use 1-2 tablespoons per load (adjust to your machine). If the powder has trouble dissolving, mix it with some hot water before adding to laundry.
- Notes:
- Wear gloves when making, as washing soda and borax are skin irritants. Also wear a dust mask to prevent inhaling the dry powders while mixing.
- Soap must be omitted from the recipes for cloth diapers to prevent build-up which will repel moisture, and eventually need stripping out. Finishing with a vinegar rinse after washing can also help.
- Recipe 2A: Liquid (follows on from 'Recipe 2' above)
- Ingredients:
- (as per recipe above) +
- Hot water
- 20L bucket with lid
- Method:
- Grate soap bars with a fine cheese grater as finely as possible.
- Place in a pot, cover with water and simmer on medium heat until melted, stir occasionally.
- Pour liquid into a 20L bucket.
- With gloves and dust mask on, add washing soda, bicarb soda and borax to the soap mixture and stir.
- Add enough hot water to almost fill the bucket, stir thoroughly until all ingredients are dissolved.
- If using essential oils, add to the mix, but only after it has completely cooled down.
- Leave overnight to gel.
- Pour into a container or leave in bucket with a lid. Stir or shake well before using and use approx. ½ to 1 cup per load, adjusting for your machine.

6.3.2 Laundry Soap Berries

Soap Berries; or 'soap nuts' as they are commonly called are the seed pods of a berry containing a very high percentage of saponins, a natural surfactant, and the following is how to use nature's readymade cleaner in their natural 'solid berry' state.

- Method 1: Cold Wash (with solid berries):
- Prior to a cold wash, soak the bag of berries in hot water for 5 mins to soften the shells and activate the saponin.
- Add to the washing machine with the berries inside a cloth pouch and start the washing cycle.
-
- Method 2: Hot Wash (with solid berries):
- Add berries to the washing machine inside a cloth pouch. The saponins are released more effectively in warm water, about 40 degrees is ideal.
-
- Notes:
- Soapberries work in all different temperatures, on average you may get 5 loads out of solid berries, possibly a few less in hot washes, or a couple more in cold washes.
- Agitation can also help bring out the sudsing (bubbles) effect.
- Don't leave the berries in contact with wet clothes for long and also avoid inadvertently tossing them into a dryer as this will shorten their lifespan.
- Soap berries may not be as effective in areas with hard water, bore water, or high mineral content. Increasing the quantity of berries in each wash may be required.



6.3.2 Laundry Additives

Experimenting with the following additives may be useful for laundry washing, depending on your requirements:

- Vinegar; add to help remove tough stains. Also add to the rinse cycle to soften fabrics.
- Lemon juice; add to whiten clothes, for stain removal and fresh fragrance.
- Sodium percarbonate; an oxidising agent used to de-stain, deodorise, and whiten.
- Tea tree; an essential oil with natural anti-bacterial properties.
- Bicarb soda; can be used with water to soak clothes overnight before washing, or added during the wash cycle for top loaders once the water has filled-up. If using on a cold water cycle, dissolve in a some hot water before adding. Used to remove odours.
- Hydrogen peroxide; natural cleaner, disinfectant and bleaching agent.

6.4 Personal Care Products

Making or buying natural personal care products can be very rewarding and contribute to greater health by excluding chemicals and synthetic materials often in contact with the body from commercial products. To gain the most from your natural products, there are some universal points to note:

- Distilled water; is pure H²O with no bacteria and therefore can extend product shelf-life if used in place of fresh water.
- Refrigerate; storing natural products in the fridge extends shelf-life across all natural products.
- Citric acid; is a natural preservative that may be used. To do this, mix equal parts (e.g. 1 tsp) of citric acid with boiling water and stir to dissolve. Then add to the selected product after it is made.

6.4.1 Shampoo Clay Rinse

Depending on hair length, this recipe makes enough for two applications.

- Ingredients:
- 3 tablespoons kaolin white clay (origin- Australia, or experiment with other locally sourced clays)
- 1 1/2 tablespoons apple cider vinegar (from pantry)
- 1 tablespoon castor oil
- 2 teaspoons rose hydrosol (optional)
- 10 drops lavender essential oil
- Method:
- Mix all ingredients together until you have a smooth (lump-free) pliable paste. If it's too thick, add another teaspoon of apple cider vinegar.
- Put mixture into a small glass jar ready for use.
- Notes:
- To use, massage into damp hair from roots to tips until well coated. Let it sit for 2 minutes, then rinse out thoroughly with warm water. Blast with cool to cold water to seal the hair cuticles. Gently towel dry as normal.
- Use within 2 weeks. It may thicken between uses, however add water to thin the consistency.



6.4.2 Shampoo Herbal Rinse

A simple herbal shampoo recipe based on castile soap.

- Ingredients:
- Herbs
- Liquid castile soap
- Method:
- Prepare a strong herbal infusion, choosing herbs that are nourishing to hair, such as horsetail, nettles, chamomile, calendula or comfrey.
- Fill a small jug or glass jar about halfway with the dried herbs, then pour over with boiling water until full. Leave this overnight to infuse.
- Strain mixture through a fine mesh (cotton, hemp, etc) bag into a dispenser and then add the liquid castile soap at approx. 1:2 ratio, however this ratio can be adjusted for personal preference.
- Notes:
- Used herbs can be composted.

6.4.3 Conditioner Vinegar Rinse

Conditioning your hair with apple cider vinegar adds shine, brightens the natural colour, leaves hair soft and easy to comb, removes soap build up, and helps combat dandruff and eczema. It's also simple, natural and toxin free.

- Ingredients:
- Small handful of dried flowers or herbs
- 100ml apple cider vinegar
- 50ml purified or distilled water
- 12 drops of selected essential oil
- Method:
- Add dried flowers to the apple cider vinegar and leave this overnight to infuse.
- Strain mixture through a fine mesh (cotton, hemp, etc) bag and into a glass jar.
- Add essential oils and distilled water to the mixture.
- Pour into a glass bottle with atomiser (preferably dark glass to help preserve a longer shelf life)
- Notes:
- The type of dried flowers, herbs and essential oils you choose will depend on whether you have dark or light hair. Light hair; use lemon essential oil, dried chamomile flowers (optional), dried calendula flowers (optional). Dark hair; lavender essential oil, rosemary essential oil, dried lavender buds (optional), dried rosemary leaf (optional).
- To use, wash hair and towel dry, then apply vinegar spray sparingly into the mid areas of your hair and one quick spray on top. Comb through from roots to tips and let it dry naturally.
- Keep out of direct sunlight and use within 3 months.



6.4.4 Body Wash / Shower Gel

- Recipe 1: Honey Wash
- Ingredients:
- 1/4 cup raw honey
- 2/3 cup liquid castile soap
- 2 tsp carrier oil (e.g. jojoba, sweet almond, grapeseed, sesame, or olive)
- 1 tsp vitamin E oil
- 50 – 60 drops essential oils
- 1 tsp xanthan gum (or guar gum at half the quantity)
- Method:
- Warm the honey into a liquid form for easy mixing, but stay below 35°C (at which point some of its health benefits diminish).
- Add all ingredients to a bottle with liquid dispenser, then shake to mix.
- Notes:
- Shake gently before each use. To use, squirt onto a washcloth, bath pouf, or directly onto body.
- If using as a baby wash, the essential oils may be omitted, or add just a few drops of chamomile or lavender essential oil. And for children, use half the suggested amount of essential oils.

- Recipe 2: Butter Wash
- Ingredients:
- 1/3 cup liquid castile soap
- 1/3 cup warm water (distilled, for longer shelf-life)
- 2 tbs shea butter (melted)
- 2 tbs carrier oil (e.g. jojoba, sweet almond, grapeseed, sesame, or olive)
- 1 tbs vegetable glycerin
- 10 drops essential oil (e.g. Lavender)
- 1 tsp xanthan gum (or guar gum at half the quantity)
- Method:
- In a medium sized bowl, add the melted shea butter, carrier oil, and glycerine, then sprinkle the xanthan gum over. Allow the gum to rest until the powder sinks into the liquid, then use an immersion blender to dissolve the gum into the oil mixture by pulsing for about 1 minute. Add in the castile soap and warm water. Pulse the mixture for another 1-2 minutes until it turns into a creamy consistency, then transfer to a dispenser bottle.



6.4.8 Deodorant

- Recipe 1:
- Ingredients:
- 1/2 cup bicarb soda
- 1/2 cup cornflour
- Method:
- Add both ingredients to a container and shake vigorously for about 1 minute to thoroughly mix the powders.
- To use- apply a small amount under the armpits with a soft cloth, cotton ball or similar.
-
- Recipe 1 Variation A:
- Ingredients:
- 3 – 5 drops tea tree oil
- 2 whole bay leaves
- Method:
- Mix in tea tree oil to Recipe 1 above, then add two whole bay leaves into the jar/container.
-
- Recipe 1 Variation B:
- Ingredients:
- Coconut oil
- Method:
- Add to Recipe 1 as much coconut oil for the consistency desired. Other preferred oils may be used.

