



**BUILDING BETTER HOMES FOR YOU.
IT'S THE GREEN HOMES NEW ZEALAND WAY.**

A modern, two-story house with a large wooden garage door and a stone wall on the left. The house has a white roof and a mix of grey and wood paneling. The background shows a clear blue sky with some clouds and green trees. The foreground is a well-manicured lawn with some plants and a paved driveway.

**Step-by-Step Guide to
BUILDING A
GREEN HOME**

**Build a green, sustainable and environmentally
friendly home, without breaking the bank.**

The building principles of a sustainable home and environmentally friendly living,
developed especially for the New Zealand climate.

THE GREEN BUILDER E-BOOK SERIES

The Green Builder eBook series is an incredibly successful and informative series of publications that discuss how you can build a green, sustainable and environmentally friendly home without breaking the bank. Titles in the series include:

The Green Builder’s Step-by-Step Guide to Building a Green Home.

The Green Builder’s 10 Questions to Save You Thousands eBook.

A TRULY UNIQUE CERTIFICATION IN GREEN HOMES

Green Homes New Zealand is the only internationally compliant Green Builder in New Zealand. Green Homes New Zealand is the only builder in the country who is in compliance with the International Standards Organisation for design and construction of energy efficient homes (ISO 50001).



This means you can have peace of mind knowing the construction group building their home has undergone the most rigorous review and approval process in the world, across all aspects of energy management, design and construction.

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ABOUT THE AUTHOR

*There's only one way to build a Green home...
with someone who knows what they are doing.*



ABOUT THE AUTHOR

Mick Fabar, also known as The Green Builder, has been building and designing residential homes for over 20 years, including numerous state and national award-winning Green homes.

Over the years he's learnt that most consumers and contractors don't understand the basic principles behind building an environmentally friendly home. Therefore the goal of this eBook is to step you through the key principles that are critical to know before designing or building a new home or extension, whatever location you're thinking of.

*A man on a mission to show that sustainability
doesn't cost the Earth.*



Mick firmly believes that spending lots of money doesn't guarantee you the most efficient home. Instead, with intelligent design and selection of building materials, fittings and appliances you can build a great Green home without breaking the bank.

With the help of his hand-picked, highly qualified team at Green Homes New Zealand, Mick continues his mission to raise the standards of sustainable construction on both residential and commercial projects... and he applauds any owner or builder who takes the time to learn how they can be more environmentally aware well within their budget.

*Come with Mick on an easy to follow, step by step
guide to a building better Green home.*

The best place to start, is reading this book.

WHY BUILD GREEN?

Separate the facts from the fiction & find out just how great a Green home can be.

Enhance efficiency. Reduce utility costs. Embrace renewables. Increase comfort. Go Green!

Sounds like a tall order, but it's completely true. As we'll explain in the following pages, if you follow the key principles in design and build, your new Green home will perform more efficiently than a standard home by reducing energy and water needs, utilising renewable resources and reducing impact on the environment.

A Green home owners greater comfort, control and a healthier space to live in all year round, regardless of your local climate.

Learning to build a Green home isn't as hard as it seems. Once you understand the basics and incorporate them into your own design, you are well on your way to building a home that will perform as a highly efficient working body in its own environment. When the design, inclusions and construction are correctly integrated, the results will be outstanding!



These days there is so much information available on building Green that it's difficult to tell what is based on fact and what is 'greenwash'.

So we've done all the hard work for you.

After years of research and accumulated expertise in building environmentally efficient homes, we are happy to share all that we've learned in one valuable, easy to use, step by step eBook. There's now no need to spend countless hours doing homework, all the key principles you'll need to develop your project are right here... along with our support team who are always on hand to provide advice and assistance in the build of your sustainable home.



A Green home helps you protect the future of the environment and your resale value.

A Green home will be more economical to run, provide a healthier, more comfortable living environment (with little or no mechanical assistance) and it will ensure a better resale return than a standard ever home could. So you get to enjoy the fantastic combination of growing your family wealth while reducing your impact on the environment, helping preserve the planet for future generations.

...plus, it really doesn't cost the Earth.

It's not the most amount of money that builds the best Green home, it's the smartest use of materials and ideas. By using the key principles that follow, you'll be bang on track to increasing the efficiency of your home and lowering the costs.

Here's to a more ethical, economical and environmentally friendly future!



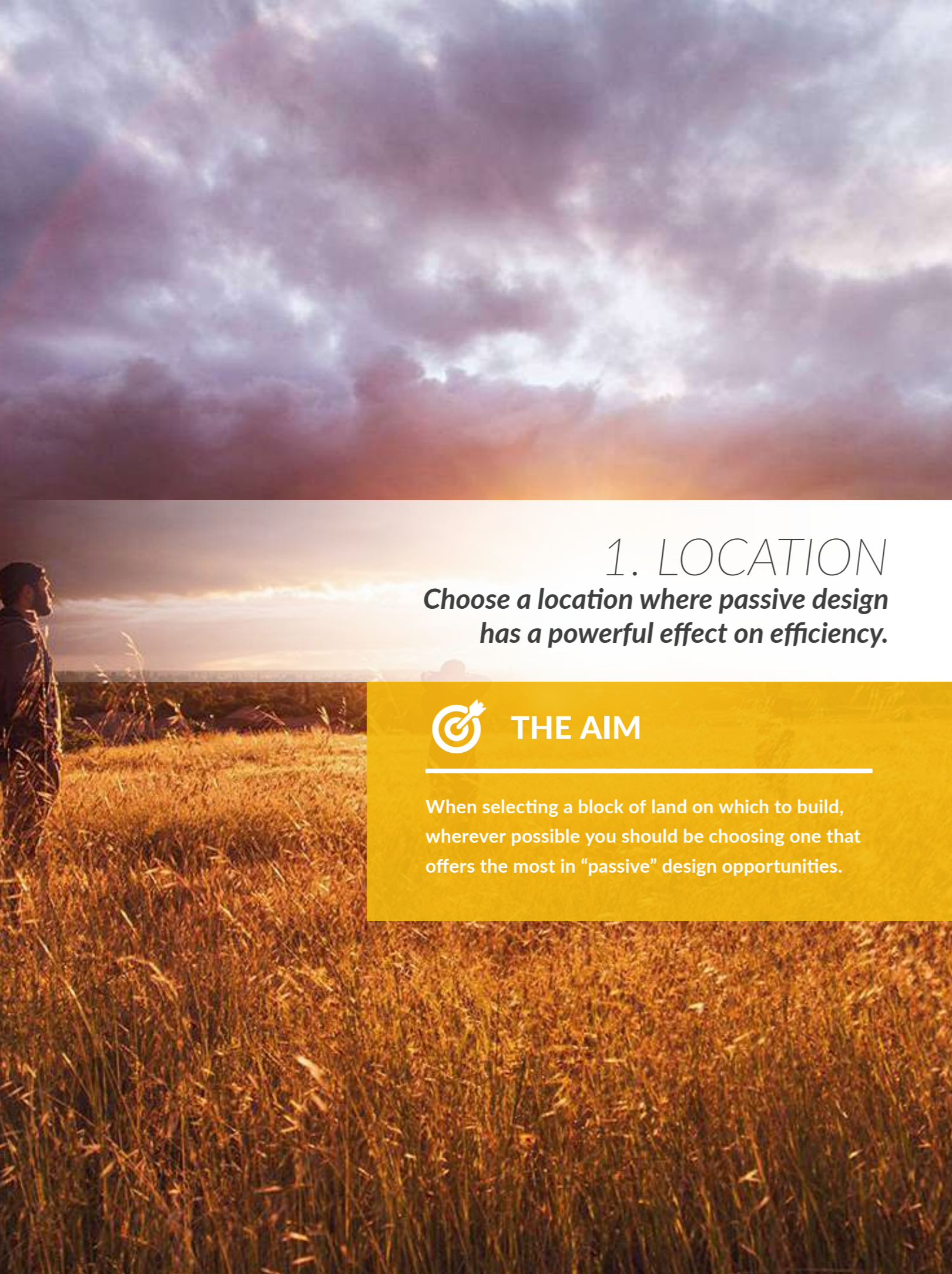
DESIGNING YOUR GREEN HOME

From the foundation up, your guide to ensuring your Green home takes the perfect shape.



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1. LOCATION

Choose a location where passive design has a powerful effect on efficiency.



THE AIM

When selecting a block of land on which to build, wherever possible you should be choosing one that offers the most in “passive” design opportunities.

PASSIVE DESIGN

Passive design is a design that by its very nature reduces the need for mechanical heating or cooling, using the sun to heat and light your home, and natural air movement



As 40% of energy use within a home comes from heating and cooling, a passive home can dramatically reduce your energy consumption.

ORIENTATION

For natural warming and cooling.

When designing the orientation of your home on your block, it's critical to think about what you need from the sun. And remember, the path of the sun in winter is different to summer.

Depending on your climate, you will need to consider where to place living areas in order to gain maximum benefits of natural warmth or cooling.



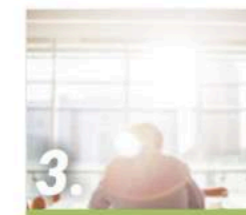
Here are our top 5 orientation tips:



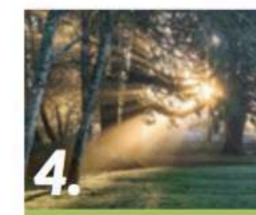
In the southern hemisphere the correct and most beneficial orientation is facing north.



Cooler climates should utilise the winter sun orientation, for natural warmth where the sun penetrates living area windows.



In the design of your home, think about how and when the sun will penetrate living areas – you're looking for natural warmth and cool at the right times.



Consider the landscape around the proposed site and how things like other buildings, trees and the length of the block could affect solar benefits.



Research prevailing breezes, which should be utilised to ensure natural flow through the home.

And of course, being truly Green means making sure you're a nice neighbour to Nature.

Whatever you're looking to achieve in the location and positioning of your home, remember it's incredibly important to have as little impact on the site as possible, both in building practice and placement. Consider the existing landscape and be mindful of the affect you'll have on any trees or natural eco-beneficial features like water ways or shrubs.



2. SIZE & SHAPE

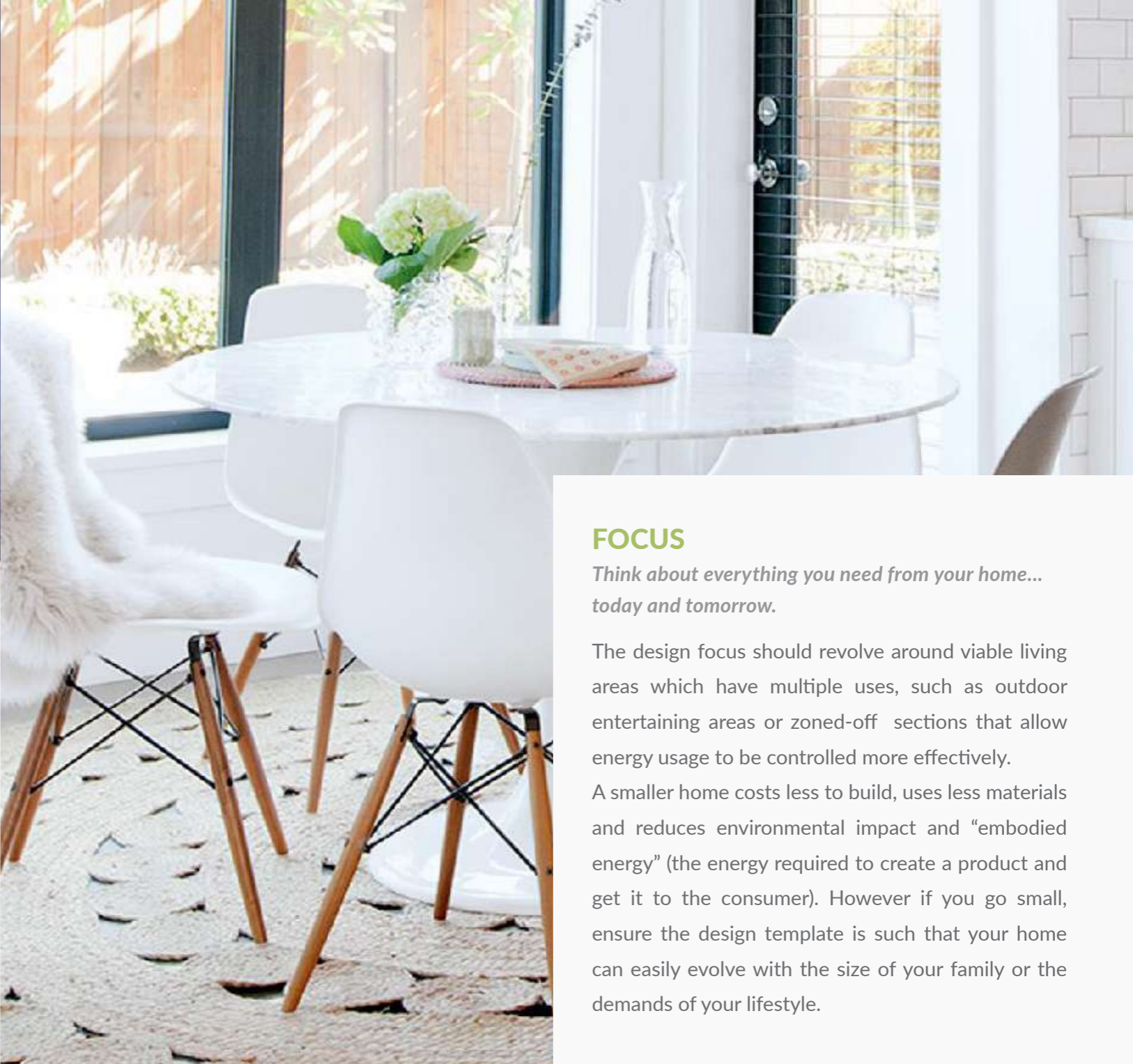
When it comes to creating a top shelf Green home, size and shape matters.

THE AIM

When designing your Green home, you need to consider the amount of space that you will use. Is it too much? Is it too little? It's important to find a compromise between your final floor area and what is practically efficient.

OVERVIEW

The larger the home, the more it will cost to heat and cool, and the more critical it is to use efficiency performance indicators within the design... however a large home can still be efficient if the correct principles are followed.



FOCUS

Think about everything you need from your home... today and tomorrow.

The design focus should revolve around viable living areas which have multiple uses, such as outdoor entertaining areas or zoned-off sections that allow energy usage to be controlled more effectively. A smaller home costs less to build, uses less materials and reduces environmental impact and “embodied energy” (the energy required to create a product and get it to the consumer). However if you go small, ensure the design template is such that your home can easily evolve with the size of your family or the demands of your lifestyle.

MODULAR DESIGN

A great choice for a Green home if you need space that can grow.

Modular designed homes are made especially to accommodate the future growth of your family. They can be easily expanded without major internal or external disturbance and, crucially, without much cost. Even electrics or plumbed bathrooms can be moved or added with relative ease.





3. ROOF LINE

For the right strategy in efficiency and sustainability, let's start at the top.



THE AIM

Allowing the sun to enter the home during cooler months to naturally heat your living space, yet avoid it heating the home in warmer months. If this principle is correctly incorporated into your design, you can dramatically decrease the need for mechanical heating and cooling.



DEPTH OF EAVES OR VERANDAS

The depth of eaves or verandas is vital for maximum efficiency.

Designs should ensure the chosen depth allows winter sun to heat the home in winter (in cool climate regions) and also avoid heating the home in summer. Given the sun tracks at different heights and angles in winter and summer seasons, consideration needs to be given to these angles to ensure the depths and heights of eaves and verandas are correct... allowing the home to take in winter sun but block out the summer sun. The final depth of the eaves will depend on your latitude and height of the window in comparison to the eaves.

A general rule of thumb for the depth of your eave is 45% of the height of your window (this is the measurement from the bottom of your window to the underside of the eave). This is the suggested depth of your eave on the northern side of your home in the southern hemisphere, and the southern side of your home in the northern hemisphere.



Tip!

Various online calculators are available and can be used to help you determine final measurements. Shade diagrams can be prepared by some designers to clearly show how this will work for your home.

ROOF DESIGNS FOR NATURAL EFFICIENCY

There are some innovative solutions to help you do your roof right.

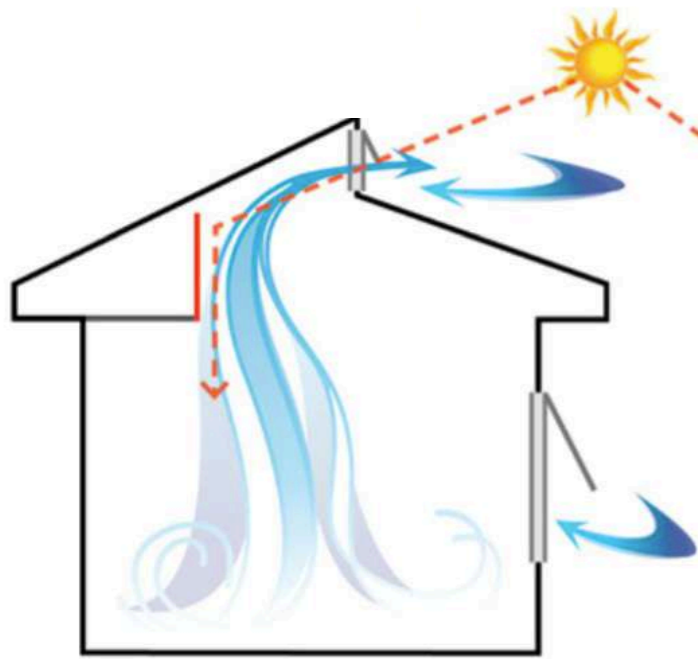
Roofs can take on a non-traditional form such as clerestory or skillion designs. These modern roof designs allow winter sun to naturally enter the home to warm an area. They can also allow the sun to shine directly onto an internal heat bank, such as a solid mass wall or floor (i.e. brick, block, cement, or stone) to retain and release stored energy, long after the sun has gone down.

Likewise, operational skylights of roof windows will allow heat to escape (in summer months) and will also help draw in fresh air. You keep control by opening or closing as you require, easily adjusting your climate to suit.

The importance of eave depth and ventilation of your roof line, and how the seasons impact on your home:

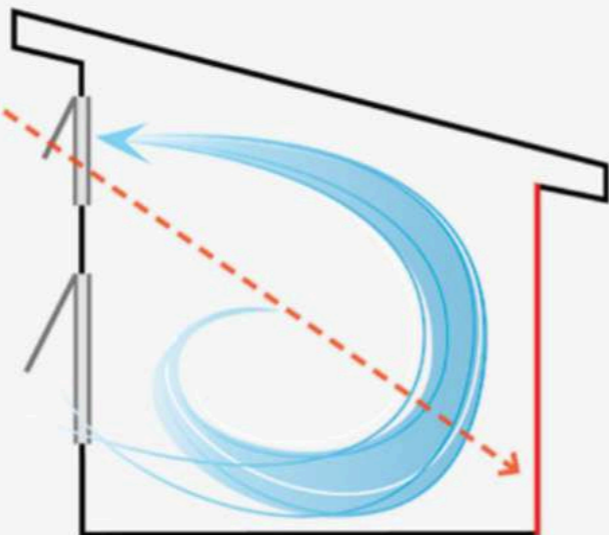
CLERESTORY ROOF

Clerestory windows in the roof will allow the sun in and can warm a solid wall mass in the centre of the house and also provide ventilation.

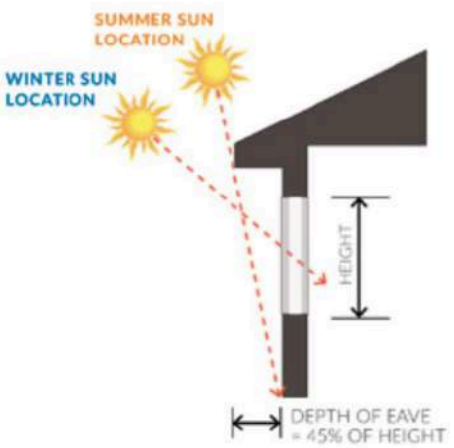


SKILLIONROOF

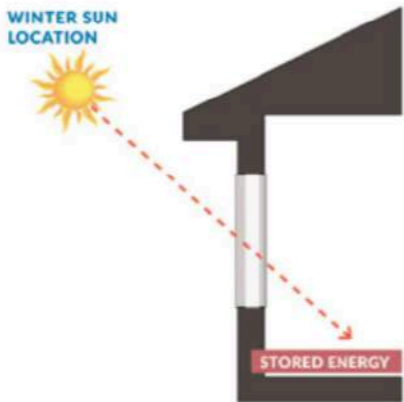
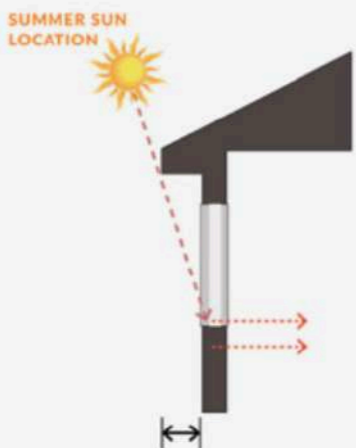
The skillion roof style allows higher raked ceilings and high external wall windows to utilise fresh air and remove stale air from the room. They can also capture sunlight for heating solid mass walls to retain and release later on.



CORRECT DEPTH OF EAVE ✓



INCORRECT EAVE ✗



Eave overhang will determine the amount of natural sunlight and energy to enter a room. An eave that does not have enough overhang depth will let too much sunlight in during Summer. An increased eave overhang will prevent the home from warming as the sun is unable to reach the external wall mass.

The aim in winter is to allow the sun to enter the home and heat the living space. Some research will need to go into sun angles and their impact on your own project.

4. INTERNAL LAYOUT

What places you put where is an important part of the puzzle.

THE AIM

Plan your Green home layout by utilising the natural elements and maximising these benefits wherever possible to heat and cool all year round.

ROOM PLACEMENT FOR MAXIMUM BENEFIT

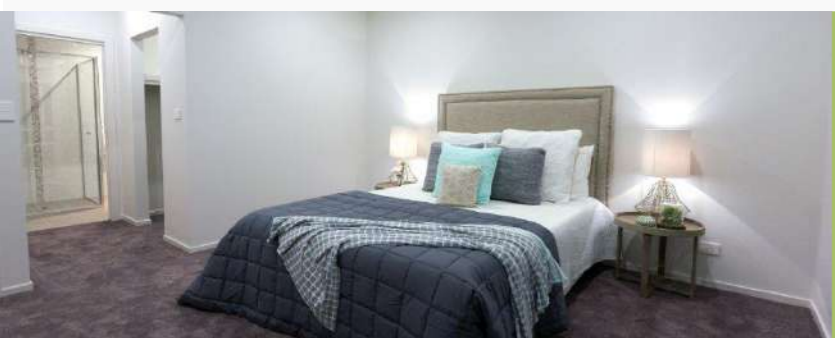
Putting your rooms in the right place is eco-friendly and will save a fortune.

Living areas should be placed on the northern side of the home in a cool or mild climate, while in very hot climates they should be placed on the southern side. This ensures the areas of the home in which you spend the majority of your time to naturally heat or cool, without having to heavily rely on expensive artificial or mechanical solutions, such as energy hungry air conditioners.

Once you know where you're going to put your living areas, here are some other important things to think about in the placement of your rooms:



Living areas should also take in as much natural light as possible, eliminating any need to switch on lights during the day.



Bedrooms should be positioned to take advantage of natural heating or cooling which circulates within the home, creating the best possible sleeping conditions.



To cool bedrooms, you should place windows or doorways opposite each other to allow cooling breezes to flow through the home.



A correctly constructed central “thermal mass” source is one of the best methods to distribute natural heat throughout your home, at the right times. (A thermal mass source is something like brick, block, cement or stone, which stores heat from the day and releases it in the late afternoon and evening, when it gets cooler outside.)





Tip!

Remember, individual heating and cooling systems are much more efficient when it comes to effectively zoning your home..

5. ZONING

Closing off parts of your home is a clever way to keep comfy.



THE AIM

Design a home that will allow you to heat and cool certain areas as desired, without having to apply mechanical energy resources.



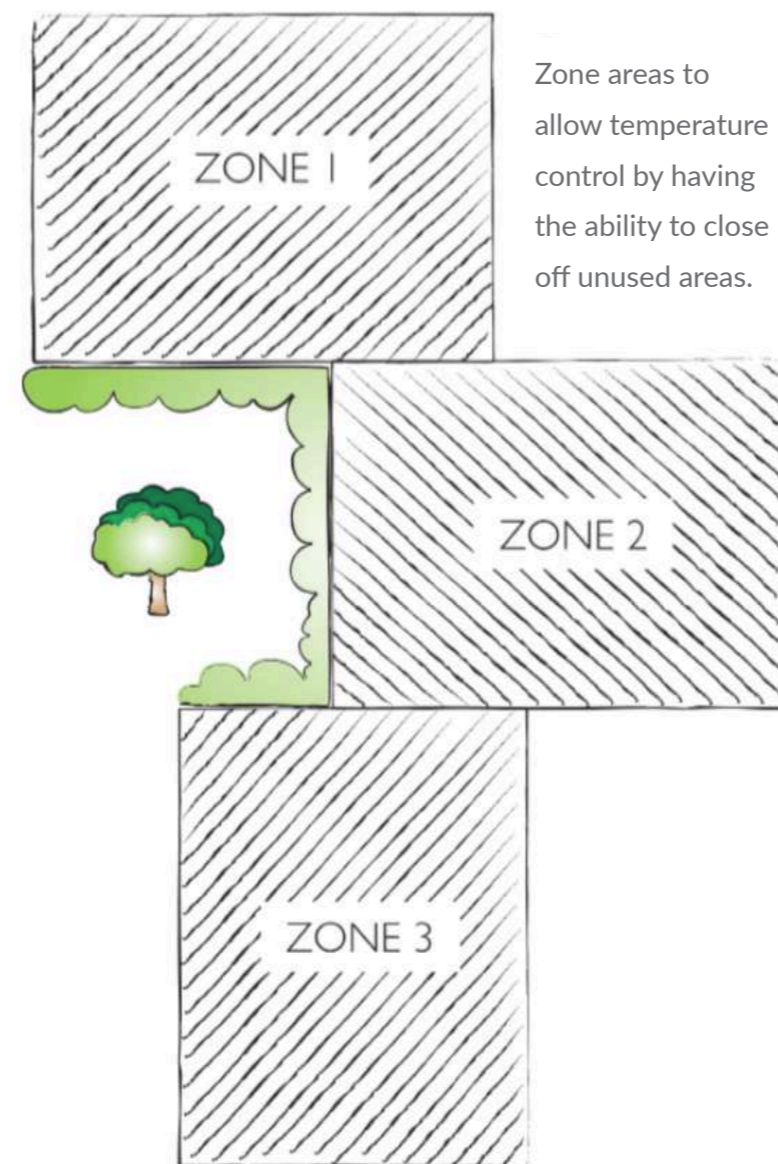
OVERVIEW

If you want to maximise comfort and minimise energy costs, get in the zone.

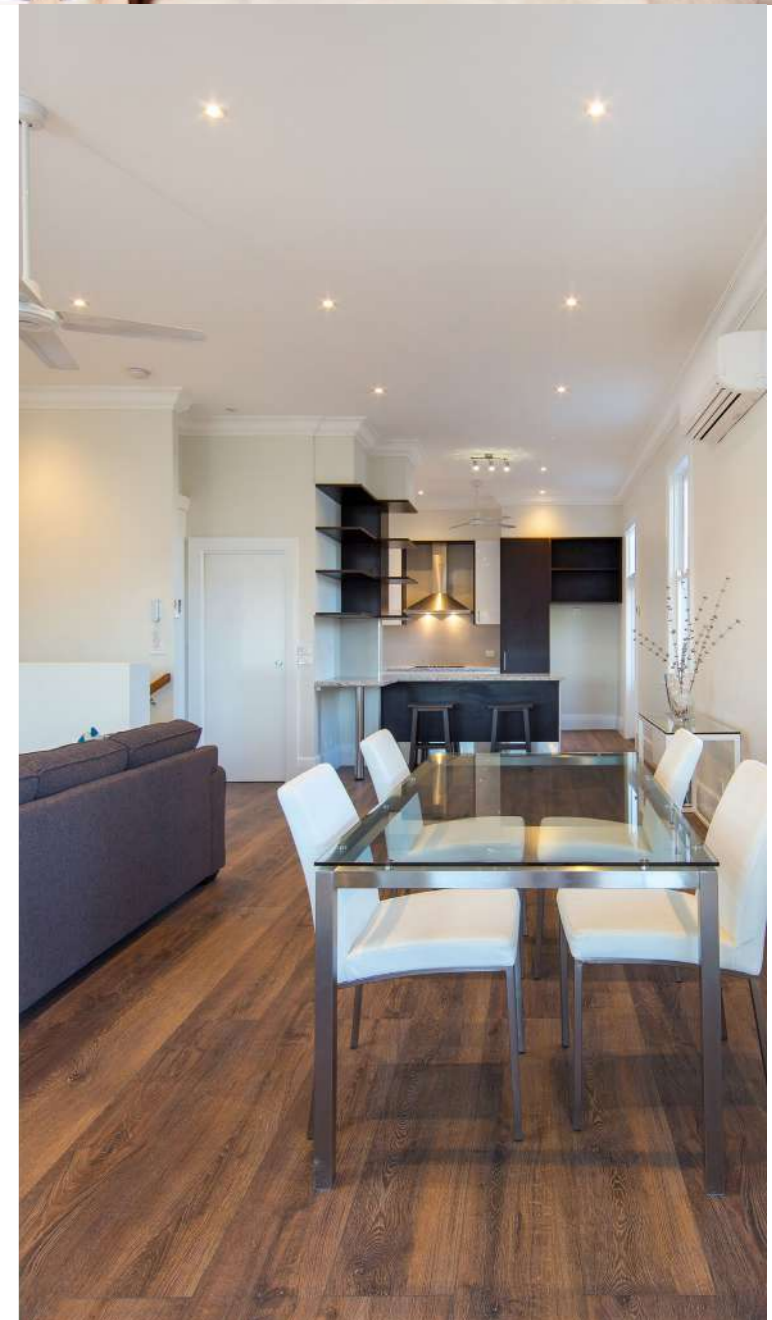
By designing your home to ensure living areas can be closed off, commonly referred to as “zoning”, you are able to more effectively control the temperature of your home to best suit the climate... at the same time saving significantly on costs.

For example, by closing off the areas not used during the day, hot or cool air is not escaping and being wasted where no-one needs it. This simple philosophy works both ways, saving on heat in the winter and air con in the cold.

ZONING AREAS OF YOUR HOME



Zone areas to allow temperature control by having the ability to close off unused areas.



6. BREEZING & VENTILATION

The strategy of making sure air goes where you want it to.

THE AIM

Naturally ventilating your home to provide a comfortable temperature and natural fresh air.

VENTILATION WITHIN THE ROOF SPACE

Ventilation is essential in your home's roof space to allow the efficient extraction of hot air. Products such as heat transfer units use a process to filter the extracted warm roof cavity air, heat it further and then distribute throughout the home. In cold climates this is a more efficient and economical solution than traditional heating units, which use the outside air.

Electronic or hand operated clerestory windows or sky lights are another valuable ventilation solution when properly incorporated into home design. This system takes the hot air (which rises) out of the home, naturally saving you money on your cooling bills. When air is removed from your home in this way, fresh air from lower openings will automatically be drawn in which provides further ventilation and cooling.

The art of harvesting warm air... it's easy when you know how.

Air is much more help at home if you let it roam around.

VENTILATION WITHIN THE FLOOR DESIGN

When designing your home rooms should have openings such as windows or doorways placed opposite one another. These openings should remain unobstructed, when then allows the home to take in natural breezes which cross ventilate and cool the temperature. By incorporating good ventilaton into your home you will help prevent the build-up of stale air, making it a much cleaner, healthier place to live.



Tip!

Seals and weather strips should be placed on all doors and windows throughout a home in all climates, thereby restricting air transfer. The aim is to be able to contain and control the air volume and temperature within your living space, and these gaps around doors and windows can cause a significant amount of temperature transfer (the cost of installing such seals and weather strips is minimal).

THE IMPORTANCE OF THERMAL MASS

What materials go where is critical to the ultimate efficiency of your Green home.

THE AIM

To capture energy from the sun, retain it and warm the home. Consider the relationship between the home and the sun. Depending on your climate it's important to allow sunlight to enter and help naturally heat the living space, also providing light to minimise the need for artificial energy.

OVERVIEW

Thermal mass refers to the ability of a material to absorb heat energy from the sun. High density materials such as concrete, rammed earth, bricks and tiles contain high levels of thermal mass properties, which allow them to absorb heat (unlike materials such as timber or plasterboard).

The correct placement of thermal mass within the home is crucial. The thermal mass can be used to soak up the winter sunlight, absorbing free heat from the sun during the day and then radiating and releasing that heat to maintain a higher internal temperature after the sun goes down.

THE BEST WAY TO GET THE MOST FROM YOUR THERMAL MASS.

The rule of thumb for the best performance is that the thermal mass feature in a room should be approximately six times the area of the north facing glass. For example, a 1m square window area equates to a 6 metre thermal mass area.

Designs should ensure that this thermal mass wall or floor is not exposed to direct sunlight during the hotter months, which would cause the home to overheat. However, you should ensure that it has good access to sunlight in the cooler months.

WHAT NOT TO DO WITH THERMAL MASS

Thermal mass in the wrong location can cause irreversible problems.

For example, a brick veneer home with a tiled roof has thermal mass properties that are almost redundant, because the external thermal mass materials are essentially cancelled out by insulation in between on internal walls.

Thermal mass installation on upper levels of two storey homes also requires careful design consideration, particularly if these are bedroom areas. For example, if a thermal mass wall was to be exposed to the summer sun, these second storey rooms would be almost uninhabitable due to extreme heat.

MATERIAL	THERMAL MASS <small>(volumetric heat capacity, KJ/m³K)</small>	RATING
WATER	4186	
CONCRETE	2060	
SANDSTONE	1800	
COMPRESSED EARTH BLOCKS	1740	
RAMMED EARTH	1673	
FC SHEET (COMPRESSED)	1530	
BRICK	1360	
EARTH WALL (ADOBE)	1300	

The table above compares the thermal mass performance of some common materials. Water has the highest VHC of these and the table tells us that it takes 4186KJ to raise the temperature of one cubic meter of water by one degree, whereas it only takes 2060KJ to raise the temperature of an equal volume of concrete by the same amount.

Well placed thermal mass brings big benefits into your Green home.

- ✓ Helps reduce temperature fluctuations within your home.
- ✓ A concrete floor slab draws heat from the earth and transfers it into your living space, then use of insulation within the base construction can trap it for efficient use.
- ✓ Allowing the sun to heat an internal wall such as a brick will enable energy capture and release into your living environment after the sun goes down.

THE IMPORTANCE OF WINDOWS

Smart window placement in your Green home means you'll see significant efficiencies.



THE AIM

To capture energy from the sun, retain it and warm the home. Consider the relationship between the home and the sun. Depending on your climate it's important to allow sunlight to enter and help naturally heat the living space, also providing light to minimise the need for artificial energy.



1. WINDOW PLACEMENT

See the light when it comes to where to put your windows.



HOT CLIMATE....

In a hot climate you need to block the summer sun from entering the home so living spaces do not heat up. A clever and sustainable design will ensure windows are placed where it's difficult for the summer sun to enter directly, but also allow winter sun penetration in the cooler months.



COOL CLIMATE...

It's critical in a cooler climate to position windows which allow the sun's energy to interact with internal living spaces and thermal mass such as masonry walls or floors.



2. WINDOW GLAZING

Keeping cool in summer and warm in winter is all about the coating.

THE AIM

The goal of window glazing is to block heat from entering in summer and ensure heat is retained in winter, thereby reducing the need for mechanically assisted temperature control.

Five things to think about with glazing...

- ! The specific weather and environmental climate in the region.
- ! The design and layout of your home.
- ! The building materials and their thermal mass
- ! The size and location of windows.
- ! The thermal properties of the glazing you will be using.

Keeping the above considerations in mind, your local glaziers or window companies are the best place to discuss your local climate and the best glazing, framing and window covering solutions available.



OVERVIEW

There are numerous solutions readily available on the market now to improve window efficiency, address the environment in which you live and enhance the overall design of your home.

It's not always the case that the more money spent will offer the best solutions. Double and triple glazing was traditionally demanded by home builders to ensure the best efficiencies, however new products have entered the market that are very efficient in restricting heat transfer.

For example, comfort glass or smart glass is a product designed to give better results in different climates for maximum sun collection and reflection. These are significantly cheaper solutions and can offer better results based on your climate and wall structure.

There are many window options available and these should be discussed with your GHA builder, to ensure you can make an informed decision.



3. WINDOW FRAMES

Window frames bring the design all together... and they can save you heaps of cash.

THE AIM

To install a frame that complements the glazing, placements and style of your window without compromising the insulation and sealing abilities of your home.



WOODEN / TIMBER UPVC WINDOW FRAMES / UPVC & THERMALLY BROKEN

UPVC Window Frames are an affordable option that pass zero energy from one side of the window to the other. Thermally broken or insulated frames have an internal insert. Timber UPVC frames offer good thermal efficiencies, as they won't get too hot in summer, or too cold in winter like aluminium frames. Wooden frames do however require ongoing treatment and maintenance, and they won't offer as tight an air seal as an aluminium frame.

ALUMINIUM FRAMES

The aluminum frame section around windows is generally hollow and can be a weak link in your effort to control internal temperatures. However, aluminum frames are available with insulation which will dramatically enhance heating and cooling efficiency.

INSULATING YOUR HOME

Intelligent insulation tips to ensure the sharpest use of hot & cold air.

THE AIM

To help ensure that you achieve a home that maintains a constant comfortable living temperature, you must insulate key areas with a material that will give the highest R-Value (or energy rating).

OVERVIEW

A well-insulated home will maintain a more constant temperature over a longer period, therefore reducing costs and producing less of a carbon footprint. Insulation acts as a heat flow barrier and is essential in helping you maintain a comfortable year round temperature.

INSTALLATION

Effective insulation is all about effective installation.

The installation of insulation is critical. It's essential that insulation be installed into 100% of the surface area. Importantly, insulation should not be compacted or squashed, as this reduces the material's insulating abilities.

Key areas of focus when you are insulating your home should be:

- ! Under roof cladding.
- ! Above ceiling level.
- ! External walls.
- ! Internal walls.
- ! Under suspended timber floor (if applicable).

Important things to remember about insulation:

- ✓ Limit all areas that may become a 'weak link', such as spaces which will lose or gain heat.
- ✓ Install thermal internal doors so you can close off rooms for temperature control.
- ✓ Ensure efficient glazing is applied to all windows in your home.
- ✓ Ensure all doors and windows are sealed.
- ✓ Install weather strips under doors.
- ✓ Install insulated window frames.
- ✓ Where possible create a wall cavity to act as a 'buffer' for increased air circulation.

CHOOSING MATERIALS

In a truly superior Green home, you should see sustainability & efficiency in every corner.

THE AIM

To use materials and products which are sustainable and environmentally friendly both in their application and in production.

OVERVIEW

There are numerous material choices available which means you can pick a product that best suits your circumstances and style of home, while keeping the environment closely in mind. The use of sustainable and environmentally friendly products and materials can improve the efficiencies of your home, as long as Green design and best practice building principles are followed.

THE BIG TWO MATERIAL CONCERNS

Any part of the material mix can help make a massive difference to sustainability.

Environmentally friendly

When choosing the products and materials for your home you should do your research, only purchasing products and materials that have the appropriate state, national or international environmental standard of endorsement. For example, you should only use timber that is endorsed by the Australian Forestry Standard (AFS) or an equally recognised accreditation.

Recycling

Where possible you should utilise recycled materials in your home. Products such as glass and stainless steel for instance are easily accessible and are two of the most recycled items in the world. Constituted stone is an ideal choice as it's recycled from natural stone waste.



Tip!

Although recycled materials should be your first choice, they are not always easily available or accessible. To counteract this you can purchase products from proven environmentally friendly companies, such as those displaying The Green Tick or an equally recognised endorsement.



Tip!

Your GHA Green Builder will happily advise you on the most appropriate products for your design, location and budget.



PAINTING

Picking the right paint is great for the environment & your bank account

THE AIM

Use products that have a low to very low impact on the environment.

All leading paint brands have an environmental listing with all the chemicals used in their products. You can find all you need to know simply by reading the label.



OVERVIEW

Always use low VOC (volatile organic compound) paint as it is a water based, rather than the usual solvent based paints which can be harmful to both humans and animals. Therefore it's best to use a low VOC paint wherever possible, both inside and outside your home.

When choosing the colours for your home, remember darker colours absorb and add to the heat, lighter colours tend to reflect it and help cool things down. The climate you live in will dictate the colour scheme that you use.

MINIMISING WASTE, CLEANING AND DISPOSAL

Cleaning up properly is a crucial aspect of any painting project.

When painting two coats of water based paint in the same day, you don't need to clean brushes and rollers between applications - instead just wrap them in plastic such as an old supermarket bag to stop them drying out. Alternatively, to stop paint brushes used with solvent based paints drying out, store in water between applications and brush out on paper to dry before reusing.

Before using paint thinners, roll the brush onto an absorbent surface, such as old newspaper, to remove excess paint. This means you will use less harmful chemicals to clean your brush.



It's now possible to purchase paint cleaning systems, often referred to as "separation systems", that use electrostatic technology to separate paint particles from the water used to clean brushes and other paint equipment. Systems such as this make the correct disposal of paint much easier and safer.



By reading a bit about your selected brand you'll discover other useful information, such as the correct way to dispose of excess paint and cleaning materials.

What to do with your "dirty wash solvent".

After cleaning your brushes off, you will be left with a container of used paint known as 'dirty wash solvent'. After a few days the pigment particles will settle to the bottom, leaving a useable solvent on top which can be carefully poured off for reuse. The solid pigment at the bottom of the container can be wrapped in old newspaper for disposal. You should check with your local council on the requirements for paint disposal in your area.



FITTINGS & APPLIANCES

There's always room for enhanced sustainability...
& we know where to look.

THE AIM

Always choose sustainable, high efficiency and environmentally friendly fittings and appliances for your home.

1. Plumbing Fittings p.36

2. Electrical Fittings p.37

3. Appliances p.38

1. PLUMBING FITTINGS

Water wastage is one of the biggest issues facing our future.

The objective is always to reduce the amount of water usage within the home, and we've done pretty well so far... 20 years ago many toilets used 18 litres of water per flush, whereas today some can use little as 4 litres.

But there's always room for improvement, so it's critical to research your products carefully to ensure you purchase the most efficient and sustainable brand available.

Our top 3 tips for finding the right fittings:



Install the most affordable, high rating efficient taps to reduce your water demand.



Install a hot water system which heats up quickly and efficiently.



Install a waste gate system that will capture and return unused water to your tank.



2. ELECTRICAL FITTINGS

A few bright ideas to ensure your home is wired for sustainability and efficiency.



Using one switch to turn on all the lights in a large room is very inefficient way to wire things.



Place switches at the exits from rooms and use two-way switching to encourage lights to be turned off when people leave.



Lights which must be turned on manually and turn off automatically, but with a manual over-ride, are preferable in most situations.



Instead of installing external lighting powered from the grid, consider using solar powered illumination for garden and security lights.



When selecting light fittings for your home, remember 'general lighting' is needed for all over illumination, while 'task lighting' is used to illuminate specific areas, such as benchtops and desks.



You should always choose light fittings that allow most of the light to pass through, as incorrect or poorly designed fittings can block up to 50% or more light.



'Smart' light switches and fittings use movement sensors to turn lights on and off automatically. These are useful in rooms used infrequently, where lights may be left on by mistake.



3. APPLIANCES

Time spent searching for high star energy ratings will pay off.



All appliances have a designated star rating for their energy use. Choose products that have a high star rating with low to very low energy usage. This will limit the amount of energy required by the home and therefore in turn reduce your carbon emissions and cost of living.

When purchasing appliances ensure that you select products that have a high Minimum Energy Performance Standard (MEPS) and display an Energy Rating Label (ERL).

Install a power usage meter in your home, which enables you to monitor and make changes to your energy consumption, plus a master switch which allows you to turn off the power to any appliance in one place as you leave your home.

SUSTAINABLE POWER & WATER

Best practice solutions for running power & water
in the most sustainable way possible.

THE AIM

To generate and freely use energy created by
the sun, wind, waste and water.

OVERVIEW

Renewable energy doesn't produce green house gases, it's better for the environment and is a completely free resource to the consumer once the correct infrastructure is in place.

Although the initial outlay to install a renewable energy system can be daunting, the substantial savings in the future and for the life of your home, along with the reduced impact on the environment, far outweigh the initial costs. To help reduce the upfront costs, your state and federal government may have rebates in place to encourage the use of such resources.








Read on to explore all the renewable energy options...

PHOTOVOLTAIC ELECTRICITY

The most common form of renewable energy is photovoltaic (PV) electricity, which is most commonly referred to as solar power. Solar panels are mounted either on your roof or in high sunlight areas of your property to capture the light from the sun and convert it to usable energy. This source of power can be used to run household appliances, lighting or even outside systems such as pool cleaners.

In the case of excess photovoltaic energy being generated, there are some private and government programs in Australia that will purchase your solar power and feed it into the community grid. Check with your local council to see if your area has a 'feed in tariff' scheme available.

Today there are more renewable energy companies than ever before. Before you purchase from any given service provider, ask yourself these questions:

-  Are they an established brand or company?
-  Do they have industry accreditations?
-  What is the warranty and maintenance period?
-  What is the call-out and back-up service?
-  Are there local installers?
-  Are there any rebates available?
-  Does the system suit your home?



GREEN ELECTRICITY

Some power suppliers offer a green power option. This is electricity that the supplier has generated using a renewable power source. It's generally at a higher premium per kilowatt, however the advantage of green power is that you don't have the expense of installing your own system.



WIND POWERED ELECTRICITY

This type of renewable energy infrastructure is generally not recommended for private urban use, as there are significant space and structural requirements for this type of system.



SOLAR POWER STORAGE SYSTEMS

With energy costs varying at different times during a 24 hour period, battery storage is a good option to consider. You can store energy in your battery system and program your house to draw from the batteries in peak periods. This type of system can save you up to 80% of your energy costs.

WATER HARVESTING

Carefully controlling where your water goes brings big benefits.



THE AIM

To capture and collect rain water from your roof, channeling into a storage facility for use in your home. There are many different types of 'water harvesting' systems available, however the core principles are the same.

HOW TO HARVEST YOUR WATER

Your water harvesting and storage abilities will range depending on the capability of your property infrastructure and the legislation of the appropriate governing authority, such as your local council. There are four key factors to successful water harvesting:

- ✓ Install large capacity gutters to maximise harvesting capacity, keep gutters clear.
- ✓ Ensure collection of the maximum amount of rain water from your roof.
- ✓ Have a filter system placed between your tank and your home.
- ✓ Ideally place your tank on the coolest side of the home, so it works as a thermal mass.

THE BIG BENEFITS OF WATER HARVESTING:

- ✓ Free and readily accessible water.
- ✓ Reduced water demand on your local ecosystem.
- ✓ Healthy and renewable water.
- ✓ A great taste.

...and you don't need a farm to harvest.

Even if you live on a small or tightly restricted block, there are still a number of storage options available, depending on the consistency of the land. Choices include:

- ✓ Under slab tanks.
- ✓ Under floor bladders.
- ✓ Underground yard tanks.
- ✓ Roof tank systems.
- ✓ Tanks that act as retaining walls.

OUTDOOR LIVING

How to make your backyard a sustainability show piece, in a few simple steps.

THE AIM

To create an aesthetically pleasing garden that provides natural advantages to the home.

OVERVIEW

Your garden is an extension of your home and effective landscaping will increase the value of your property, improve your ability to maintain a constant temperature inside all year round and of course it look beautiful at the same time.

Here's your step by step guide to sustainable gardening:



GARDEN DESIGN

Close co-ordination with Mother Nature.

Develop a design based on your site and use the principles in this eBook to get a garden which improves the quality of your home and your quality of life. For example, planting a tree adjacent to a doorway or window allows a breeze to pass through and enter the home at a reduced air temperature, thereby giving greater internal comfort.



PLANT CHOICE

Plants are pivotal, pick local performers.

It's essential to choose plants that grow well within your climate and region. You should take into account water-wise and native plants and shrubs wherever possible. It's recommended that you consult with a horticulturalist at your local garden centre to get the best local advice.



MULCHING

The smell of a strong, sustainable garden.

Mulch can be made up of hay, straw, sugar cane, newspaper, cardboard, bark, leaves from deciduous trees, sawdust and even shells. It's very important to mulch your garden. Mulch helps to stabilise soil temperatures, suppresses weed growth and assists with water retention. You can make your own mulch or buy it easily at your local garden centre.

COMPOSTING

*The easy to make miracle
which will help any garden grow.*

Compost is easy to make, completely natural and a great way to recycle vegetable scraps, fallen leaves, lawn clippings and other green garden waste back into your garden. Composting will have positive benefits on your soil, your lawn and your garden.



Eight ways to find the path to an enjoyable, sustainable garden:



1. Consult a local gardening professional and use intelligent design methods.



2. Select water-wise plants and shrubs.



3. Use native plants and shrubs where possible.



4. Choose deciduous or non-deciduous trees based on your climate and region.



5. Choose plants that will provide shading for your home.



6. Use landscaping to increase air flow through your home.



7. Incorporate a water feature for a cooling effect around the garden and home.



8. Utilise mulching and composting principles in your garden.

BUILDING YOUR GREEN HOME

Methods, materials, planning & execution...
your comprehensive project checklist.

1. Building Methods p.47
2. Building Costs p.49
3. Construction System p.50
4. Choosing a Builder p.52

1. BUILDING METHODS

For the very best build, get everyone on board.

THE AIM

To reduce personal impact on the building site and to the environment by using better construction methods.

OVERVIEW

It's just as important to reduce your carbon footprint while the construction phase is underway as it is when you are living in your home. It's also critical that builders, tradies and contractors understand the principles of building green and are aware of their impact on the environment.

CORRECT ORDERING OF MATERIALS

By appropriately gauging the amount of materials needed for your project you will reduce costs, reduce wastage and minimise the impact of your home on the environment.

SEPARATE WASTE

It's essential that builders, tradies and contractors separate materials that can be recycled from the general waste. This simple behaviour helps significantly reduce land fill.

CONTRACTOR COMMITMENTS

Make sure that all the builders, tradies and contractors working on your home understand and agree to these core building principles:

- ✓ Recycle responsibly.
- ✓ Minimise waste at every opportunity.
- ✓ Employ professional environmental standards.
- ✓ Find positive environmental solutions wherever possible.



2. BUILDING COSTS

Because the cost of building a Green home doesn't have to hurt.

THE AIM

To minimise your expenditure while using the best products and materials, with the highest quality of workmanship for your home.

If you do your research, utilise green building principles and a bit of common sense it's very possible to build an efficient, sustainable and environmentally friendly home at no extra cost than a 'standard' home.



OVERVIEW

There is a perception in the general public that building a Green home will cost much more than a 'standard' home... and this is simply not true. This may have been the case 20 years ago, because many of the products and materials that improve the efficiency of homes today didn't exist back then. But now they do, and they make a big difference.

In addition to reasonable unit costs and superb energy efficiency returns, many Green products and materials for your home will attract rebates offered by local, state and federal governments. For example, high efficiency water saving tap fittings and shower heads often qualify for a subsidy from local councils, while installing a solar hot water system can bring substantial rebates from some government bodies. These subsidies and rebates are subject to change and should be researched before purchasing.



3. CHOOSING A CONSTRUCTION SYSTEM

Ensure your new Green home fits like a glove.

THE AIM

To find the most appropriate and environmentally friendly combination of construction systems and materials for your Green home.

OVERVIEW

Residential design for comfort and energy efficiency are influenced by climatic considerations. There can be considerable differences between maximum and minimum temperatures in summer and winter, the day or night temperature range (also known as the diurnal temperature range), and the length of the heating and cooling seasons across Australia.

To get the very best out of your Green home, housing design and construction materials should be matched appropriately to the climate of the region. Where you live will determine what level of thermal insulation you need and should try to achieve.



**Heavyweight? Lightweight?
Or a bit of both?**

The difference between heavyweight and lightweight materials used in construction is that they differ in mass content. Heavyweight construction systems are usually masonry and include brick, concrete, concrete block, tiles, rammed earth, and mud brick. Lightweight construction uses timber or light gauge steel framing as the structural support system, for non-structural cladding and linings such as fibre cement, plywood and colourbond steel.

Heavyweight and lightweight materials have differing thermal performance and environmental impact depending on:

- ! Whether they are used internally or externally.
- ! How much energy and water is used in the manufacturing process.
- ! Specific site requirements such as slope, aspect, noise control and fire resistance.
- ! How far they need to be transported.
- ! How they interact with or moderate the climate.
- ! Exposure to destructive natural forces like fire, termites, rain, cyclones, UV and humidity.

**The pros and cons of
heavyweight construction:**

- PRO**
- ✓ Generally has higher embodied energy than lightweight construction.
 - ✓ Improves thermal comfort and reduces energy use in conjunction with passive design.
 - ✓ Works really well in climates with high diurnal temperature ranges (exceptions occur).
 - ✓ Significantly bigger benefits in warmer climates.
 - ✓ Typically requires less maintenance and is more durable than lightweight construction.
- CON**
- ✗ Requires more substantial footing systems, could cause greater site impact and disturbance.
 - ✗ Should be avoided on remote sites where there is a high transport component.
 - ✗ Is often quarried or processed with high environmental impact.



Tip!

A carefully designed combination of lightweight and heavyweight systems will produce the best overall outcome for your home.

4. CHOOSING A BUILDER

Look for a builder who gets really into the Green thing.



THE AIM

To commission a builder who genuinely understands green building principles and practices.



OVERVIEW

The right builder for your Green home will be able to discuss with you location, orientation, product and material selection, along with other fundamentally important green building principles. If you are looking for a green builder, a good place to start in your search is to chat to Green Homes NZ. We're ready and happy to help you on your building journey.

THINGS TO BEAR IN MIND AS YOU LOOK FOR YOUR BUILDER:

Do your homework. Talk to former clients and referees, look at previous projects for build quality, environmental aspects, timing and budget performance.

Keep in mind that third party endorsements within the building industry generally flow through to the best performing builders.

Ask the builder for a copy of their Environmental Management Plan (EMP), their Project Execution Plan (PEP) and their Occupational Health and Safety (OH&S) Handbook.



Tip!

If you need any further information, get in touch with the only internationally compliant Green Builder in New Zealand. At GHNZ, building Green homes is all we do. And we'd love to help you.

MEET SOME GREEN HOME OWNERS WHO ARE HAPPY TO CHAT.

You don't have to take our word for it, our customers have lots to say too.

"I want to tell you how immensely pleased I am with my new home... after living here through the seasons, I have been thoroughly and completely impressed! The house is performing to a very high standard, naturally warmer in winter, and cooler in summer. The energy efficiency concept really works. It really does add to my resale value."

— CHRISTINE E.

"If the renovating experience was meant to be a trying time, you and your team have proven this to be wrong. As we lived in and watched our new home take shape, it was both stress free and an exciting time for both of us."

— PAUL & KIM R

"You are so easy to work with. This is a large investment in my future and you have worked with me to make my dream of a very comfortable, welcoming and sustainable home become a reality. You have delivered a home where I have the best of both worlds looks great, amazing finish and will not cost me a fortune to run!"

— WENDY M.

"People have asked why we went with Green Homes and we tell them it's because they were genuinely interested in our plans and what we were looking to achieve. All through the design stage they were very helpful and keen to consider our different ideas, many of which they found a way to incorporate in the final build." — NORM & CHRIS P

"This was a complicated, challenging project that involved constructing a modern extension at the rear and side of a 90 year-old double brick cottage, including rebuilding a double brick tandem garage with workshop over the existing garage footprint... Green Homes completed before the finish date and as well as producing quality work, the trade professionals went out of their way to make the process as painless as possible for us." — SHANE & MEGAN C

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We'd love to hear from you!**

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Get started today. Call 0800 33 00 00 or visit www.greenhomesnz.co.nz