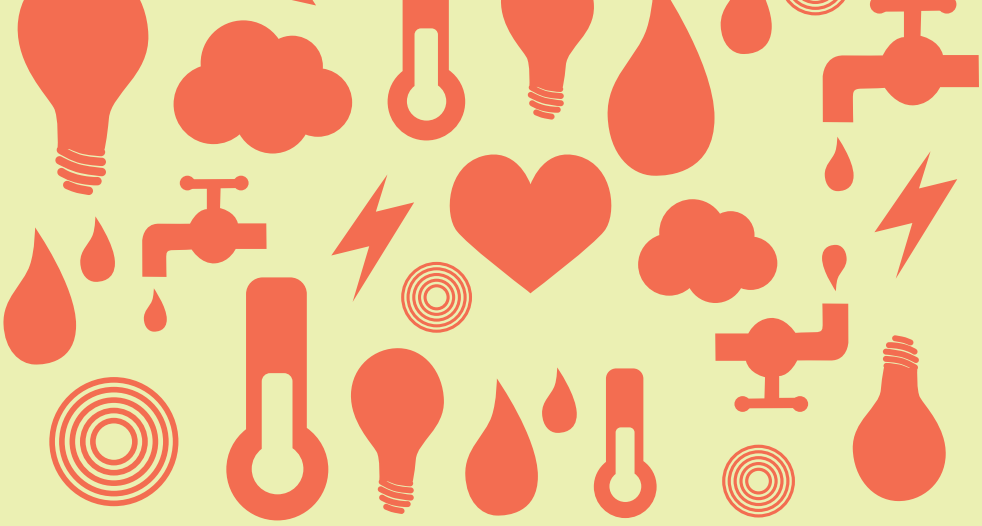
Home*Smart* Renovations

Home Owner Manual

Beacon

Creating homes and neighbourhoods that work well into the future and don't cost the Earth

Contents



Dear Home*Smart* Renovations Participant

Congratulations! You have just received your Home*Smart* Renovations Plan and are about to embark on a pathway bringing your home to a HSS High Standard of Sustainability™. This choice will make your family healthier, will cost you less in bills and is kinder on the environment. Enjoy!

By participating in the Home*Smart* Renovations project, you are part of an exciting initiative of families, scientists and business leaders in New Zealand establishing a new approach to more sustainable living. The monitoring data which you provide is critical to encouraging sustainable home renovations across New Zealand. If you like, keep in touch by sharing experiences and finding out about new solutions for making your home better for you and for the environment.

This manual gives you key information about the features and design contained in your Home*Smart* Renovations Plan, and provides advice on how to get the very best from your home as your renovations are completed. The technology and design of a house is only half of the solution; how you use it is the other half. There is always more you can do to make your home perform better. You have already taken the most important step by choosing to renovate your home. This document contains a blueprint showing you how you can continue along this journey over the years to come.

With this manual, you should have also received the following documents:

- your personalised Home*Smart* Renovations Plan
- a guide to Project Managing Your Home*Smart* Renovations

This manual has been developed to help you and subsequent owners enjoy the full benefits from your Home*Smart* Renovations. Keep it in a safe place and if one day you choose to sell your home, please ensure you pass it on to the next owners.

We are always keen for feedback on any aspect of the Home*Smart* Renovations Project – so please let us know. You can contact us on office@beaconpathway.co.nz.

Kind regards,

Nick Collins
GENERAL MANAGER
BEACON PATHWAY LTD

1. Introduction to Home*Smart* Renovations

HomeSmart Renovations are renovation projects which aim to improve the performance of existing homes to meet a HSS High Standard of Sustainability™. A Home*Smart* Renovation meets future needs – it's environmentally sustainable, affordable and desirable - but it uses designs, products and materials which are available now.

The HSS High Standard of Sustainability™ sets performance standards (benchmarks) for homes. This table shows the current standards which a Home*Smart* Renovation should reach.

energy

- 35% reduction in energy use in new homes
- 15% reduction in energy use in existing homes

water

- 40% reduction in water use in both new and existing homes

indoor environment quality

- Average indoor temperatures meet WHO recommended minimums of 18°C living room; 16°C bedroom
- Adequate ventilation without excessive draughts
- Relative humidity: between 20-70% in bedrooms and living space
- Checklist of features to avoid pollutants

waste

- Provision for kitchen waste composting or storage space for kitchen waste collection
- Space for recyclables storage
- No in-sink waste disposal unit
- Minimising building waste during construction or renovation

materials

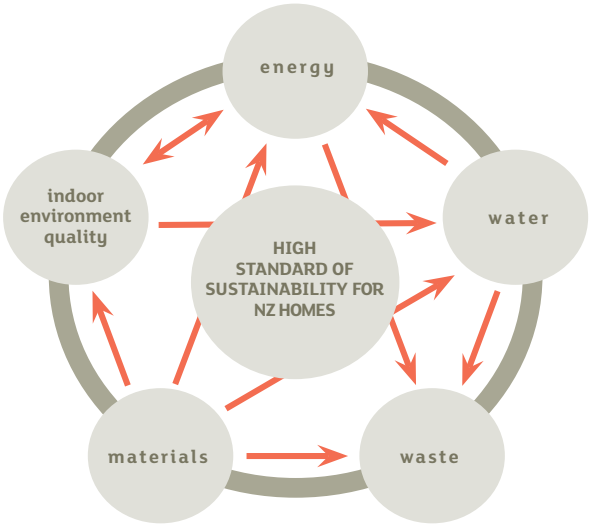
Using materials which:

- promote good indoor air quality
- have minimal health risks during construction or renovation
- are durable and have low maintenance requirements
- incorporate recycled content or can readily be recycled
- reuse existing or demolished building materials or can readily be reused
- are made from renewable or sustainably managed resources
- have low embodied energy including minimal impacts due to transport choices
- have low impact on landfill or are biodegradable,
- have third-party certification (e.g. NZ Environmental Choice Forest Stewardship Council)

1.1 Beacon's whole of house approach

We believe that we need to focus on the whole of the house in order to really get a fundamental change in our homes and their effect on the natural environment and on our quality of life.

The reason for this? Our houses are a web of interdependent features and building systems. We cannot fix one area only without compromises and under-performance in other aspects of the home. For example:



- We could use less energy by under-heating the home, but this would mean unhealthy temperatures.
- We could install heat pumps or pellet burners to heat a home, but without sealing draughts and insulating ceiling, walls and floor, this would be like driving a car with the heater on and the windows open.
- We could install a wonderful super-energy-efficient product, but if it has toxic by-products, we'd compromise our indoor environment.
- We could insulate and use energy efficient heating, appliances and lighting but if we still use a lot of hot water, overall energy use will still be high - approximately 30% of typical New Zealand household energy consumption is spent heating water.
- And even if we used energy-efficient water heating, if our showers and taps have high water flows, we'd still be washing away unnecessary amounts of expensive reticulated water.

So, here at Beacon, we take a "whole of house" approach to sustainable homes. The HSS High Standard of Sustainability™ sets benchmarks in five key performance areas:

- Energy
- Water
- Indoor environment quality
- Waste
- Materials

Home*Smart* Renovations meet the benchmarks in each of these areas. By focusing on whole of house solutions, we believe our homes can be truly sustainable.

1600

more people die in winter in New Zealand than during the rest of the year
(Otago University research)

1.2 Why Home*Smart* Renovations?

Many homes in New Zealand are cold, damp and hard to heat. This contributes to New Zealand having the second highest rate of asthma in the world and a high winter mortality rate.

Private homes account for 32.4% of total national energy use, and $1.1 billion is spent by households every year just to keep warm, heat water and run appliances. Improving New Zealand's homes will reduce the amount of electricity consumed and this, along with savings in water use and raw materials, will reduce pressure on power and water infrastructure. Improving our housing will also contribute significantly towards meeting our commitments under the Kyoto Protocol.

Beacon aims to bring most New Zealand homes to a HSS High Standard of Sustainability™ by 2012. Through the Home*Smart* Renovations project, an individualised Renovations Plan is being developed to bring each participating house to the HSS High Standard of Sustainability™.

Once completed, your home will perform better. Your home will:

- be warmer and drier
- be a healthier place to live for your family
- use less electricity, gas and water
- be cheaper to run
- have a greater resale value as buyers realise the benefit of owning a sustainable home

60%

hot water provided by solar panels in one Papakowhai home

1.3 What is Beacon?

Beacon Pathway Limited is a research consortium that's working to find affordable, attractive ways to make New Zealand homes more sustainable: warmer, healthier, cheaper to run and kinder to the environment. Our shareholders are a unique mix of industry, local government and research organisations: BRANZ, Scion, New Zealand Steel, Waitakere City Council and Fletcher Building. Their contributions are matched, dollar for dollar, by funding from the Foundation for Research, Science and Technology (FRST).

Beacon trialled Home*Smart* Renovations in a pilot project in Papakowhai, Porirua. We renovated nine homes built in the 1960s and 70s to different levels of sustainability. By monitoring how the homes performed before and after the renovations, we have identified which renovations will bring the best results.

In the Papakowhai renovations with the most impact, we found significantly warmer temperatures in the living areas and bedrooms, and less condensation and damp – our homeowners didn't need their dehumidifiers any more. The homeowners also enjoyed significant energy savings, but what they valued most was the improvement in comfort and wellbeing experienced in their renovated homes.

Beacon's team worked with experienced community renovation organisations throughout New Zealand to ensure that we have identified the best ways to improve your home performance so that it matches or exceeds the experience of the prototype Home*Smart* Renovations.

community energy action charitable trust

EcoMatters Environment Trust our environment matters

EnergySmart

ENERGY OPTIONS

2. Monitoring & the Home*Smart* Renovations Community

Why monitor your home?

All houses being renovated as part of the Home*Smart* Renovations project are to be monitored. What we learn will help us to evaluate how the programme is performing in bringing homes up to a high standard of sustainability. We will also use the information gathered to encourage homes throughout New Zealand to become more sustainable.

We may need to monitor:

- Energy use (electricity, gas and firewood)
- Water use
- Indoor temperature
- Indoor humidity
- Ventilation
- Your experiences of living in the house

Our team will collect data by speaking with you and by taking measurements.

The "before" picture

Before you started your renovation, you'll remember that Beacon asked you to take part in a survey about the current running of your home. This included a review of your previous electricity bills (and gas and water if available). From this we were able to create a "before" picture which will be compared with an "after" picture on completion of your renovation. Our research partners, CRESA and BRANZ Ltd, are assisting us with the monitoring of the renovations.

CRESA

BRANZ

CRESA – the Centre for Research and Social Assessment - is co-ordinating the monitoring and will be your main contact for surveys, homeowner agreements and monitoring.

BRANZ Ltd – the Building Research Association of New Zealand - will be undertaking the actual monitoring and analysis of how the homes perform.

30%

of New Zealand living rooms regularly don't meet World Health Organisation recommended minimum temperatures for good health

Monitoring levels

These will vary from home to home and will depend on which steps you may have completed from your Home*Smart* Renovations Plan. There are two monitoring levels: Standard and Intensive. We'll discuss these options with you and advise which we'll be using in your home.

1. Standard monitoring

We would like to access your electricity and gas bills and, if you receive them, your water bills as well, to see how the renovation is affecting your energy (and water) use. This information will be used to see how your home has performed as you work through your Renovation Plan. The data will also be used as part of more general research into house performance for this project.

You will be asked to take part in a survey at the end of your renovation. A staff member from Beacon or one of our research partners (CRESA or BRANZ) will call to arrange a convenient time for an interview and to take some measurements.

What do I have to do?

1. **Allow Beacon access to copies of your electricity, gas (and water) bills from 1 April 2007 to 1 April 2010. If you don't have copies, please let us access them on your behalf from the utility company.**
2. **Let us know when you have completed your Renovation Plan.**
3. **Take part in a survey at the end of the project about ways in which your home has changed as a result of your renovations.**

2. Intensive monitoring

We would like to access your electricity and gas bills and, if you receive them, your water bills as well, to see how the renovation is affecting your energy (and water) use. This information will be used to see how your home has performed as you work through your Renovation Plan. This data will also be used as part of more general research into house performance for this project.

In addition, Beacon will install some monitoring equipment. Two temperature and humidity loggers will be placed in your home. These are small wall-mounted sensors which record data every 30 minutes. One will be located in your main living area and the other in one of the bedrooms. At the end of the project we will remove them. If you don't already have one, we will also install a water meter, so that we can track your water use.

You will be asked to take part in a survey at the end of your renovation. A staff member from Beacon or one of our research partners (CRESA or BRANZ) will call to arrange a convenient time for an interview and to take some measurements.

What do I have to do?

1. **Allow Beacon access to copies of your electricity (and water) bills from 1 April 2007 to 1 April 2010. If you don't have copies, please let us access them on your behalf from the utilities company.**

2. **Follow the instructions included with the temperature sensors we sent you. During your Home*Smart* Assessment we will replace the sensors with new ones. After that you'll receive new sensors every few months which should be placed in the same spot and then send us back the old ones. Please don't move the sensors or let children play with them. If you notice anything wrong with a sensor please let us know as soon as possible.**

3. **Take part in regular surveys about your home and how you are finding it to live in. We will contact you to organise convenient times for these surveys.**

4. **Tell us when you complete actions on your Renovation Plan. This is important so we can measure the impact of different actions on your home's performance.**

$1

spent on improving insulation in a pre-1979 house will save $2 in health costs
(Housing, Insulation and Health Study)

Privacy and confidentiality

Beacon will protect the confidentiality and anonymity of information given to us by you regarding your energy, water and other resource use; renovations undertaken or not taken up; and their effects on your household. Beacon's research partners, CRESA and BRANZ, will receive data which will be linked to a random unique number rather than being identifiable to any person.

If your home is selected for direct temperature and humidity monitoring, the installation, downloading and eventual removal of the monitoring devices used will be done in such a way as to ensure no damage to the fabric or appliances in the home.

The Home*Smart* Renovations community

Through opting to have a Home*Smart* Renovations Plan, you have become part of the community of people dedicated to making their homes healthier, more comfortable, and easier on the environment. Once completed, your home will be amongst the leading sustainable buildings in New Zealand.

It's really important to let Beacon know when you complete different parts of your Renovation Plan, or of any changes to your household. That way we will be able to account for why your energy or water use has changed.

We want to share what you have learnt and pass on the experiences of others. Beacon will send you a quarterly newsletter packed with tips and information about the project, and those taking part in it.

At the end of the project, each Home*Smart* Renovations participant will receive a report from Beacon outlining how their home has performed and how it compares with others being monitored by Beacon.

Any questions?

If you have questions about the monitoring of your home or about the newsletter, you can contact Lois Easton, the project leader for Home*Smart* Renovations.

Email: loise@beaconpathway.co.nz

Phone: (06) 867 4458

3. How to make the most of your home

Your Home*Smart* Renovations Plan is designed to make your home perform better. As you work through it, you will notice increasing benefits such as better warming and cooling, or lower power bills. However, these benefits depend not just on your home's special features, but also on you.

This section gives some everyday advice on what you can do to live more sustainably in your home, as well as some specific tips on getting the best from features recommended in your Renovation Plan. Finally, we have included a checklist on maintaining your home.

3.1 Everyday actions to get the best from your home

This section has four parts:

- Effective waste management
- Ways to use less water
- Improving indoor air quality
- How to use less energy

Effective waste management

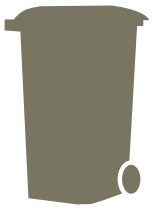
Effectively managing your waste is important as you will cut disposal costs, extend the life of materials and lessen your impact on the environment.

We'll discuss how to manage the following different kinds of waste:

- Kitchen and garden wastes
- Recycling
- Hazardous waste
- Waste to landfill

Have a look at your rubbish bin in the kitchen. Is there space to separate your waste? Ideally, you should have three bins: "general recyclables", "decomposables/organics", and finally one for "landfill". You can buy bins which are already split into compartments, or you can just adapt your existing bins.

Hazardous wastes should only be stored in a secure (i.e. lockable) outside space – such as a garden shed or garage.



43%
of household waste is organic

Kitchen/garden wastes

Firstly, try not to use a waste disposal unit, as you're getting rid of valuable nutrients and creating an environmental problem elsewhere. Thinking of your waste as a resource will give it the importance it deserves.

Most household rubbish is organic and comes mainly from the kitchen – though some also comes from the garden. It has a negative environmental impact if disposed of in the landfill as it creates the greenhouse gas, methane, as it decomposes. The best way to remove this waste is by using worms or having a compost heap. The end product – compost – is nutrient-rich, and can be used as fertiliser on your garden.

If you are interested in making a **worm farm**, it is best to use Tiger worms which quickly transform scraps into compost. They can be bought at garden and environmental centres, or ask a friend with a fertile compost heap or worm farm. You will need a good ice-cream container-full to get started – about 1,000 worms. Many council websites have a guide to setting up a worm farm. Make sure the worm farm is sheltered from direct sun but protected from frosts. Worms will eat food scraps (cooked and raw), tea bags, coffee grounds, bread and other organic waste. However, avoid large amounts of citrus, onions and garlic. You can include limited amounts of meat scraps, dairy products or oils but not large bones. The smaller the pieces of food waste, the quicker the worms can digest it. You may need to add several litres of water each week during a dry summer.

If you are interested in making a **compost bin**, you will need an area about $1m^2$ in your garden. You could make a bin yourself or buy one from a garden centre. Make sure the bin is in a sunny spot. You can add food scraps, tea bags, coffee grounds, bread, citrus, onions and garlic. Do not include meat scraps, dairy products or oils as they are difficult to break down and can attract pests. Placing a lid on the bin can also help keep pests away. Compost bins are better if you have more land as they tackle garden waste and produce larger amounts of compost.

Recycling

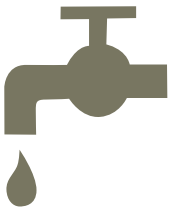
Waste is not waste if it is recycled – instead it is a valuable resource. By recycling, you are not only reducing waste, you are also reducing the consumption of raw materials like iron, aluminium and oil.

- Identify if there is a kerbside recycling scheme in your neighbourhood; your local council can tell you this. If there is none, then ask what recyclables are collected at your local transfer station.
- Make sure you are recycling properly (Code 1 and 2 plastics, steel cans, aluminium, glass bottles etc.).
- You can identify the recyclable plastics by looking on their base for a triangle – the number inside the triangle should be either #1 (PET) or #2 (PET – HD). Examples include clear soft drink bottles and opaque plastic milk bottles.
- Rinse out your tins and plastics as food contamination makes them difficult to recycle.
- You can find out more about the plastic identification codes by going to www.plastics.org.nz

Never dispose of hazardous materials with ordinary wastes and never tip paint, oil or other chemicals down stormwater drains, as they will end up running into rivers and out to sea. Just a small amount of oil down a stormwater drain can pollute a huge amount of water.

These include:

- waste oil
- petrol
- batteries
- fluorescent lightbulbs (including energy saving bulbs)
- pool chemicals
- petroleum-based solvents
- storage containers from paints
- adhesives and varnishes
- acidic cleaning products
- garden sprays



3%

of expensive treated water piped into homes is used for drinking

Hazardous wastes need to be disposed of carefully as they can be very dangerous if not contained properly. Usually, a specially marked area of your local landfill or transfer station is set aside to handle them. Check with your local council which hazardous materials your landfill or transfer station can take. Councils often organise special collection days for hazardous waste. Some, such as paint, can be returned to retailers – ring them and ask!

Waste to landfill

Once you have composted all your food scraps, set aside hazardous waste for collection and separated your recyclables, there will still be some waste left. This is what gets sent to landfill with your usual collection.

By doing all of the above, you will probably find that your general waste volume is much smaller: a real saving if you are paying for collection. The environment will benefit as less waste means each landfill will last longer, with fewer valleys being filled in. Reducing how much of your waste goes to landfill is a great way to help the environment.

Ways to use less water

If you live in an area where you pay for water, using less will lower your bills. In areas where water is paid for via rates, you'll still get indirect benefits by reducing water use. If we are all careful with our water consumption there would be less need for expensive infrastructure and reservoirs, and not so much wastewater to treat. This is good for your pocket and for the environment.

In the shower:

- Take shorter showers; use a kitchen timer to help here.
- Don't turn the shower on until you are ready to get in.
- Take a "navy" shower. Due to limited supply of fresh water on ships, sailors are taught to get wet, turn off the tap, soap and scrub, then turn the water on briefly to rinse off.
- Make sure your hot water system is not set too high or you'll be tempted to cool your water from the cold tap. Around 55°C at the tap is ideal.
- Install a low flow shower head or flow restrictor on your shower. Check with your plumber first to make sure it suits your hot water system.

3. How to make the most of your home: Everyday actions

15%

of your water bill saved by installing a dual flush toilet

In the bathroom:

- Don't use your toilet as a rubbish bin; it wastes water to flush away cigarette butts and other bits and pieces.
- Check for slow leaks in the toilet – is your toilet always running? This is surprisingly common.
- Turn the tap off when brushing your teeth or shaving.
- Fill the sink to wash your hands and face rather than using a running tap.
- Don't rely on water pressure to remove dirt — use a nailbrush or cloth instead.

In the kitchen:

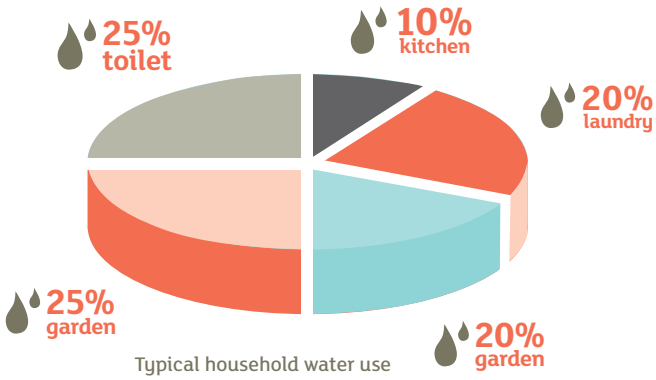
- Keep a bottle of drinking water in your fridge so you don't have to run the tap cold every time you want a glass of water.
- Defrost frozen food overnight in the fridge rather than under a running tap.
- Put a plug in the sink when washing vegetables and use just enough water to cover them when boiling.
- Use your dishwasher efficiently. Modern dishwashers can clean very dirty dishes so there is no need to rinse them first. Make sure your dishwasher is full before using it and be careful how much detergent you use as it can help reduce excess rinsing water.
- If you are installing a new dishwasher, choose one which is rated as low water use. This will be noted in your Renovation Plan.

In the laundry:

Modern washing machines generally have water efficient features. If a new washing machine is part of your Renovation Plan, it should be one which is both energy and water efficient.

- Only wash full loads and if you do have to wash smaller loads, adjust the water level accordingly.
- Try to break the habit of just throwing everything in and actually decide what needs washing and what doesn't.
- Use the "eco" or "water saver" cycle.
- If washing clothes by hand, plug the sink rather than using running water.

3. How to make the most of your home: Everyday actions



Typical household water use

In the garden:

- Choose trees and plants that need less water. Native plants are ideal.
- Water the garden only where it's needed by arranging plants into groups of those requiring water and those that don't.
- Try using ground cover like thick green mulch or a weed mat to reduce evaporation. A good garden centre can provide advice on what to use.
- Learn how to tell if your soil actually has a moisture deficit, and water only when needed. Your garden centre can usually advise on this or try the internet. A good section on "waterwise" gardening may be found on www.bestgardening.com.
- Avoid watering the garden during the hottest parts of the day; around dawn and dusk is best. Place sprinklers carefully so they only spray what needs water or consider using a drip system which places water near the roots of plants and so is more efficient.
- Accept a dry lawn over the summer as grass becomes dormant during periods of drought but rejuvenates when winter approaches.
- Still want green lawns? Try a drought resistant grass such as couch.

Other outdoor uses:

- Wash the car on the lawn and use a bucket. This is less wasteful than a hose and the lawn can absorb those detergents before they run off through the stormwater system.
- Use a broom to clean driveways and paths as sweeping will get them clean enough without wasting many litres of water.
- Buy a trigger gun hose attachment to prevent water wastage.

25-30kg

of moisture comes off the soil underneath a house every day

Improving indoor air quality

A well ventilated home will:

- Control indoor moisture – a major problem in New Zealand
- Dilute pollutants
- Provide summer cooling
- Control heat loss in winter

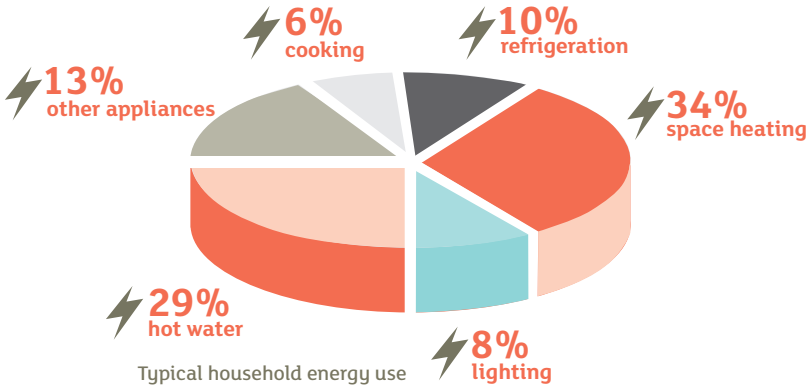
Indoor dampness and mould are relatively common problems in New Zealand homes. Mould has adverse effects on health and is linked to increased occurrences of asthma. Dampness can affect the durability of a building.

Indoor moisture can be regulated by:

1. **Eliminating the source! This means avoiding drying clothes indoors where possible and reducing excess house plant watering. Prevent damp air from the ground rising into the house by checking and improving drainage under the house and/or installing a ground vapour barrier (thick polythene) on the ground.**
2. **Controlling what you can't eliminate: cover pots of boiling water, ensure dryers are vented to the outside and use range hood and bathroom extract fans or a shower dome. If you do have to dry clothes indoors, try not to use the bedroom if at all possible.**
3. **By ensuring adequate heating and ventilation with your heating system, passive vents and open windows you will greatly reduce the risk of dampness or moisture developing in your home. Good insulation will also help.**

Good ventilation can dilute pollutants which may be present in a home. Off-gassing from new products such as floor coverings can be harmful but you can reduce their effects by opening windows and passive vents and increasing air flow through your home.

Your home might already contain vents in some windows or doors, or in the roof. These will help to reduce moisture and overheating in summer. You can fit security stays on windows to keep you cool and secure. Ideally, you can create passive ventilation by opening windows on opposite sides of the house, or on both the downstairs and upstairs. Natural heat convection i.e. hot air rising or flowing from the sunny to the shady side of the house will move air around which cools your home.



Typical household energy use

Leaving the vents and windows open before you go to bed will help remove excess heat in the summer. In fact, air conditioning or cooling systems are not part of any Home*Smart* Renovations Plan because adequate ventilation will almost always be enough to keep a building at a comfortable temperature in New Zealand.

For areas which are prone to high moisture such as the bathroom and kitchen, it is best to use mechanical ventilation to keep moisture levels under control. If you already have mechanical vents in the kitchen, bathroom or laundry then use them whenever you are generating steam in these rooms. Make sure that the system installed in your home is adjusted so it works well by clearing moisture laden air quickly and efficiently.

How to use less energy

Your Home*Smart* Renovations Plan is likely to include insulation, an efficient heating system, and possibly other features like curtains or carpets. These will all improve the energy efficiency of your home.

However, the technology is only half the battle. It is what you do and how you use your home that will really make the difference.

Appliances

- Each time you plug in an appliance or electronic item, you use electricity. It stands to reason then that by reducing their number and how often they are used that you will reduce your electricity bill. Do you really need to have that second computer on all the time?
- When you buy or replace appliances, look for energy efficient models with the Energy Star label (visit www.energystar.govt.nz) or for those which have been highly rated under the Energy Rating Labels.
- Turn off your lights when you don't need them or install motion sensors. Use energy efficient light bulbs in high use areas.

Everyday use

- Pull your curtains at dusk to keep heat inside.
- Open your windows in the summer to cool your home.
- Fix leaking hotwater taps promptly.
- Dry your clothes outside whenever possible.

There are many websites which give advice on energy efficiency in the home including www.energywise.org.nz and www.sustainability.govt.nz/energy

40%

of household water use can be provided by a 4500 litre rainwater tank

3.2 Specific technologies and systems

Each Home*Smart* Renovation Plan has been customised to fit your home. However, many renovations have a number of design features in common.

Here are some hints on maintaining and getting the most out of your:

- **Rainwater collection and greywater system**
- **Insulation**
- **Exposed concrete floor**
- **External shading device on windows**
- **Passive ventilation**
- **Extractor fan and rangehood**
- **Heating system**
- **Heat transfer system**
- **Wetback**
- **Solar hot water system**
- **Heat pump hot water system**

Have a look through to find any which are included in your own Home*Smart* Renovation Plan.

Rainwater collection and greywater systems

Domestic rainwater collection is relatively straightforward, although some councils require a building consent. Rainwater is collected from the roof via gutters and pipes and after screening to remove dirt and debris it is stored in tanks outside the house. The rainwater can be used for non-potable uses only. This may be just for watering your garden, or everything other than drinking, bathing, and cleaning items used to cook or serve your food.

Rainwater collection requires minimal maintenance. Check your gutters and downpipes for obstructions every few months, and clean out any leaves or mess. Make sure your roof remains clean, especially from bird droppings. It is also a good idea to inspect your tanks for any cracks and leaks, particularly before it gets dry over summer.

Greywater is the wastewater from the shower, bath, washing machine and taps (except those in the kitchen). Between about 50% and 60% of water used in your home ends up as greywater, and would ordinarily get discharged to the sewer. This overloads sewers and increases the need for expensive infrastructure and treatment systems.

900,000

homes built before insulation was mandatory

Greywater systems are generally used for outdoor water use or for toilet flushing thereby reducing the amount of drinking water wasted on non-potable uses. Beacon recommends that greywater systems only be installed for lawn and garden watering. You shouldn't use greywater on vegetables or other food plants. A building consent will be required, and in some circumstances, a resource consent. Not all councils allow greywater systems. Depending on what sources are feeding your greywater system, you may have to be careful what products you use in your home. For example if your washing machine supplies the system then a suitable detergent (such as one low in phosphate) should be used. Greywater should not be allowed to pond on the surface of your garden. Ensure that noone inadvertently drinks any greywater – fit a lock on the tap and put up a sign.

For further helpful information see: www.smarterhomes.org.nz

Insulation

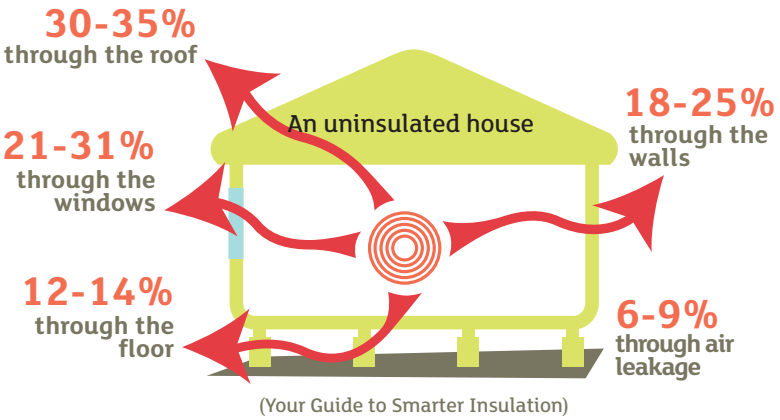
When choosing insulation, consider products which:

- Perform over time
- Come with a BRANZ appraisal
- Are easy to fit if you are doing it yourself
- Are non-toxic and non-irritant
- Won't sag over time
- Breathe
- Are non-combustible or fire retardant
- Are vermin resistant, stay mould-free and will not rot
- Will provide noise insulation

Here are some tips on the different kinds of insulation available:

Wool

Wool is a sustainable agricultural by-product. Though it's non-toxic and recyclable it pays to research what it may have been blended with as this may alter its properties. Some resins or binding products could have low levels of emissions when first installed - check with your supplier. Wool insulation is non-irritating and easy to handle.



(Your Guide to Smarter Insulation)

Glass and mineral wool

A very effective and widely used form of insulation. Mineral wool can contain up to 15% of industry mineral waste. Glass/fibreglass insulation can contain up to 80% recycled glass.

If you are installing this yourself, you should use protective clothing and a mask or respirator to prevent minor skin irritation and inhalation of small fibres.

Polyester

This is a by-product of the petrochemical industry. Polyester/wool blends can contain a high proportion of both recycled wool and polyester offcuts, contributing to general waste minimisation. Polyester insulation will not emit any airborne pollutants if no chemical binders are used.

As with other bulk insulation, polyester needs time to restore its natural loft after being packed and stored. Longer storage time will require a longer loft restoration time. Polyester insulation does not degrade and is claimed to be suitable to recycle and reuse. It is toxic if burnt.

Rigid sheet insulation products / polystyrene

Polystyrene is manufactured from a by-product of the petrochemical industry, and manufactured in expanded and extruded forms. Recycled polystyrene products are also available. Extruded polystyrene may emit a form of CFC (CFCs deplete the ozone layer). It's safe if fully sealed by concrete or cladding, thus containing any emissions.

Polystyrene is easy to handle but shreds and crumbs from cutting it should not be inhaled. Nor should they be allowed to enter soil and water as they break down very slowly. Polystyrene is toxic if burnt.

Where possible, it's a good idea to check your insulation from time to time to make sure it hasn't come loose or moved.

21°C

the indoor temperature in winter recommended by the World Health Organisation for children, the elderly and the sick

Exposed concrete floors

As you were proposing an addition to your home an insulated exposed/uncovered northerly-oriented concrete floor has been included in your Renovation Plan which will both look good and be useful. It is designed to help keep temperatures in your home consistently comfortable (18–25°C). Dense materials, such as concrete, are able to absorb, store and release heat – just like a solar battery. In winter, solar heat from the sun shining directly on the concrete during the day time is absorbed and stored within. At night as temperatures drop, this stored heat is released into the room and helps maintain a comfortable inside temperature.

To maximise the amount of heat stored, you need to directly expose as much of the concrete floor as possible to the sun's rays and for as long as possible.

Furniture

Don't place large pieces of furniture where they will block lots of sunlight. Leave curtains open or blinds up during the day in the cooler months. This way you'll get the most out of your exposed concrete floor.

Floor coverings

If you *do* need to cover your concrete floor, try covering only those parts that don't get direct sun on them, or use hard and dark materials (such as ceramic tiles). This will mean that the floor's heat storing ability is not compromised significantly.

In the warmer months your concrete floor can still be of benefit – as long as the house has good ventilation at night time. As the temperature drops at night, heat will be released from the concrete floor. This warmed air needs to be released outside to assist in keeping the inside temperature down. It is pushed out by ventilating the house with cooler outside air.

In single storied homes, the wind brings about this ventilation while in multi-storied houses, natural air pressure and temperature differences initiate air movement. It's that simple!

1 kW

per hour of heat (the same amount as a 1 bar heater) is produced by the sun falling on 1 m2 of window

External shading devices on windows

The idea of window shading is to ensure your house has comfortable temperatures (18 –25°C) and as little glare, for as long as possible.

Many people don't realise that the sun produces an enormous amount of heat energy. In summertime in New Zealand, on average about 1,000 Watts of heat energy beams through every square metre of your windows. This is the equivalent of a 1 kW bar heater for every square metre of window!

Your Home*Smart* Renovations Plan includes external window shading devices to minimise overheating and glare year round. Exact features and placement will depend on your home and renovation, but generally this means that:

- on the **north side** (where the sun is at noon) an overhang with the correct depth is constructed. This is fixed, and allows as little direct sunlight as possible to enter through your northern windows in the summer time.
- on the **west and eastern sides** movable shading, such as pergolas with shading battens, awnings, shade sails, or adjustable louvre systems, give maximum shade.

How to use external shading devices

If your home has east and west window shading devices fitted, use them to ensure that comfortable conditions are achieved indoors. The idea is to use the depth of the shading device to block out as much unwanted sun as possible. This is usually done manually with a crank system. If adjustable manual shades are fitted, then the idea is to use them only in the warmer months, on a daily basis. If possible, you should adjust them so they block out all the unwanted sun for the bulk of the day.

- On the eastern side, adjust shades to their maximum depth in the morning – keeping out all the sun. The earlier in the morning, the better; in the afternoon, they can be left up.
- On the western side, adjust shades to their maximum depth in the afternoon – keeping out all the sun. Unwanted westerly sun is probably the most problematic as it comes when the house is already warmed up, so make sure you manage it well. For the times when you will be out all day, the best idea is just to leave the shades down (providing they are protected from the wind).

75%
of your time is spent at home

Correct use of your adjustable shading devices will reduce the likelihood of your home overheating in the warmer months – and you'll have the added benefit of reducing glare. Comfort levels will be further increased by the use of correct ventilation.

Best design

In general:

- It is important that the eaves/shades do not block the winter sun, as this is when you want higher indoor temperatures.
- Always allow the heat build-up under and behind shading devices, such as louvres and overhangs, to vent to the outside.
- Don't place reflective ground surfaces (such as swimming pools) outside windows.
- Renovated louvres must allow for windows to be opened and cleaned, and, irrespective of design, will obstruct the outlook
- If changing windows, then ask for window frames with good thermal performance and low environmental impact. Builders are encouraged to specify timber, thermally broken aluminium or composite (aluminium/timber).

Planting for shade:

- Planting provides flexible shade options
- Deciduous vines and trees let winter sun through but provide summer shade.
- Groundcover plants keep surface and ground temperatures lower in summer, as well as reducing glare - use plants instead of hard paving in outdoor living areas exposed to direct summer sun.
- A shaded courtyard next to the main living area can act as a cool air well.

2 hours

- how often the air inside your house should be changed to stop it becoming stale. This is called an hourly air change rate of 0.5

Passive ventilation

Passive ventilation occurs when the differences in temperature and air pressure create a gentle air flow through the house. It is energy efficient because it doesn't rely on fans or a cooling system. However, it does need clear, uninterrupted pathways through the home for it to work well. There are different ways to encourage passive ventilation:

Cross ventilation

- Opening windows and doors placed on opposite or adjacent walls of a room and home will encourage cross-ventilation.
- Airflow through living areas is maximised by having openings at different levels or near the ceiling on both sides of the space.

Stack ventilation

- A vertical distance is created between opposing openings to create a stack effect (hot air rising) and thus enhances air flow;
- Vertical ventilated shafts within a building can promote air flow.
- Vents or other openings in the roof or on upper floors will allow air to escape as heat rises.

Strata ventilation

- Windows can be placed at the top of a wall as well as the bottom.
- Useful where there is limited outside wall face, such as in apartments.

Some further options to consider are:

- Closable vents installed in window frames allow low level ventilation throughout the year. This can help with controlling moisture without compromising security.
- Install trickle vents in windows, louvres, security stays and vents and other openings in the roof to encourage secure, background ventilation when the house is empty.
- Installing safety locks allows the windows to be kept open even when nobody is home.
- A well insulated home has greater passive ventilation because it is cooler in summer and has less uncontrolled air infiltration.

For further information check out www.level.org.nz and www.smarterhomes.org.nz

34%
of your total energy use goes on heating your home

Extractor fans and rangehoods

These are often recommended for the bathroom and kitchen respectively to remove moist air.

Installation and maintenance

- They should have a manual on/off switch rather than be humidity controlled.
- All fans and rangehoods should be vented to the outside, not into the roof cavity.
- The exhaust vent should be away from any window, so that moist air won't just re-enter the house.
- Periodically clean or replace the air filters

For further information look at www.level.org.nz and www.smarterhomes.org.nz

Heating systems

Keeping your home warm is the result of a whole house system, rather than simply running enough heaters. Your Home*Smart* Renovations Plan is likely to recommend insulation measures prior to installing a heat system as there is little point in spending money on generating heat that will simply leak out of your home. However, once you are ready to move ahead onto heating systems, you will need to decide which option to take. Your Home*Smart* Renovations Plan may already specify a certain heating system, however several options are outlined below.

Heat pump

What makes heat pumps so efficient is the way they operate. Without using any fuels, a heat pump will extract available heat from the outside air and transfer or "pump" it inside your home. This is a very efficient process as for every kW of electrical energy used, a heat pump will supply up to 5 times as much heat energy. The ratio of use/supply is called the co-efficient of performance (COP). A heat pump should have a COP of greater than 5. This compares to electrical bar heaters which have a COP of 1.

12°C

inside your home can seriously impact your health

Tips on using your heat pump:

It takes time to learn how to best operate your heat pump because their performance depends on your home and settings. If you get it wrong, you can end up with a large electricity bill.

Make sure you use your heat pump in an insulated room. There's no point in paying for heat to escape through the roof, floor and walls.

- **Heat pumps take time to warm a room. There is a delay between setting the temperature and feeling warm. Avoid constantly fiddling with the thermostat. Choose a temperature which is comfortable and then try to leave it alone.**
- **If you have a house with heavy mass, for example a brick home, it will take longer to heat up and cool down. It is better to have the heat pump on constantly at a low level in this kind of house. If your home is timber framed, the response will be quicker and therefore it may be more efficient to turn on the heat pump twice a day.**
- **Experiment with finding the right temperature. Generally, people are comfortable at 18–21°C. Remember, however, that for every degree warmer you set your heat pump, the energy use and running costs of the heat pump will rise.**
- **Most heat pumps have some kind of filter system which needs to be cleaned or replaced regularly. Check your heat pump instruction manual for details.**

The refrigerants in a heat pump can be harmful to the ozone layer and/or contribute to climate change if they escape. Before you purchase one, find out whether CFCs or HCFCs are released during its manufacture. Read the manual on maintaining your heat pump and consult your local council for instructions before disposing of a unit.

For further information see: www.level.org.nz and www.energywise.govt.nz

7¢

per unit of heat - wood burners are the cheapest heating option.

Wood burner

Properly designed wood burners are a very efficient means of heating your home and have the added bonus of using a renewable fuel. However they do release fine particles into the atmosphere which can accumulate and are considered harmful to humans. The Ministry for the Environment has identified acceptable wood burners (MEPS compliant) available in New Zealand and Beacon recommends that you purchase one of these. In some cases a building consent will only be granted for those burners on the approved list.

Your house may be equipped with a heat transfer system. This takes the heat generated by your fireplace and distributes it to other rooms, which don't have their own in-built heating appliances.

Tips on using your wood burner:

- **Only use well seasoned firewood with less than 25% moisture. You can test it by throwing a small piece onto hot glowing coals. If it catches fire on the top and sides within one minute, it's dry enough to burn well. Keep firewood in a dry space.**
- **Treated or painted timber should not be used as firewood as it emits toxic fumes when burnt and can damage the flue.**
- **Avoid using the damper mechanism as this greatly increases emission levels.**
- **If you have small children or pets, it may be worth installing a protective guard around the wood burner.**
- **Regularly clean and maintain your chimney flue. An annual professional clean is recommended.**

For further information look at www.nzhha.co.nz and www.level.org.nz

1°C
warmer inside can significantly reduce dampness

Pellet burner

Pellet burners are another efficient means of heating your home and they also use a renewable fuel. The Ministry for the Environment has identified acceptable pellet burners available which do not pollute the air and are suitable for New Zealand conditions. Beacon recommends that you purchase a pellet burner from this approved list thus helping to reduce local air pollution. A building consent is required for installation.

Pellet burners work by burning specially produced sawdust pellets, which would otherwise be a waste residue of the wood processing industry. These pellets take less space to store than conventional firewood and you don't have to worry about kindling. Pellets are place in a hopper and feed automatically into the pellet burner. You can control the rate at which they are consumed. The on/off switch is usually electric which avoids the hassle of setting and lighting a fire.

Tips on using your pellet burner:

- **Keep pellets in a covered storage space (about one third of the space needed for the equivalent in firewood)**
- **Pellets can be in short supply as there are not enough manufacturers at present, so order plenty in good time.**
- **Use a timer to control when the pellet fire turns on or off**
- **Don't put anything else in the burner apart from pellets. They can't be used for burning rubbish.**
- **Keep grills, air vents and flues clear of obstruction by inspecting them weekly and cleaning if necessary. An annual professional clean is recommended.**
- **If you have small children or pets, it is worth installing a protective guard around the pellet burner.**
- **Consider a battery back-up to ignite your pellet burner in case of a power failure.**

For further information see: www.nzhha.co.nz and www.smarterhomes.org.nz

29%
of your total power bill will be for heating water

Heat transfer systems

Often a wood or pellet burner produces too much heat for one room. In this case you can distribute the excess heat around the house with a heat transfer system. This is usually a system of vents and ducts, as well as a fan and is simple to install by a registered electrician.

Tips on using your heat transfer systems:

- Remember the system won't work if there is not enough heat in the first place. Insulate your house well and choose an efficient heating appliance first.
- If the system is ducted into rooms which are seldom used, specify vents which can be closed for those rooms.

Wetback

If the layout of your house allows, and if your wood burner is large enough, you can install a wetback system to boost your hot water cylinder. You will need a building consent for this. Wetbacks are sometimes installed on pellet burners but check with your local council first. A hot water system that has both a wetback and solar boost can be designed, but can be tricky to install on existing homes.

Maintenance tip

- Regularly check your thermostat to make sure it's working properly. If there is any fault, get it replaced immediately.

For further information see: www.nzhha.co.nz and www.level.org.nz

75%
of your hot water could be provided by a solar water heater in summer

Solar hot water system

Look for a solar collector that has a ten year warranty or better. Solar collector panels need to face in a northerly direction and be as free from shade as possible. A building consent is required.

A solar water heating system can be added to an existing conventional hot water system. If the existing hot water cylinder is in good condition, a pumped system can be installed by addition of collector, pump and controllers.

Maintenance tip

- **Solar collector panels should be washed occasionally and any lichen or other matter removed.**
- **Check the system for leaks in the case, glass or pipes. Condensation on the glass or wet insulation indicates there is probably a leak.**

For further information see: www.eeca.govt.nz, www.solarindustries.org.nz and www.smarterhomes.org.nz

Heat pump hot water system

These are relatively simple for a registered plumber and electrician to install. However maintenance varies so check your product manual for specific instructions.

3.3 Maintaining your home

Regular maintenance will make your home last longer and increase its value. Also, you'll find it easier to identify any work that needs to be done before it becomes a major issue.

There are two key things to remember on home maintenance:

- A maintenance log cataloguing what was done, by whom and when is a smart idea. Keep it in a place known to all adults in the home and hand it on when you sell the house.
- Cleaning materials and finishes on both the inside and outside of the building will make them last longer. This is especially important for metals which are not rain washed to reduce corrosion.

For more detailed information about maintenance, you may like to buy BRANZ's publication, *Maintaining Your Home.*

TASKS	PERIOD	NOTES
Regular preventative tasks	**between maintenance or replacement**	
wash down roof and walls	3–6 months	(depending on the environment)
clean gutters	6 months	
roof check	yearly	
sub floor check	yearly	
exterior wall check	yearly	
clean chimney	yearly	
checking function of battery smoke detectors	6 months	
emergency first aid/food kit	yearly	
check photovoltaic panels (cleanliness)	6 months	
check solar hot water system (panels, glass, pipe insulation, temperature probes)	6 months	
check heat pump system (pipes, pipe insulation)	6 months	
rainwater collection system	2–4 months	(dependent on conditions)
Major maintenance tasks		
paint wall	every 5 years	
paint windows	every 5 years	
paint roof	every 5 years	
paint lounge ceiling	every 5 years	
paint bedroom ceilings	every 5 years	
paint service rooms	every 5 years	
Planned irregular major maintenance tasks		
new carpet	every 7 years	
reseal timber floors	every 7 years	
resealing exposed concrete floors	yearly	(for wax system)
	every 5 years	(for polyurethane)

4. Plans, products and warranties

Your Home*Smart* Renovations Plan has been designed to make your home reach a HSS High Standard of Sustainability™. It includes many features to enable you and your family to enjoy living a more sustainable lifestyle.

There may be occasions when you need to find additional details about your home and its special features. You may want to tell your friends and neighbours about your renovations, or you need to contact a manufacturer or supplier if something isn't quite right.

The following details should help you to quickly find out anything you need to know about your renovation and who to contact for further information or assistance. We strongly recommend that you keep this list up-to-date as you proceed with your renovations and pass it onto the new owner if you sell your home.

Home*Smart* Renovations Plan provider

- Name, address, contact person, contact number

Home*Smart* Renovations Plan

- Home*Smart* Renovations Plan

Documents and house plans

- Site Plan
- Slab Plan (include slab insulation detail if relevant)
- Floor Plan
- Elevations
- Door and Window Schedule
- Foundation and Lintel Details
- Construction Details
- Electrical Plan
- Plumbing Plan
- Changes to House Plans
- Other

Consent documents

- Include the documents below as relevant
  - Resource Consents
  - Building Consents
  - Code of Compliance Certificate

Renovation records

Intervention	Completion Date	Installer Name	Installation company contact details	Product Name
Hot water system				
Heating system				
Insulation				
Electrician				
Plumber				
Concrete slab floor				
Exposed concrete floors				
External shading devices				
Heat pump				
Wood burner				
Pellet burner				
Underfloor heating				
Double glazing				
Passive vent				
Mechanical vents (extraction fans and rangehoods)				
Heat transfer system				
Wetback				
Other				

Appliances

Type	Make	Model	Energy rating	Water rating	Manual (internet pdf url or attach hard copy)
Oven					
Fridge					
Dishwasher					
Heating					
Solar water heater					
Rangehood					
Other					

Indoor environment quality

Type	Manufacturer	Product/Colour	Enviro-Choice Certified (tick)
Paints			
Carpet			
Ventilation			
Kitchen			
Bathroom(s)			
Smoke detectors			
Other			

Water

Type	Manufacturer	Model	Rating
Rainwater tank			
Greywater system			
Toilet			
Tapware			
Other			

Warranties/Guarantees

- Builder's guarantee
- Appliance warranties
- Cladding
  - Roof
  - Walls
- Paint systems (if applicable)