

FREE Guide Home Renovation



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buildbacksmarter.co.nz



Where to start

When renovating, make your home warmer, drier, healthier and cheaper to run - it's your chance to build back smarter.

Where to start

- Reduce heat loss**

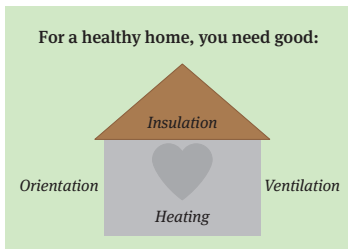
Stop drafts around doors and windows, boost ceiling, underfloor and wall insulation, use two layers of thermally-backed curtains and when possible double glaze with low-emissivity glass.
- Efficiently heat your home**

Capture free heat by improving access to winter sun through north-facing windows, choose an efficient heating system that can heat living areas to a minimum of 18°C and bedrooms to 16°C.
- Control moisture at the source**

Remove damp air from your home with an extractor fan in all bathrooms, a range hood in the kitchen and vent your clothes drier outside. Laying a plastic sheet over the ground beneath raised floors also provides an important moisture barrier.
- Be water-wise**

Insulate all hot water pipes and hot water cylinders, check your cylinder thermostat is set to 60°C, then choose water-efficient taps and low-flow showerheads, dual flush toilets, and a water-efficient washing machines and dishwashers.
- Regularly ventilate your home**

Open windows and doors for a few minutes each day to remove moisture and allow fresh dry air to circulate throughout your home.



How healthy is your home?

Check the temperature and humidity of each room in your home throughout the year. To meet world health standards, living spaces should be a minimum of 18°C and bedrooms a minimum of 16°C when occupied. Relative humidity should be between 40% and 60%.

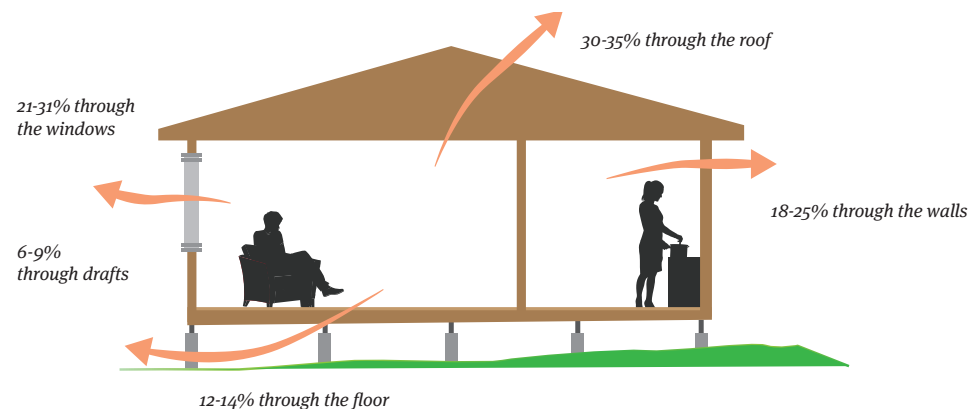
The risk of respiratory disease and mould growth in your home significantly increases if household temperatures are consistently below 16°C and humidity is greater than 70%. Home sensors are available from most electronic retailers for less than \$40.



Ceiling and roof

Opportunity	Description and Benefits	Value
Boost ceiling insulation	Improving your ceiling insulation is the best way to make your home warmer and healthier. Up to 35% of heat can be lost through an uninsulated ceiling. Boosting insulation by adding another layer over old insulation will help to trap more heat in your home. Fit insulation between and completely over ceiling joists so it looks like a thick continuous blanket across your roof space (provided no down-lights are in place). Aim for an R value of 4 or at least 17 cm of insulation depth. Be aware of gaps. Even small gaps can dramatically reduce the performance of your insulation.	Avoid 35% loss from your home – saving up to \$500 per year. An insulation top-up for an average home can cost \$1000. Insulating an uninsulated ceiling can cost \$3000. Financial help is available depending on personal circumstances.
Check insulation does not cover down lights.	If your recessed down lights are labelled non-IC or CA (see lighting section), they must not be covered with insulation otherwise they are a potential fire hazard. Heat can build-up around lights and ignite ceiling material. Most down lights require a gap around them to release heat.	Avoid a fire risk. No cost to check down lights.
Replace all non-IC-rated down lights	Choose pendant lights that hang from your ceiling or IC and IC-F-rated down lights to avoid heat loss through your ceiling. Further cost savings can be achieved by using LED bulbs (see lighting section).	Less heat loss through your ceiling and lower running costs for lights.
Change to lightweight durable roofing material.	Consider replacing heavy roofing materials such as concrete tiles, with light-weight and durable materials such as coloured steel. A light-weight roof will be more earthquake resilient.	Improved resilience to earthquakes and less maintenance.

Heat loss in an uninsulated home

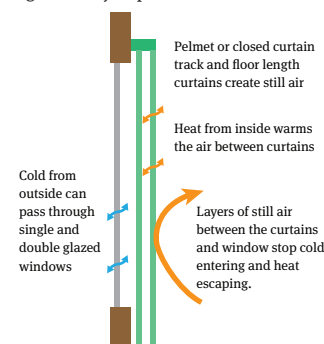


Windows and Doors

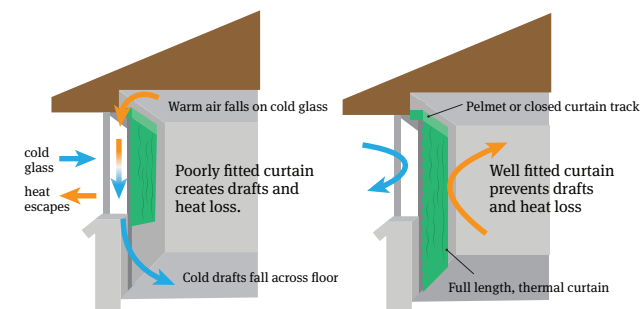
Opportunity	Description and Benefits	Value
Stop drafts	<p>Stopping drafts is one of the simplest and cheapest ways to make your home warmer. Gaps around windows and doors allow cold air to enter and leak warm air outside.</p> <p>Self-adhesive foam, rubber or V Seal tapes can easily be attached around the frames of doors and windows. Brush strips can be screwed to the bottom of doors and flexible silicon-based sealants can fill gaps.</p>	<p>Less cold drafts from doors and windows.</p> <p>Typically 10% of home heat is lost through gaps.</p> <p>\$40 for 10 meters of adhesive draft stopping.</p>
Two layers of curtains	<p>Good curtains can dramatically improve your comfort and lower heating costs.</p> <p>Use two layers of full length thermally backed curtains. A second layer can simply be attached to the inside of your existing curtains.</p> <p>Choose close-fitting curtain tracks, which act like small pelmets above windows, to stop warm air at the ceiling being drawn onto cold windows and circulating cold drafts round the room.</p> <p>Close your curtains early to trap in the day's heat and to block out cold through the night.</p>	<p>Typically 35% of home heat is lost through windows.</p> <p>Stops cold drafts across the floor.</p> <p>Second layer of curtains \$30 per linear meter.</p> <p>Free from the Community Energy Network Curtain Bank</p>
Secondary glazing	<p>Secondary glazing is a relatively low-cost way to improve the thermal performance of your windows and reduce condensation.</p> <p>Plastic film window kits can be taped onto wooden window frames or hard acrylic sheets can be cut to size and attached by magnet to the inside of your windows. Both options work well to improve heat loss and eliminate condensation but have a shorter life than glass double glazing.</p>	<p>Typically 35% of home heat is lost through single glazed windows.</p> <p>Plastic window kit – \$10 per window</p> <p>Magnetic acrylic secondary glazing – \$250m²</p>
Double glazing	<p>Double glazing is a long-term solution to reducing heat loss and condensation. A gap of at least 12 mm between window panes is recommended. Double glazing can almost halve the heat lost through windows in comparison to single glazing. Choose Energy Star-labelled windows for the most efficient options.</p>	<p>Typically 35% of home heat is lost through single-glazed windows.</p> <p>Double glazing – \$400m².</p>
Low-emissivity glass	<p>Low-emissivity glass (Low-E) is an invisible coating that lets in light and acts like a mirror reflecting radiant heat back into your home. Low-E glass can reduce heat loss through glass by a further 20% with relatively minimal cost.</p>	<p>20% less heat loss through windows.</p> <p>5% cost increase over standard glazing.</p>

Opportunity	Description and Benefits	Value
Window frames	<p>Window frames made from insulating material like wood or plastic (PVC) reduce heat loss and condensation.</p> <p>Because aluminium transfers heat and cold extremely well, a small thermal break is needed to make the frames work properly reducing condensation forming on the frame and around the edges of windows.</p>	<p>15% less heat loss and less condensation.</p> <p>25% cost increase over standard frames.</p>
Capture the sun through windows	<p>Aim to maximise the sun's warmth during winter and limit overheating in summer.</p> <p>Appropriately size and locate windows - most on the northern side and least on the southern sides of your home.</p> <p>Use eaves, trees or external shading to reduce overheating in summer especially on the north and western side of you home. Ask your builder about passive solar design or refer to www.level.org.nz for more information.</p>	<p>1m² of north facing window is equivalent to a 1 kilowatt heater in winter.</p>

Two layers of thermally-backed curtains significantly improves heat retention.



Full length curtains tightly fitting around the window prevents cold air entering your home.



Source: Build Back Smarter

Home Heating

Home heating is often the largest contributor to your energy bills (making up 35%). Choose the most energy-efficient source of home heating you can afford, sized and located appropriately for your house. Options include a heat pump, electric heater, gas fire or a clean air-approved log burner

or pellet fire. Energy Star-labelled appliances are the most energy efficient, so will cost you less to heat your home. Aim to warm living spaces to a minimum of 18 degrees and bedrooms to a minimum of 16 degrees.

Comparative heating costs for a range of home heating options







Fuel	Appliance	Energy Efficiency	Output (kw)	Installed Cost (\$)	Heating Cost (\$ / hr)
Electricity	Fan heater	100%	2.4	30	0.57
	Oil column heater	100%	2.4	170	0.57
	Radiant bar heater	100%	2.4	80	0.57
	Night store heater	80%	3.4	1,400	0.61
	Heatpump	370%	5.4	2,750	0.34
	Heatpump central heating	330%	14.0	15,000	1.00
	Ground source heatpump central heating	400%	15.0	32,000	0.89
Gas	Flued gas heater	80%	7.0	5,400	1.66
Pellet	Pellet fire	82%	9.5	5,100	1.16
Wood	Free standing log burner	70%	16.0	3,500	0.86
	Englosed log burner	65%	14.0	3,500	0.81

Source: Environet Ltd, heating choices and costs for Christchurch 2013




Portable gas heaters are not recommended

The continual use of a portable gas heater is not recommended. Portable gas heaters burn LPG, but have no chimney to carry away emissions. This releases into your home harmful gases such as carbon monoxide and nitrogen dioxide and significant amounts of moisture contributing to condensation. Because of this, gas heaters should only be used with an open window and at times of emergency such as during a power cut.



Appliance	Advantages	Disadvantages	Best used for
Heat Pump  	Very efficient form of heating. Wide range of sizes and outputs. Quick to heat a room Able to heat and cool. Highly controllable with built in settings. Safe form of heat. Able to filter the air.	Performance can drop when very cold outside. Need to clean filters May need multiple units to heat whole house and large external unit. Requires qualified installer. Relatively high purchase price. Drafty air circulation.	Primary source of home heating Background heating for large rooms. Summer cooling
Oil and convection heaters 	Often has thermostat and timer. Portable - often wheeled. Quiet.	Slow to heat up. Heat rises to the roof. Can't heat large spaces well. Fire risk if covered.	Background heating of a bedroom or small living space.
Radiant heaters 	Instant heat. Portable. Direct radiant heat feels warm even if the room is cool. Quiet.	Fire risk if it falls over or is placed too close to furniture or clothing. Hot surface could burn if touched. Often limited in size / output.	Spot heating of a person for a relatively short time.
Panel heater 	Thin wall mounted panel. Takes up little space. Often has a thermostat and timer. Quiet.	Very low heat output. Relatively high cost for heat. Not to be placed on an uninsulated wall because of heat loss.	Background warmth for small well insulated rooms.
Fan heater 	Low cost. Instant heat. Often has thermostat.	Limited in size / output. Drafty with air circulation. Noisy.	Heating small spaces quickly.

Water Heating

Appliance	Advantages	Disadvantages	Best used for
 <p>Flued Gas Fire</p>	<p>Fast to heat.</p> <p>Easily controlled, often has thermostat and timer.</p> <p>Provides both radiant and convection heat.</p> <p>Provides aesthetics of fireplace.</p>	<p>Relatively expensive.</p> <p>Requires electricity to run.</p> <p>Uses non-renewable fossil fuel.</p>	<p>Good if house already connected to mains gas supply.</p>
 <p>Wood burner</p>	<p>Provides radiant and convection heat.</p> <p>Large heat output range 8 kW to 30 kW.</p> <p>Affordable form of heating.</p> <p>Can run without electricity.</p> <p>Can combine with wetback in some areas.</p> <p>Can combine with heat transfer to heat whole home.</p> <p>Relativity low running costs.</p>	<p>Requires effort and space to store and cut wood.</p> <p>Ash and chimney cleaning can be messy.</p> <p>Contributes to air pollution.</p> <p>Requires building permit.</p> <p>Creates a fire risk.</p> <p>Needs a fire safety guard.</p> <p>Relatively high purchase price.</p>	<p>Heat large areas.</p> <p>Where wood is readily available.</p> <p>When power cuts are possible.</p> <p>When difficult to insulate home.</p>
 <p>Pellet Fire</p>	<p>Very clean burning.</p> <p>Easily controlled - with timer and thermostat.</p> <p>Less handling of wood.</p> <p>Can combine with wetback in some areas.</p>	<p>Requires electricity to run (although some come with batteries).</p> <p>Mainly convective heat</p> <p>Smaller heat output 8-15kW.</p> <p>Pellets can be relatively expensive.</p> <p>Requires building permit.</p>	<p>Heating large areas</p> <p>People who want a wood burner but without the effort of handling wood.</p>

Close fitting curtain rails reduce drafts and heat loss



Opportunity	Description and Benefits	Value
Choose efficient water heating	<p>Hot water heating can make up 30% of your home's energy bill. Choose the most efficient form of hot water heating you can.</p> <p>Highest running cost</p> <p>\$ Electric water cylinder Gas water storage Instant electric Instant gas Fireplace wet back Solar hot-water Hot-water heat pump Solar / wetback in combination</p> <p>Lowest running cost Excludes purchase and maintenance costs</p> <p><i>source: Home Performance Advisor Manual</i></p>	<p>Various purchase prices and running costs.</p>
Install seismic restraints for cylinders and tanks	<p>Many water header tanks and hot water cylinders were affected by the Canterbury Earthquakes. Adding strapping and bracing around these heavy tanks should be considered to prevent future damage.</p>	<p>Future-proofing your home.</p> <p>Minimal cost.</p>
Insulate all hot water pipes	<p>Wrap insulation or lagging around all hot water pipes. This is especially important for pipes nearest to your water cylinder because this is where the greatest amount of heat is lost.</p>	<p>Less time waiting for hot water to reach your tap or shower.</p> <p>\$5 per meter.</p>
Insulate your cylinder	<p>Most hot water cylinders, even new ones, give off heat. By placing an insulation wrap around the cylinder you can trap in heat meaning you will spend less on heating water.</p>	<p>Save on average \$100 per year.</p> <p>One-off cost \$70 for a cylinder wrap.</p>
Consider solar hot water	<p>Solar hot water systems are ideal for larger families or for people who use lots of hot water. You can typically save about 70% of your hot water heating costs by using a solar system.</p>	<p>\$7000 - \$10,000 for a solar hot water system.</p>
Ask about night-rate water heating	<p>Electricity is substantially cheaper overnight when there is less demand. If you have a large hot water cylinder, you can enjoy the benefits of this cheaper electricity by heating water overnight. Check with your electricity supplier to see if night-rate water heating will work for you.</p>	<p>Night time electricity rates can halve your water heating costs.</p>

Ventilation and moisture management

A damp home is much harder to heat and can lead to condensation and mould problems. It is best to control moisture at its source rather than treat the symptoms of a damp home. Using a dehumidifier or mechanical ventilation system could be considered only after all other options to prevent moisture in the home have been taken.

<i>Opportunity</i>	<i>Description and Benefits</i>	<i>Value</i>
Install a kitchen range hood	Install a kitchen range hood to remove unpleasant cooking odours and moisture from your home. Cooking is a significant source of moisture and odour in the home. Regular cleaning of the filters also helps maintain good air flow.	Avoid cooking odours and three litres per meal of moist air saturating your home. \$300 plus installation.
Install extractor fans in all bathrooms	All bathrooms should have an extractor fan (minimum 120mm in diameter) vented to the outside. Fans should be left on for at least five minutes after showering. An open bathroom window is seldom used over winter when moisture problems are exacerbated by cool, wet weather.	Avoid 0.5 litre per shower of moist air saturating your home. \$120 plus installation.
Consider a shower dome	Eliminate bathroom condensation by placing a plastic lid over your shower cubical. Shower Domes trap in moist air and give you a warmer shower. You will still need to ventilate the bathroom and shower to manage mould that may grow on damp surfaces.	Avoid 0.5 litre per shower of moist air \$250 includes installation
Vent your clothes dryer outside	Ensure your clothes dryer expels the moist air to outside your home. Avoid drying clothes inside on clothes racks or in front of wood burners which significantly adds to dampness in your home.	Avoid four litres per wash of moist air saturating your home. \$90 for ducting plus installation.
Dry your clothes outside	Drying clothes outside is a great way to avoid moisture in the home and natural UV from the sun helps to purify clothes. Place your clothes line in a convenient sunny location and, if possible, take clothes in before the evening gets cool to avoid the need to finish drying damp clothes inside.	Avoid four litres per wash of moist air saturating your home. Free, once an outdoor clothes line is set-up.
Open windows and doors everyday	Opening windows and doors for just a few minutes each day is a great way to remove moisture and allow fresh air to circulate throughout your home. Windows that have ventilation latches or security stays are useful to securely allow fresh air to circulate through your home.	Fresh dry air replaces damp stale air making the home easier to heat and healthier. Free.

Floors and foundations

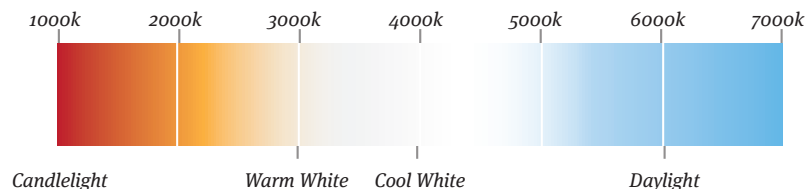
<i>Opportunity</i>	<i>Description and Benefits</i>	<i>Value</i>
Install a ground moisture barrier	Homes with an enclosed subfloor space should have a heavy-duty plastic ground sheet laid over the soil and placed securely around foundations to prevent dampness entering the home from moist soil below. Rising damp is a particular issue for Christchurch because of the high water table and moist soils.	Eliminate rising damp. 30% of household moisture can rise from the damp soil beneath the home. \$17 per m ² installed.
Install underfloor insulation	Homes with sufficient space beneath raised floors should have underfloor insulation installed. Aim for an R value of 1.4 using bulk or ridged insulation materials. Silver foil insulation is no longer recommended because more durable and effective options are available.	Up to 14% of home heat is lost through an uninsulated floor. \$18 per m ²
Insulate the perimeter of concrete slab floors	If you are pouring a new concrete slab foundation, talk with your builder about perimeter insulation. Most heat is lost at the edge of a concrete floor. A range of options and products that use a thermal break within the edge material are available. This is essential if you are planning underfloor heating.	Significantly reduce heat lost through concrete floors.
Keep your underfloor vents clear	If you have a raised floor, make sure any underfloor vents are clear of vegetation or building work to adequately remove moist air from beneath your home.	Manage rising dampness. Free.
Check for leaks	Regularly check around and beneath your house for leaks, overflows or puddles. Poor site drainage and plumbing defects can be a major source of rising dampness and can damage your home.	Maintain proper drainage. Free.











Lighting

Opportunity	Description and Benefits	Value
Switch to LEDs	LEDs (light emitting diodes) can be used in all modern light fittings. Most commonly, people prefer warm/soft coloured lights (3000k or less). White lights could be considered for your bathroom, kitchen, workshop or outdoor areas (more than 3000k).	Saving of \$100 per year per LED bulb, plus up to 30-year life. Purchase price \$10 - \$20 per bulb.
Use pendant lights	Recessed down lights restrict the amount of light cast by each bulb meaning that you will need many more lights to adequately illuminate a room in comparison to pendant lights that hang from your ceiling.	Fewer lights means less costs.
Use IC-labelled or IC-F-labelled down lights	IC-labelled and IC-F-labelled recessed down lights are able to have insulation placed completely over the light fitting. This stops down lights acting like small chimneys sucking heat from the room and heat being lost through the gap in insulation required around non-IC-labelled lights.	Saves home heating costs. Purchase price \$70-120 per light fitting.
Personalise your lighting control	Consider the location and zoning of light switches to enable you to turn off sections of lights when not needed. Consider dimming switches to allow you to change the mood of the room. Check that your LED bulbs are able to be dimmed if needed.	More control of lights and lower running costs.
Capture natural light	Allow natural light to enter your home with north facing windows, and limit the size and number of windows facing south. Consider sky lights or solar tubes to allow natural light to illuminate darker spaces in the house.	Brighter internal spaces using daylight. Solar tube or skylight purchase price \$600 - \$2000.
Light entranceways, stairs and hallways.	Lighting of entranceways, stairs and hallways is vital to avoid trips and falls. Ensure that these places are adequately lit and that a light switch is accessible from the top and bottom of stairs and each end of hallways.	Improved personal safety.

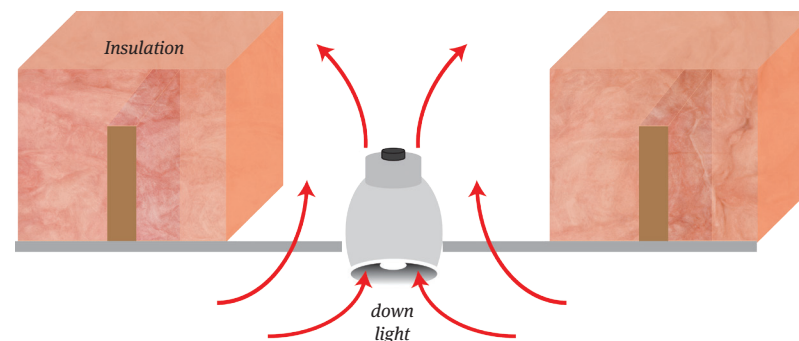
LED colour range.



New Zealand Down light fittings Classifications

Classification	Description	Label
Non-IC	Insulation must be at least 100mm away on all sides. Not recommended.	 
CA 135 and CA 80	Insulation must not cover, but can be close to the sides of the light fitting (abutted only). Not recommended.	  
IC and IC-F	Insulation can cover and surround the light fitting (abutted and covered). Recommended.	  

Non-IC labelled downlights cause heat loss.



Non-IC labelled downlights cause heat loss through ceilings because of the required insulation gap and the light's chimney effect.

Choosing pendant lights, LEDs or IC labelled downlights avoids this problem.

Garden and outdoor areas

Opportunity	Description and Benefits	Value
Face the sun	Enjoy winter sun and cool summer shade. Outdoor areas and north facing windows should capture winter sun. In summer, use features such as overhanging eaves, deciduous trees, awnings or umbrellas to stay cool.	Warmer home in winter and cooler in summer.
Escape the wind	You will enjoy outdoor living more if spaces are sunny and sheltered. Use your home, structures or trees to provide shelter from cold prevailing easterly winds and if possible, orient outdoor living spaces toward the north or west.	Enjoy outdoor living.
Grow edibles	Enjoy fresh, healthy and delicious fruit, vegetables and herbs grown at home. Include edible trees, shrubs and raised beds in your garden. For information about what varieties are suited to Canterbury visit www.edible.org.nz	Delicious home grown food.
Compost at home	Feed your garden with compost made from your household food scraps, lawn clippings and garden trimmings. Why pay for fertilizer when you can easily recycle organic nutrients at home.	More productive soils and less waste.
Go native	Native plants are hardy, require less maintenance, less watering and attract birds. Choose a mix of plants that provide year round food for birds offering a diversity of flowers, nectar, berries and bugs throughout the seasons.	Easy care garden that supports birds.



Home appliances and materials

Choose energy and water efficient appliances to reduce your bills.



Energy Star is awarded by EECA to the top-performing appliances in New Zealand.

Energy and water rating labels show how efficient your appliance will be - the more stars, the better.

Look for these labels when buying home heating, water heating, white ware, televisions, stereos, lighting and windows.

www.energywise.govt.nz/tools/energy-star#

Choose Environmental Choice to reduce your footprint.

The Environmental Choice eco-label is awarded by an impartial third party to show products meet stringent environmental standards. Look for Environmental Choice when you are buying paint, insulation, plaster board, carpets, joinery and other building or household products.

www.environmentalchoice.org.nz



Ask your designer or builder about:

Homestar.org.nz

Homestar measures the health, efficiency and environmental performance of your home. The advice provided in this Build Back Smarter guide aligns with Homestar. The Homestar website lists certified designers and builders, so you can find someone able to deliver these practical ideas.



Lifemark.org.nz

Lifemark provides a practical checklist and guide to improve the liveability of your home for people of all ages and all abilities. A Lifemark certified home will be more flexible and adaptable as your needs change and is often called lifetime design.



More help is available

BRANZ provides detailed advice about home renovation	www.renovate.org.nz
EECA provides tips, guides and online calculators on home energy use	www.energywise.govt.nz
MBIE provides guides on the building code, weather tightness and earthquake resilience	www.building.govt.nz
MFE provides guides about ways to make a healthy and efficient home	www.smarterhomes.org.nz
ECAN provides lists of approved wood burners (look under 'Our Responsibility - Air Quality')	www.ecan.govt.nz
Consumer Institute provides guides on home building, renovation, and maintenance	www.consumer.org.nz
Sustainable Living offers adult education and future living skills courses	www.sustainableliving.org.nz
Power Switch helps you find the best electricity provider for your home	www.powerswitch.org.nz

Book your free, no obligation, home consultation at
buildbacksmarter.co.nz



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