

THE ESSENTIAL GUIDE TO HOME HEATING IN NEW ZEALAND

ALL YOU NEED TO KNOW ABOUT HEATING
BEFORE BUILDING OR RENOVATING



HEATING NEW ZEALAND HOMES

Are you sick of living in a cold, damp house?

Many New Zealanders will be familiar with the struggle to stay comfortably warm in their home each winter. Typically, New Zealand homes are heated unevenly and unhealthily because they haven't been built with a focus on heating. Kiwis have been used to living in cold, damp homes despite the effect this has on comfort and health. We have all experienced this and have often warmed ourselves up by putting more clothes on or by only heating one part of the house at a time.

The World Health Organization's recommended air temperature standard is 21°C. In New Zealand homes, the air temperature in bedrooms often falls below 16°C, while living areas are commonly over-heated – sometimes to as high as 30°C. This is a throwback to the days of a traditional log fire in the living room, producing four times the energy required to heat the room.

You don't have to live this way. There are number of solutions available to heat your home effectively, evenly and efficiently.



Where in New Zealand do you live?

Four climate zones are used to differentiate the weather patterns in different parts of New Zealand. These climate zones are based on average temperature data and take in to consideration territorial authority boundaries.

Climate Zones

Zone 1: Northland, Auckland and the Coromandel Peninsula (the warmest areas).

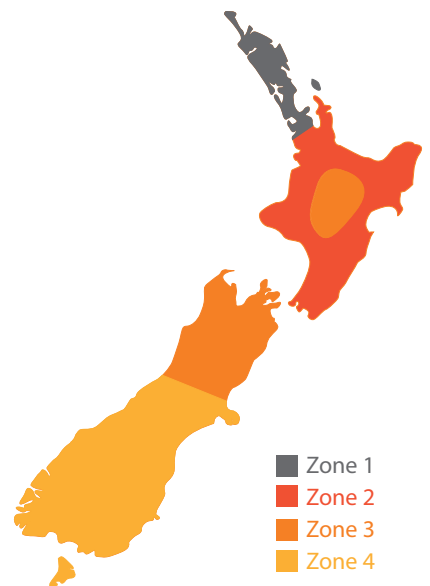
Zone 2: The rest of the North Island other than the Central Plateau.

Zone 3: The Central Plateau of the North Island & the top of the South Island .

Zone 4: Lower South Island (the coldest areas).

Consider the climate you live in when considering heating solutions. The New Zealand climate changes vastly across the country and heating solutions and home construction types are not appropriate for all regions. Within zones, rural and urban areas can have varying temperatures, sometimes by as much as 5 degrees.

Some architectural styles can make it harder to heat your home. For example, homes with large expanses of glass windows and high ceilings are harder to heat than homes with less windows and lower ceilings. This is particularly important in Climate Zones 3 and 4 where the weather is a lot colder than in Climate Zone 1.



Consider your preferred heating solution at the design stage rather than adding it as an afterthought. You won't regret it! Decent heating systems require components in particular areas for best efficiency and are often compromised if the heating is considered only after the building plans have been finalized.

TIP

Building Construction



Every construction type has different abilities to retain heat. Timber frame houses are the most traditional and many outside cladding systems can be used (eg. wood or brick). Poly block construction has a higher performance in withstanding heat loss compared to timber frame.

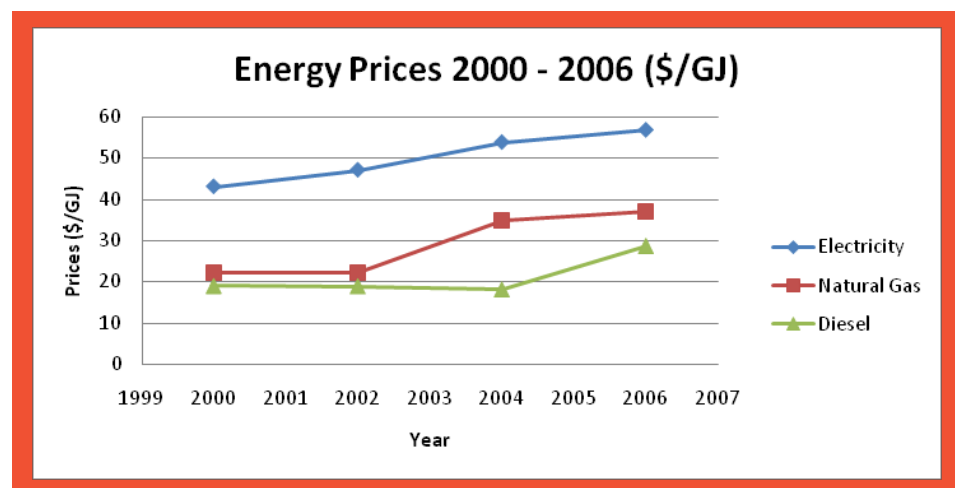
Thermal Mass Construction uses dense building materials such as concrete and stone products that take a longer time to heat but then retain the heat for longer periods. Examples of this kind of construction are Hebel, Continuous Insulated Concrete (CIC), block or tilt panel construction. They also work in reverse in the summer time, in that they stay cooler for longer. One of the issues with using thermal mass construction is that the mass must be within the heated envelope of the house. It is less efficient to build a block house and then batten, insulate and gib the inside of the walls, as this insulates the thermal mass from the indoor environment, nullifying the effect.

Thermal mass houses can consume a lot of energy at the start of a heating season as they absorb a lot of heat into the structure.

1. ENERGY SOURCES: THE FACTS

FACT There is no such thing as FREE heating. There is always a cost involved with heat sources. (Except for passive solar gain (e.g. When the sun is out).

Example: Even chopping up firewood for a log burner comes at a cost to you of the time needed to cut the wood.



Data sourced from the Ministry of Economic Development, Energy Data - Prices. March 2008.

FACT Electricity is the most expensive energy source in New Zealand.

FACT Gas, diesel and wood pellet technology have cheaper running costs because of the cost per kilowatt produced. (See chart below).

FACT Energy costs more in the South Island than the North Island despite the fact that the South Island is colder. (We wonder whether the Government knows this!) Check energy costs in your local area.

FACT All energy sources have increased in price and unfortunately will continue to do so in the future.

FACT New Zealand will face an electricity supply issue because of the growth in demand and the lack of new energy generation.

FACT A standard construction house of 200 square metres in Climate Zone 3 or 4 will require 10,000 - 15,000 kilowatt/hours per year of energy to heat it adequately.

MYTH Government agencies state that the largest consumption of energy in a home is heating the hot water. This obviously is for houses without heating!

To have a balanced, informed view of heating, one must understand the available fuel sources. Natural gas has been used extensively in the North Island and continues to be the obvious choice. The South Island has had less choice not having the reticulated network.

Newer heat pump technology can squeeze the electricity dollar further; however the ability to perform well depends on the climate zone and the type of appliance used.

One heat pump company in Christchurch has stated that diesel was only popular as a fuel source 40 years ago. In actual fact, 80% of commercial buildings in Christchurch are heated using diesel fuel, including Westpac Arena and the Christchurch Art Gallery.

Energy Issues

New Zealand's energy issues are a major topic of interest at the moment. In the past, we have been used to cheap and plentiful supplies. The increased demand has seen all forms of energy rise in price in the past few years. We need to be diversifying our usage so as to not rely solely on one source.

Each of the fuels, be it Natural Gas, LPG, wood, wood pellets, diesel or electricity have their advantages. Central Heating New Zealand believes it is environmentally and morally sound to offer all energy types. Not one energy source suits every situation and having options means that the chance of one fuel source running out is lessened.

Costs of Fuel & Delivered Heat

	Cost per unit of fuel	Energy Value of fuel	Cost of energy in fuel	Appliance Efficiency	Cost of delivered heat
Natural Gas	\$0.075 / kWh	0.075 cents / kWh	8.95 cents / kWh	95%	8.5 cents / kWh
Wood Pellets	\$0.40 / kg	5.1 kWh / kg	11.77 cents / kWh	85%	10 cents / kWh
Diesel	\$1.56 / litre	10.6 kWh / litre	14.73 cents / kWh	95%	15.5 cents / kWh
LPG	\$2.25 / kg	12.8 kWh / kg	16.15 cents / kWh	95%	17 cents / kWh
Electricity	\$0.23 / kWh	0.23 cents / kWh	23 cents / kWh	100%	23 cents / kWh

All figures relate to high efficiency condensing central heating boilers and are correct at the time of printing. Prices may vary from region to region. Line charges may apply. Data collected from New Zealand Energy Information Book.





2. INSULATION VS. HEATING

MYTH Our house has the best insulation and the best building materials so we don't need heating in our house.

FACT Insulation and high performance building materials do not replace the need for heating. New Zealand, generally, is miles behind the rest of the world in heating systems, as well as well insulated & energy efficient homes.

Example: A well insulated home without a heating system is much like a chilly bin. It will stay warm if there is a warm object inside and cold if there is a cold object inside.

MYTH I have double glazing so I don't need a heating system.

FACT Window double glazing is a huge advance on single glazing. There are many stages of performance with double glazing units, but even the best windows available allow more heat to pass through than a standard timber framed wall. In modern houses it is common for windows to be floor to ceiling and very wide. These are the enemy of the heating system!

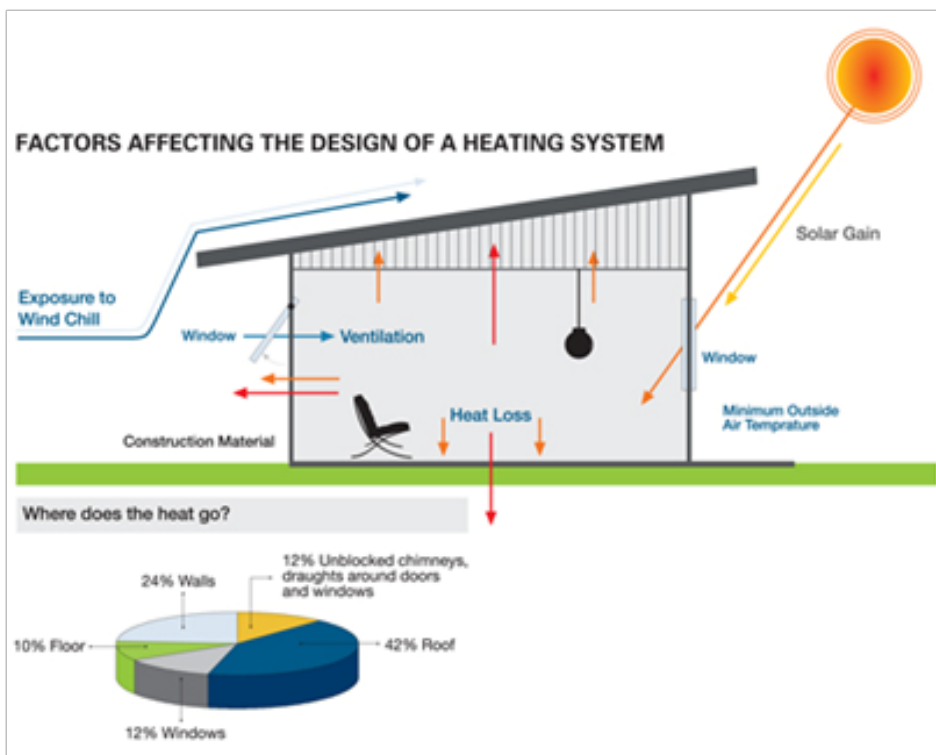
FACT Houses that have large expanses of glass and have an open plan style are harder to heat than homes with a compact layout and less glass.

MYTH Our house is in a sunny area so we don't need heating.

FACT This is correct on a sunny day however you will still need heating on cloudy days and in the early morning and evening.

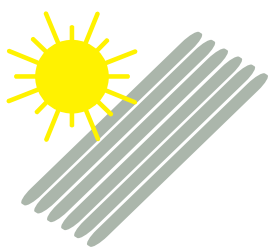
Heat Loss

All structures lose heat. The rate of heat loss depends on the materials of the structure and the inside and outside temperatures. If the two temperatures are a long way apart, the heat loss is greater. The colder the weather, the greater the heat loss from all structures. Because all homes are different, heatloss calculating should be completed before a heating system is installed. All reputable heating companies should provide this service free of charge.





3. SOLAR: MYTH VS. FACTS



Using solar for house heating

There are two types of solar or “gain from the sun”. Passive solar is the sun heating the structure or coming in through the windows and heating the room. Active solar is using special collectors usually on roofs, to heat water that is then transferred into the domestic hot water cylinder (tap water). Solar heated domestic tap water works very well. Many companies offer this product that can heat up to 60% of your domestic hot tap water requirements.

In special circumstances, by using a large amount of solar collectors to heat a very large cylinder (or thermal store) we can transfer this water into a heating system such as radiators or under floor. This solar input can usually only put in up to 20% of the heating system requirements and the rest needs to be achieved with another heat source. This type of system is very capital intensive. Beware of companies offering solar inslab heating, as they tend to be light on the facts of how much input the solar can achieve. The effectiveness is often unable to be measured or determined when the system is in operation.

MYTH Solar energy can heat my whole house.

FACT Solar can contribute towards house heating, BUT you will be heavily reliant on other heating sources to supplement the solar energy. Be aware also that the capital cost for a solar heating system is quite high.

4. WHY DO NEW ZEALAND HOMES HAVE CONDENSATION PROBLEMS?

FACT Condensation is a symptom of damp homes, lack of double glazing, incorrect ventilation and proper heating.

Condensation will always form on a single pane of glass when the temperature on the outside is lower than the inside. Double glazing insulates the outside pane of glass from the inside one by an air gap. Condensation will form on any surface, even new aluminum window joinery that is not thermally broken (where there is isolation between the surface exposed to the outside and the surface exposed to the inside).

Domestic Ventilation Systems (DVS) have become popular in New Zealand recently. They work on the basis of air movement forcing moist air out of leaks in the dwelling structure (around windows and doors). Heat from within the home is also forced out. It is important that the reason for the condensation in homes is addressed also.

In Europe, America and the U.K., ventilation systems are almost unheard of. This is because homes have double glazing, are well insulated, ventilated and well heated.

Heat recovery systems are also available. These warm the fresh air entering a dwelling.

FACT Fresh air needs to be introduced into any home. However in a well insulated and well heated home all that is needed is for windows to be opened. Living rooms and bedrooms should have 1 - 1.5 air changes per hour whereas kitchens and bathrooms require 2 air changes per hour.

FACT Putting central heating in an old house can eliminate up to 80% of condensation problems. The heating system will dry out the structure of the home. (Dry air condenses less than damp air). It will not solve the issue of cold /hot single glazing condensation.

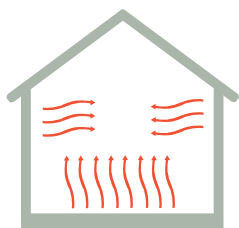
FACT Wet areas (E.g. bathrooms) and steam areas (E.g. kitchens) will still need separate ventilation systems. For example, a fan is needed in the kitchen or in a bathroom.

WHY? Because steam is produced from hot water in a bathroom and cooking produces steam.



TYPES OF HEATING SYSTEMS

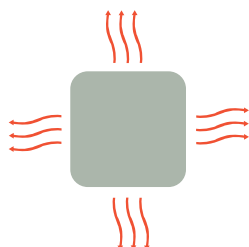
Heating takes two forms; appliances that heat only one area, or systems that heat more than one area. Currently there is no requirement in The New Zealand Building Code to heat more than the main living area and bedrooms. However the Code is gradually changing to make whole house heating and double glazing mandatory in the coldest regions of New Zealand.



Storage based heating

Storage based heating uses the floor slab or walls to gently radiate heat inside the house. These systems take some time to come up to temperature, but once there, they are very effective at heating a home and are extremely comfortable to live in. Nightstore heaters are also a form of storage based heating.

Storage based systems tend to suit those who spend a greater portion of the day in the home, however the increased comfort that these systems offer are attractive to most home owners no matter their lifestyle. Storage based systems also suit thermal mass houses because these are naturally slower in temperature response.



Instantaneous/rapid heating

Instantaneous or rapid heating systems are able to change the temperature of a room more quickly. These units can be, gas fires and heaters, log fires, heat pumps, water radiators, electric heaters or ducted hot air systems. Appliances and systems are used for instantaneous heat, with appliances heating one room only and systems being capable of heating the entire house.

5. RADIANT HEAT VS. WARM AIR SYSTEMS

Radiant heat *Examples:* Sitting in the sun, in front of the fire, panel heaters, radiators, under floor heating.

FACT Radiant heat is the most comfortable form of heat for the body. This is because the body loses most of its heat radiantly, and it feels good to be warmed in this manner.

Warm air systems *Examples:* An air to air heat pump appliance, a ducted air system or fan heater.

FACT Warm air systems work by pumping volumes of heated air into a room. This causes air movement so consideration must be given to the positioning of the duct outlet or appliance to avoid discomfort from drafts and noise.

Consideration must be given at the design phase of the project for access to run ducts through the structure and for the provision of return air grills in the case of ducted air systems. Water based heating systems need less access, because there are no return ducts required and pipes are smaller than ducts, but they still require routing and access consideration.

All heating systems need to be sized correctly to perform as required. This requires accurate heatloss calculation of individual rooms within the dwelling. Appliance retailers often use very general rules of thumb for this which does not give the best performance or efficiency. A specialist heating design company should be consulted to get the best result.

6. HEAT PUMPS

The Air to Air Heat Pump air conditioner is well known in New Zealand. They work on the principle of transferring energy from one method such as air to inside the house. The technology these units use is now available for heating water for water based heating systems. These are referred to as air to water and water to water (ground source/geothermal) heat pumps.

MYTH Heat pumps are the best form of heating for New Zealand homes.

FACT Air heat pumps work very well in moderate climates but not necessarily well in all New Zealand homes. They also only heat one area of a house.

WHY? All stated heatpump outputs are based on an outside air temperature of 8 degrees. In standard winter conditions, (e.g. 8 degrees) the coefficient of performance (rate) can be up to 300% or 3 units of heat for 1 unit of energy input. This figure is widely published without reporting the balance of what happens below this temperature. In extreme conditions, (e.g. -1 degree) a heat pump's efficiency is reduced and it can spend long periods in defrost mode instead of producing heat. Over a season (in Climate Zone 4 and Europe and the United States) heat pumps have an efficiency of 2:1.

This is not the case for water to water (ground source/geothermal) heat pumps as they take energy from the earth and have a constant coefficient of performance that can approach 5 units of heat for 1 unit of energy output. See page 12 for more information on water to water heat pumps.

7. WATER VS. AIR

FACT Two thirds of the rest of the world use warm water to heat houses.

WHY? Because water transfers heat at a rate 4 times the rate that air does and is a perfect medium for transferring energy around a home. It is silent, efficient, effective, future proof and there is no dust movement.

WHY? Because water can be heated by a number of energy sources including; heat pumps, diesel, wood pellets, gas and electricity.

WHY? Water underfloor heating is much healthier than electric underfloor as you don't have to live above an electrical framework.

WHY? Because using water future proofs your home. You can change out the energy source used to heat the water while the emission system in the home stays the same. You are not tied into using one energy source forever and you can take advantage of any new technologies or any changes in availability of supply.



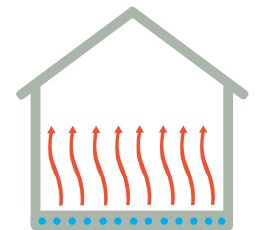
8. INSLAB HEATING / UNDERFLOOR HEATING



Also called underfloor heating, inslab heating is an extremely comfortable and luxurious type of heat because it warms you from your feet up. It is best suited to tile or vinyl floors, polished concrete or thin wood veneers because these allow more heat to come through as compared to carpeted floors.

WHY? Carpet and underlay insulate you from a cold floor but also insulate the heat from coming through. A tiled room with underfloor heating may have a temperature of 21 degrees whereas a carpeted room of the same size, running the same under floor system with the same floor slab temperature, would have a temperature of approximately 17 degrees.

Depending on the house design and floor coverings in your living room, it can be a good idea to supplement inslab/underfloor heating with another type of heating. *Example:* If your home has high ceilings, carpet floor coverings, lots of glass and 3 external walls, it would be wise to fit a gas fire too!

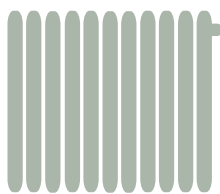


9. WATER RADIATORS

Water Radiators are the heat emitters in a central heating system. They are made from steel panels and warm water flows through them. The water from the heat source is piped to the radiators and then back to the heat source for continued reheating. No water is consumed, just recirculated and the process is superbly efficient.

Radiators come in many different styles and sizes. The larger the radiator, the more heat it puts out. They all have a thermostatic valve that can be set to regulate the temperature in the room. Each room can be set at a different temperature if required or even turned off.

Radiators are perfectly safe for children, the elderly and pets. Their surface warms to between 60°C and 75°C. They will not affect curtains or furniture placed in close proximity. Radiators warm rapidly and suit New Zealand's unpredictable climate.



Ultimate Delonghi Radiator



Designer Delonghi Radiator

10. NEW ZEALAND APPROACH TO SPACE HEATING VS. INTERNATIONAL APPROACH

A lot of homes built in New Zealand are built by developers or speculative builders. This has meant that budget often comes before function. This compromises the heating in a home, because it is only when one lives in the home that the comfort value becomes apparent, not during the sale and purchase. This attitude is changing as people take a more responsible approach to building.

People often ask “What’s the pay back on this heating system?” The same question could also be asked of your kitchen. It’s a necessity in the home therefore this is a very hard question to answer. All heating has a cost comparative to the level of comfort achieved. In your home you need to decide what value you place on comfort.

Space Heating

Space heating requires a heat source (e.g. a fire or a heat pump) in the main living area. This is supplemented with electric and/or night store heaters in hallways. This is the way that kiwi homes have been traditionally heated.

It’s not uncommon for a New Zealand home to have a gas fire, a heat pump and some underfloor heating or nitestore heating. The capital cost of this combination would be similar to central heating and yet its effectiveness is less than half. In other homes there are 15-20 kilowatt log fires in a living area that only requires 5 kilowatts. If this 20 kilowatts was spread evenly around the house, it would be much more comfortable. Trying to move heat from overheated living rooms through transfer kits is better than nothing but it does fall short of proper heating.

FACT Space heating is not an efficient or complete solution for home comfort and heating is often undersized or oversized.

Undersized example: A heat pump that is too small for the area it is supposed to heat.

Oversized example: A fire in a living room that gets so hot you have to open the windows.

MYTH If I heat the hallway, the bedrooms will get warm enough.

FACT The greatest heatloss is from the exterior of the house. Therefore the coldest areas of the house are the external walls. If we can combat the cold at its source (external wall) then there will be no cold spots in the house. This is why the technically correct place for a heating appliance, duct or radiator is on or near the external walls. An example of this is the air curtain at the door of the mall. It ensures that the mall is warm by heating the coldest area.

International Approach to Heating

Most of the world heat their homes with central heating which provides heat throughout the entire house. Correctly sized central heating is the most efficient heating method for the comfort experienced because it is neither too hot or too cold everywhere in the house.

There are no cold spots in hallways, bedrooms and bathrooms. More of the house is used and rooms such as bedrooms are more comfortable to be in. This can only be achieved by using effective heating that is sized for the volume of the room. This can significantly improve the occupant’s health, comfort and the resale value of the home.



11. WHAT IMPACT DOES HEATING HAVE ON THE VALUE OF MY HOUSE?



FACT A warm, dry, future-proofed home is of greater value to potential buyers than a home with a budget approach to heating. People emigrating to New Zealand, or New Zealanders returning home after living overseas are looking for homes that have heating systems built into them.

FACT More and more new homes are built each year with sustainable and eco-friendly heating because consumers are waking up to the long term benefits to the occupants and to the environment.

FACT The investment spent on installing a future-proofed heating solution is paid back by the savings you can receive in energy bills over a period of time and the pay back on your health and general lifestyle.

12. THE FUTURE OF HEATING IN NEW ZEALAND

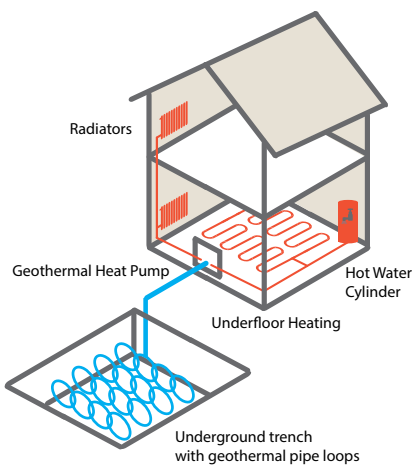
Geothermal - the greatest renewable energy of them all!

Geothermal or Groundsource heating is one of the most exciting advances in world heating technology. It uses the earth, the worlds largest solar collector, to provide a large quantity of low grade heat that is then transferred to a smaller amount of highgrade heat suitable for heating houses.

Special water pipes buried in the earth, have liquid pumped through them, transferring the constant ground temperature to a special heatpump which uses refrigeration cycle technology to produce a smaller amount of high grade heat.

This can then be distributed around the house in water or air central heating systems. The systems are electrically powered but can produce as much as 5 units of heat while only consuming 1 unit of electricity. The best thing is that this efficiency is constant through all outside air temperatures even well below freezing, and works 24 hours of the day! No other renewable energy comes close.

The systems also can cool a dwelling by using the earth as the heat dump, at twice the efficiency of an air to air conditioner (standard heat pump). Currently in the domestic market, these systems are capital intensive, but commercially they are a big part of the future for energy conservation.



SIMPLE TIPS FOR KEEPING YOUR HOME WARM

Close off rooms that aren't used often. This allows the heat to be concentrated in the areas you want it most.

TIP

If you have an old unused fireplace, get the top blocked and close off the lower level so you don't get any drafts coming in from the fireplace.

TIP

In winter, shut the windows and draw the curtains before it gets dark. This means you keep the warm air inside from the solar gain during the day.

TIP

Use insulated thermal backed curtains to keep more warmth inside.

TIP

Insulate your hot water cylinder. You can buy insulation kits at any hardware store. Make sure your hot water cylinder is located somewhere warm. If the tank is outside in an unheated garage, it will lose even more heat.

TIP

Use hot water wisely. The first run of hot water that takes a minute to reach the faucet is tremendously wasteful, as this simply heats up the water in the pipes, with only a fraction of that water reaching you.

TIP

Consider 'ring main' plumbing for instant hot water at taps when designing your new home or renovation. This saves waste run-off water.

TIP

Consider the use of an expansion vessel on hot water cylinders to eliminate wasteful cold water expansion.

TIP

Inspect and resolve any drafts that are the result of defective weather striping around doors and windows. Have your heating systems and appliances serviced regularly to ensure they are operating at peak efficiency.

TIP

Add more insulation to the ceiling space as old insulation can be less effective over time.

TIP

Have foam insulation injected into wall cavities of existing houses.

TIP

Insulate under the floor of existing houses to stop rising damp and stop heatloss.

TIP

WARM WATER CENTRAL HEATING

Most New Zealanders have never experienced living in a home that is warm throughout. People who have lived with central heating find it absurd to only heat one area. The reality is that while it may not be essential to heat the bedrooms and hall as well as the living room, the comfort is worth it in terms of practicality. You are more comfortable in more of the house.

The running costs, although higher are not that much more than the cost of running a single appliance for a medium sized house because the temperature in other parts of the house doesn't need to be as high as in the living room. Bedrooms, hallways and bathrooms for example don't need to be as warm as the living room, as long as they are not icebox temperature! 16-18 degrees is recommended for these areas. A modern structure with no heating in a zero degree frost will be as low as 9 degrees inside.

At the design stage of the building process, it is essential that you plan for heating in your home. If you are renovating, make sure you consider the options available to improve your house for warmth and comfort, not just aesthetics.

Central Heating New Zealand are the experts in heating New Zealand homes and can offer you professional heating advice in order to get the most efficient and effective heating for your home. We have the skills, products and people to help you. Get expert technical advice and customer support and be assured that we import only the highest quality European products. Our team works harder to create the right heating system for your home, budget and lifestyle.

Your home and your comfort is essential for your health and well being. To transform your lifestyle contact the experts in absolute warmth and comfort, Central Heating New Zealand, so you can live like it's summer all year round.

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“Just a note to personally say thanks for the top job you guys have done re: our central heating system. It made living in our home so much more pleasant. Now that we have shifted, we are both really looking forward to getting our second system installed in our new home. We really appreciated the hard work and effort that has gone into helping us get both central heating systems right for the two different homes.”

Having lived and worked in the UK, I have experienced the benefits of central heating and am amazed how efficient and cost effective radiators are. That so many of us kiwis are still happy to live in a cold house every winter amazes me. The old ‘shut the door’ and ‘throw on a jersey’ is a thing of the past in our home. With central heating we can regulate the temperature to suit us and as a result we are warm and comfortable all of the time.

Everything has been done in a thoroughly professional manner, with the whole system explained in a way which made it very easy to understand and use. I have to say I am REALLY impressed with the service from your whole team. I would recommend Central Heating New Zealand to anyone wanting to heat their home.”

Steve Hansen and Family