

CHOOSING A HEATING SYSTEM



As heating accounts for over half the average household's energy costs, it is important that you think carefully before making a decision on how to heat your home.

Making the wrong decision can be a costly and uncomfortable mistake.

This brochure can help you to identify your heating needs. It outlines the types of systems available and provides a guide to their running costs and energy efficiency.

An energy smart heating system can save you energy and money, and can help our environment by reducing greenhouse gas emissions.

A HEATING PACKAGE—NOT JUST A HEATER

An effective and economical heating system is more than just a good heater. It is a 'heating package' which should always include:

- ▶ insulation in ceilings, walls and floors where possible;
- ▶ sealing-off draughts;
- ▶ effective window coverings;
- ▶ zoning of living and sleeping areas;
- ▶ appropriate and efficient heater(s); and
- ▶ **YOU** using your heating package wisely and efficiently.

An energy smart heating package can use 40% less energy!

Radiant and convective heat

Radiant heat

Radiant heat is emitted from hot surfaces, e.g. the glowing panel of a gas heater, the surface of a heated concrete slab, a bar radiator or open fire. Radiant heat heats objects within the room directly, but does not directly warm the room air.

Radiant heaters are most appropriate if your rooms have large open spaces or high ceilings, or are particularly draughty, such as in bathrooms.

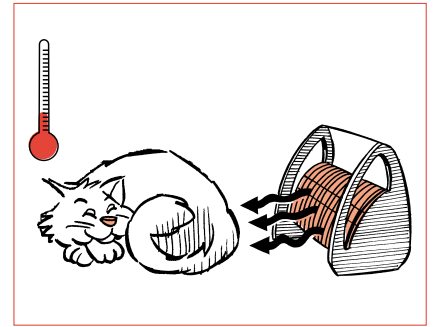
Convective heat

Convective heat is heat which is transferred from one object to another, using moving air or water. Convection heaters work by filling a room with warm air. Fan heaters and ducted heating are examples of convection heaters.

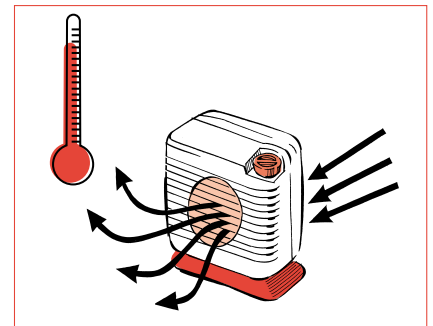
Convection heaters are most appropriate if your rooms are insulated, well sealed against draughts and have average ceiling heights.

They should be avoided in draughty rooms, rooms with high ceilings or areas with open stairwells.

Some heaters combine the effects of radiant and convection heating. Hydronic radiator panels, wood heaters, storage fan heaters and many gas heaters function in this way.



Radiant heaters heat objects rather than the air surrounding them



Convection heaters fill a room with warm air

SELECTING A HEATING SYSTEM

Decision 1 — Central heating or space heating?

Firstly, it is important to establish which areas of the home you need to heat, how large the areas are, and how long you need to heat the areas for.

Creating zones in your home can allow you to heat each zone individually, giving you **flexibility**—the key to energy efficiency.

Heating individual rooms with efficient space heaters, or installing a zoned central system, is preferable to whole house central heating which heats all rooms regardless of whether they are in use or not.

Work through the chart opposite to identify the best heating arrangement for your home.

If you need to heat...	
Only living zones	Use one or more high efficiency space heaters
Living areas for long periods, sleeping areas for short periods	Use high efficiency space heaters for living zones and electric 'spot' heaters for sleeping areas, or a zoned central heating system
Living and sleeping areas for long periods but at different times of the day	Use a zoned central heating system
Living and sleeping areas both for long periods at the same time	Use a zoned central heating system
Bathrooms/ensuites	Use radiant heaters, e.g. strip heaters or infra-red lamps

Decision 2— What size system do I need?

A correctly sized heater is essential for comfort and economy. A heater which is too large will have a higher purchase cost, will not operate efficiently and can create uncomfortable conditions. An undersized heater will not heat the area adequately.

Heaters should be sized to maintain a comfortable temperature in a room on an average cold day in winter. This 'heat load' is determined by room dimensions, insulation levels, window areas and coverings, indoor and outdoor temperatures, etc.

You can use the table opposite as a guide, but **the size of your system should be determined by your supplier**. This is especially important when sizing central heating systems.

Home	Heater output required per m ² of floor area*
Uninsulated home	130W
Insulated ceiling only	100W
Insulated ceiling and walls	80W
Energy smart home	60W

* Assumes 2.4 m ceiling height. Does not apply to off-peak electric storage heaters

SELECTING A HEATING SYSTEM

Decision 3— What type of heater?

Try to identify those heaters which closely match your heating requirements

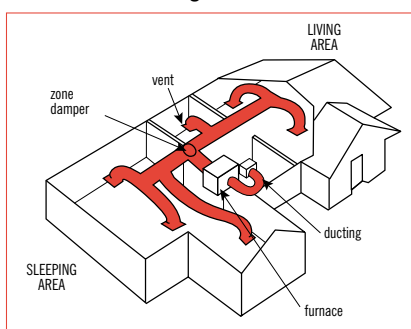
Central heating systems

Central heating systems are large heaters capable of heating most of your home at the one time. To help you control your heating and reduce running costs, all large central heating systems should be zoned.

Central heating systems can also be supplemented by installing a high efficiency space heater in the main living area, to be used when whole house heating is not required. (If you are 'upgrading' from space to central heating, consider retaining the existing space heater for this purpose).

Ducted air heating

- ▶ Are convection heaters which circulate warm air around the home through insulated ducts entering rooms through the floor or ceiling.
- ▶ Typically run on gas, but electric reverse-cycle air conditioners are also available.
- ▶ Are able to heat areas quickly to a thermostat setting.



A schematic plan of a zoned, ducted heating system

- ▶ Typically up to one third of the total number of outlets can be closed off at any one time, depending on the size of the system. Newer, advanced models allow even greater zoning flexibility.
- ▶ Can circulate dust and tend to dry the air.

- ▶ Systems available are able to serve from 90 m² to over 350 m² of floor area.
- ▶ Costs start at around \$2500 (basic six outlet system).

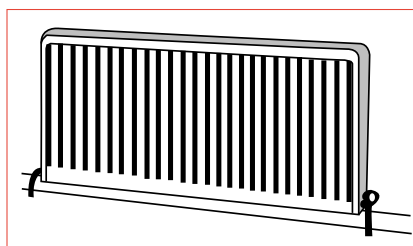
Checklist for greatest efficiency

Should have:

- ▶ high star rating (4–5 stars on the Energy Rating label—gas units only);
- ▶ well insulated ducts (minimum R0.9 where heating only is used, R1.5 or greater where heating and refrigerative cooling are used);
- ▶ zoning option;
- ▶ 'positive close-off' floor registers;
- ▶ electronic ignition; and
- ▶ thermostat with programmable timer.

Hydronic heating

- ▶ Water is heated in a boiler and then circulated around the home to radiator panels, skirting board convectors or fan coil convectors that heat the room by convection and radiation.



Hydronic heating radiator panel

- ▶ Typically fuelled by natural gas, LPG or wood, but also possible to use off-peak electricity.
- ▶ Each panel usually has its own control valve to give individual room control.
- ▶ Has silent operation, little dust circulation and does not dry the air.
- ▶ Cost of a system starts at around \$5500.

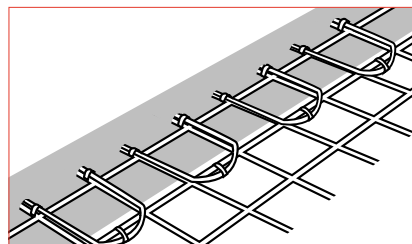
Checklist for greatest efficiency

Should have:

- ▶ low water content boiler;
- ▶ quick response panels, e.g. mild steel with low water content;
- ▶ well insulated pipes; and
- ▶ independent valve controls/thermostats in each room.

In-slab heating

- ▶ A concrete slab is heated by internal electric cables or hot water pipes.
- ▶ Usually installed only in new homes or extensions before the concrete is poured.
- ▶ Gives off radiant heat suitable for rooms with high ceilings.



Electric cables through a concrete floor for in-slab heating

- ▶ Typically fuelled by off-peak electricity (for cables) or natural gas (for hot water pipes). LPG or solid fuel can also be used for heating water in pipes.
- ▶ Slow response time (6–8 hours) to changes in thermostat settings means systems should be set and left on for 24-hour heating.
- ▶ Greatest economy when run at a moderate temperature (18°C).
- ▶ Not recommended for suspended concrete floors where the space underneath is unoccupied, or for slab-on-ground in areas with a high water table.
- ▶ Costs of a system start at around \$30/m² of floor area.

Checklist for greatest efficiency

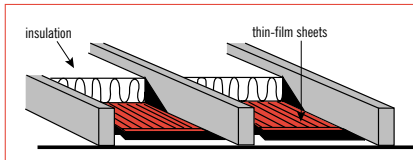
Should have:

- ▶ zoning for each bedroom and formal/informal living areas, with thermostatic control in each zone;
- ▶ slab edge insulation; and
- ▶ hard floor coverings, e.g. tiles.

SELECTING A HEATING SYSTEM

Electric thin-film heating

- ▶ Thin films installed in the ceiling, in wall panels or under floor coverings to give radiant heat.



Electric thin-film radiant heating installed in ceiling

- ▶ Operate on 'peak rate' electricity.
- ▶ Thermostatically controlled.
- ▶ Costs start at around \$35/m².

Checklist for greatest efficiency

Should have:

- ▶ adequate insulation against heating film;
- ▶ individual thermostat control for each room; and
- ▶ programmable timers.

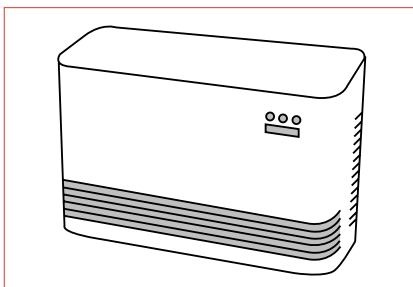
Space heaters

Space heaters are designed to heat a zone, rather than a whole home (although some wood heaters can produce enough heat for a whole home).

Installing individual space heaters in different zones of a home according to your needs gives you greater heating flexibility.

Gas space heaters

- ▶ Produce convective heat, radiant heat, or a combination of the two.
- ▶ Run on natural gas or LPG.
- ▶ Can be mounted on internal walls where a vertical flue can be fitted, or external walls.



Gas space heater

- ▶ Some wall furnaces have a rear register to heat an adjoining room.
- ▶ Rated for energy efficiency with an Energy Rating label; the more stars, the more energy efficient the unit.
- ▶ Units are available to heat from 30 m² up to 120 m².
- ▶ Costs start at around \$600.

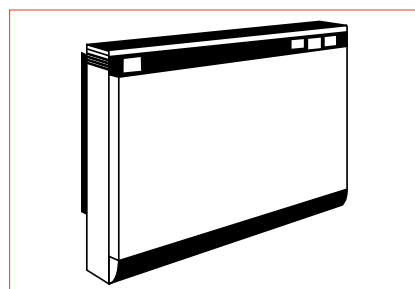
Checklist for greatest efficiency

Should have:

- ▶ high star rating (5–6 stars on the Energy Rating label);
- ▶ heat outlet at floor level;
- ▶ electronic ignition;
- ▶ remote thermostat;
- ▶ power flue; and
- ▶ programmable timer.

Off-peak electric storage heaters

- ▶ Radiant/convection heaters which store off-peak electricity as heat in storage bricks.
- ▶ Storage fan heaters are available to heat up to 50 m². The fan helps distribute the heat and control the heat delivery and temperature.
- ▶ Storage radiators deliver 24 hour background heat for areas up to 50 m².



Off-peak electric storage heater

- ▶ 'Combi' heaters are storage radiators with a back-up day rate electric element to boost the off-peak output when necessary and for more rapid on-demand heating.
- ▶ Costs start at around \$750.

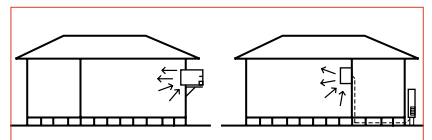
Checklist for greatest efficiency

Should have:

- ▶ remote thermostat;
- ▶ charge controller; and
- ▶ fan control.

Reverse-cycle air conditioners

- ▶ Electric convection heaters which extract heat from the outside air and deliver it into the home. Use a compressor and fan.
- ▶ Also provide refrigerative cooling in summer.
- ▶ Can be installed in a wall or window, as a split system with the compressor outside and console unit mounted internally, or as a central ducted system, usually zoned.
- ▶ 'Multi-split' systems are also available, which utilise more than one internal unit, allowing several rooms to be heated by the one external unit.
- ▶ Available in sizes suitable for bedrooms, living areas or whole house.



(left) wall mounted, and

(right) split system air conditioners

- ▶ Heat output of some units declines when outside temperatures drop below 5°C. Look for models which guarantee performance in colder conditions.
- ▶ Carry an Energy Rating label. The more stars, the more energy efficient the unit is.
- ▶ Costs start at around \$500 (window/wall mounted unit).

Checklist for greatest efficiency

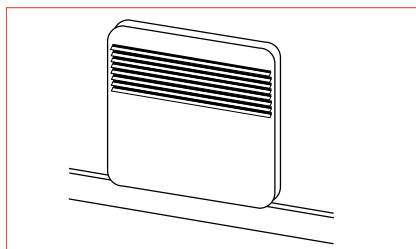
Should have:

- ▶ high star rating (4–6 stars);
- ▶ remote thermostat;
- ▶ adjustable directional louvres; and
- ▶ programmable timer.

SELECTING A HEATING SYSTEM

Electric space heaters/ panel convectors

- ▶ Convection or radiant heaters which use 'peak rate' electricity.
- ▶ Can be very expensive to run, so should be limited to heating for short bursts only, e.g. for bedrooms, bathrooms. Not suitable for main living areas.



Electric panel convector

- ▶ Available in sizes to heat up to 70 m² of floor area.
- ▶ Costs start at around \$200.

Checklist for greatest efficiency

Should have:

- ▶ remote thermostat or AA rated unit; and
- ▶ programmable timer.

Solid fuel heaters

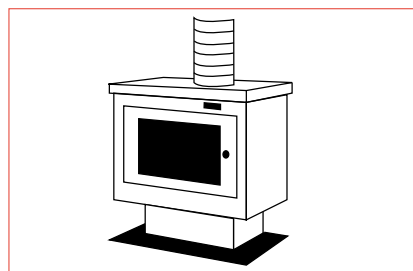
- Convection or radiant heaters burning wood, briquettes, coal etc.
- Highest efficiency units are airtight 'slow combustion' heaters, boilers (for hydronic heating) and furnaces (for ducted heating).
- ▶ Require a flue.
- ▶ Heating outputs adequate to heat up to around 150 m², but require suitable heat distribution methods to disperse heat evenly.

- ▶ Efficiency and performance depend on the quality of wood and method of operation.
- ▶ Costs start at around \$800.

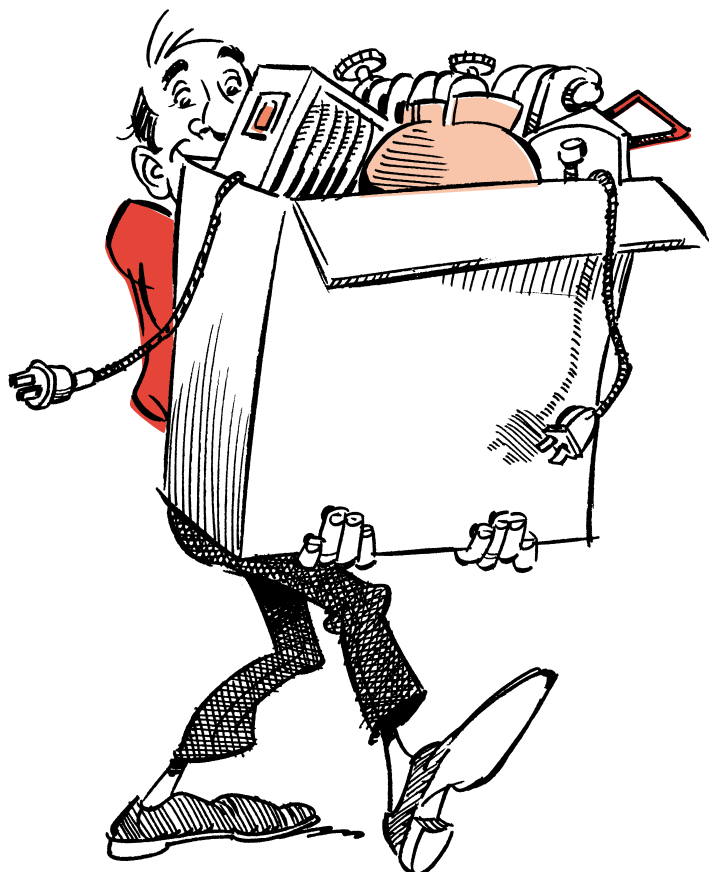
Checklist for greatest efficiency

Should have:

- ▶ air intake controls, baffles, secondary combustion chambers;
- ▶ quality wood supply; and
- ▶ correct method of operation.



Slow combustion wood heater



Important note

The running costs in this brochure are based on tariffs averaged across all Victorian gas and electricity retailers at time of print and are GST inclusive. Tariffs will change over time and may vary between retailers. Check with your supplier for the tariff applicable to your home and adjust the running costs accordingly.

COMPARATIVE RUNNING COSTS FOR HEATERS

In general terms, space heating is more economical to run than central heating, essentially because of the smaller area being heated.

Space heaters

The most economical space heaters are:

- ▶ high efficiency (5–6 stars) natural gas heaters;
- ▶ off-peak electric storage fan heaters; or
- ▶ high efficiency (4–6 stars) reverse-cycle air conditioners.

Central heaters

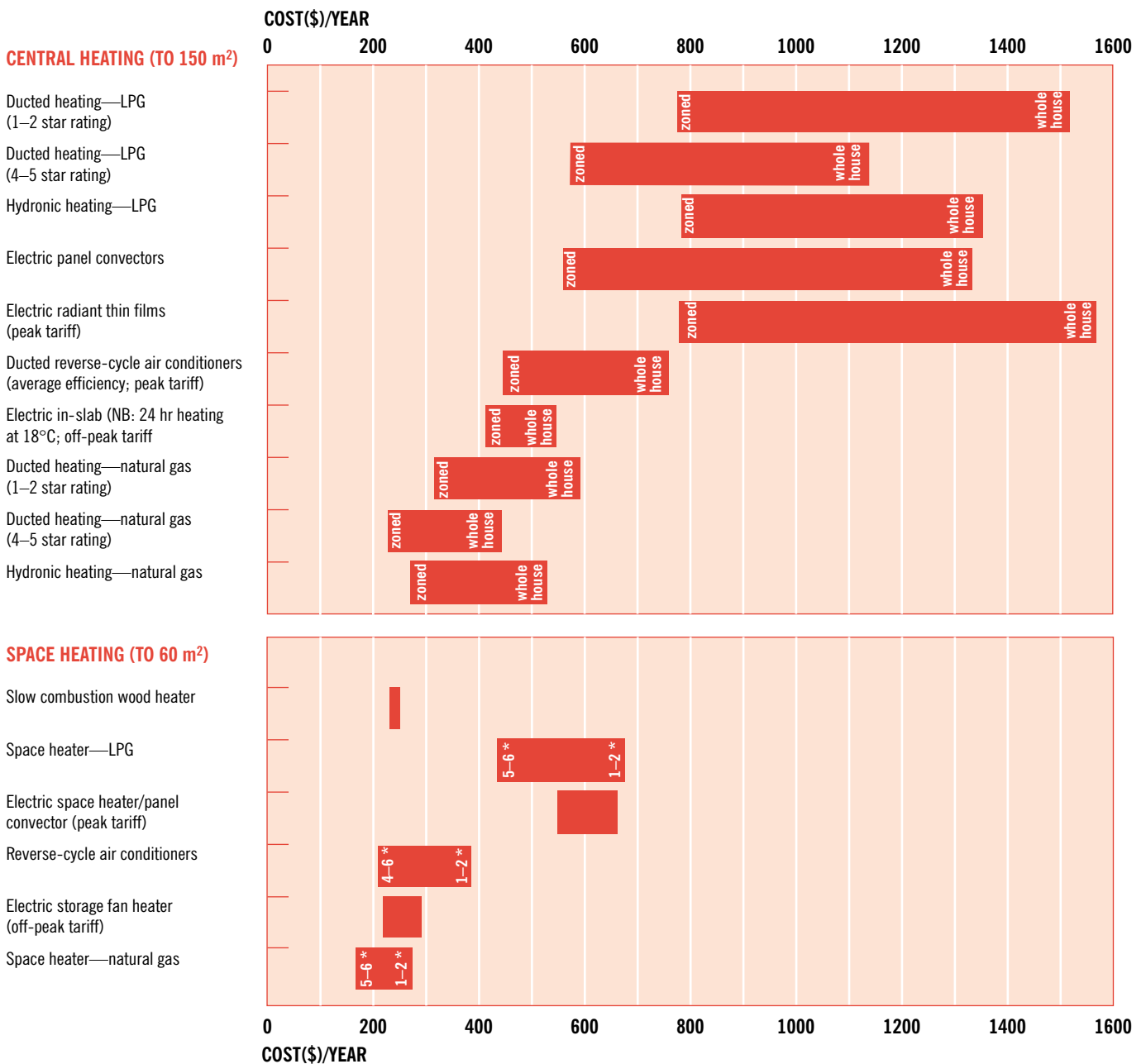
The most economical central heaters are:

- ▶ zoned, high efficiency (4–5 stars), natural gas ducted heaters;
- ▶ zoned, natural gas hydronic systems; or
- ▶ zoned, off-peak electric in-slab heating.

The actual running costs of a system will depend on a range of variables. These include the size of your heater, operating temperature, hours of operation and the energy efficiency and size of your home.

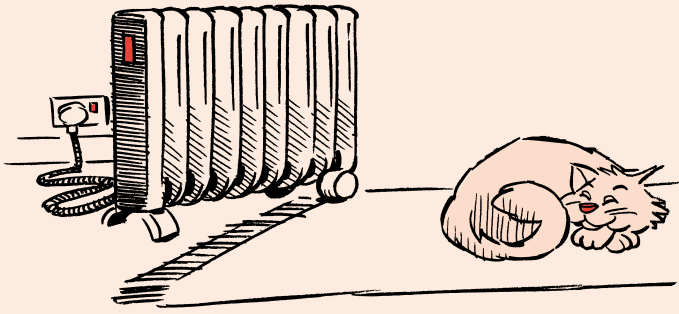
The tables below are a guide to the approximate running costs of different heating systems in a typical new home.

ANNUAL HEATING COSTS



Figures based on:

- ▶ NatHERS THERMAL SIMULATION PROGRAM for a typical new home with R2.5 ceiling insulation and R1.0 wall insulation in Melbourne.
- ▶ 24 hours heating to 18°C for in-slab heating; 8 hours heating to 21°C for all others.
- ▶ Tariffs used—GD 15.0 c/kWh, Y6 5.0 c/kWh, Y8 6.0 c/kWh, natural gas 0.96 c/MJ, LPG 70.0 c/lt, wood \$175/tonne. Supply charges not included.
- ▶ Costs for reverse-cycle air conditioners based on average GD electricity tariff. Selected retailers offer cheaper tariffs to customers using efficient reverse-cycle air conditioning systems.
- ▶ For an existing home, increase space heating costs by 25%, central heating costs by 45%.
- ▶ For an energy smart home, reduce costs by 30%.
- ▶ For every 1°C increase in operating temperature, increase costs by 15%; for 24-hour heating, double these costs (except in-slab).
- ▶ Includes energy costs of fans and pilot lights where used.



Other considerations

Portable heaters

Portable heaters are generally small units designed to heat small areas. They are most suitable for short periods of heating such as in bedrooms, bathrooms or infrequently used rooms. Typical portable heaters include electric radiators, electric fan heaters, electric natural convection heaters such as oil-filled heaters, portable gas heaters and kerosene heaters. These heaters are described in detail in our *Portable heaters* brochure.

Heating systems and the environment

With the exception of solar energy, every fuel that is used to provide heat gives off gases which contribute to the greenhouse effect. Carbon Dioxide (CO₂) is by far the main greenhouse gas, but others such as methane, nitrous oxide and chlorofluorocarbons (CFCs) also contribute.

The charts below compare the amounts of greenhouse gases (CO₂ equivalents) released annually by different central and space heating systems when heating a typical new home (as described below of the *Annual heating costs* chart on the previous page).

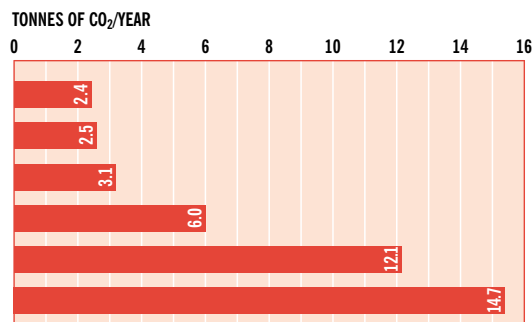
Further information

For more information on heating accessories and running your system more efficiently, see our *Home heating hints* brochure.

CO₂ EMISSIONS

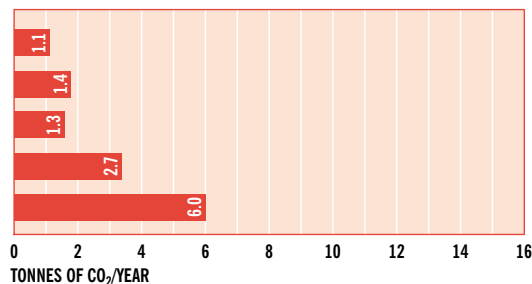
CENTRAL HEATING (TO 150 m²)

Ducted heating—natural gas (average efficiency*)
 Hydronic heating—natural gas
 Ducted heating—LPG (average efficiency*)
 Ducted reverse-cycle air conditioner
 Electric panel convactor
 Electric in-slab



SPACE HEATING (TO 60 m²)

Space heater—natural gas (average efficiency*)
 Space heater—LPG (average efficiency*)
 Slow combustion wood heater**
 Reverse-cycle air conditioner (average efficiency*)
 Electric space heater/panel convactor



* Average efficiency is based on a 3 star rating

** Assumes wood is harvested sustainably

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