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### Cheaper ground source system developed

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## Cheaper ground source system developed

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Canada offer heat pumps as a standard item, almost 60 per cent report that they are now available as options. The greatest inroads are being made in Quebec, Manitoba and Ontario, while Alberta has not shown much interest to date.

There are two basic types of heat pumps — air source and ground source — each with many variations. An air-source heat pump extracts heat from the outside air until it is uneconomical to do so, and then a backup heating system takes over. Typically, this type operates for about 70% of the heating season.

Ground source heat pumps remove natural heat from the earth (or ground water source) to provide space and water heating in the house. In summer, the process is reversed and heat and humidity are extracted from the house. These types of heat pumps have two parts; a heat pump unit in the house and a circuit of underground piping outside the house.

### Cheaper Ground Source System Developed

Ground source heat pump technology goes back to 1912, a Swiss concept, and today it is recognized as a leading renewable energy technology. But cost has kept the technology from rivaling electricity, oil and gas in the heating market.

"I've always felt that the way to make GSHP technology cost-effective is to reduce the cost of the heat exchange system," says Dr. Otto J. Svec, senior researcher for the NRC's Institute for Research in Construction. In 1983, Dr. Svec began research on an affordable, efficient ground source heat pump system and it led to a new heat exchange design which was introduced to manufacturers and dealers last fall.

The new system cuts pipe and installation costs by at least half and the overall heat exchange system by 25 per cent. "That's the biggest input," said Svec. "We felt if we could cut overall costs by 25 per cent then ground source system heat exchange would become directly competitive with other heating systems."

The new design is based on a spiral heat exchange system, using high-density polyethylene tubing, placed in a ditch and backfilled. In test projects it delivered three kilowatts of energy for every kilowatt used and is designed for a typical 2,000-square-foot Canadian home.

### Radiant Heating Systems

Although warm air heating systems are the standard in most Canadian new home construction today, there are specialized markets for radiant heating systems.

Radiant heat is a technology which is finding its market niche, as evidenced by the number of systems which have become available in recent years. It is a technology which will feed on the current trends toward comfort and life-style in the home building industry, although it carries a

hefty premium over more conventional heating systems.

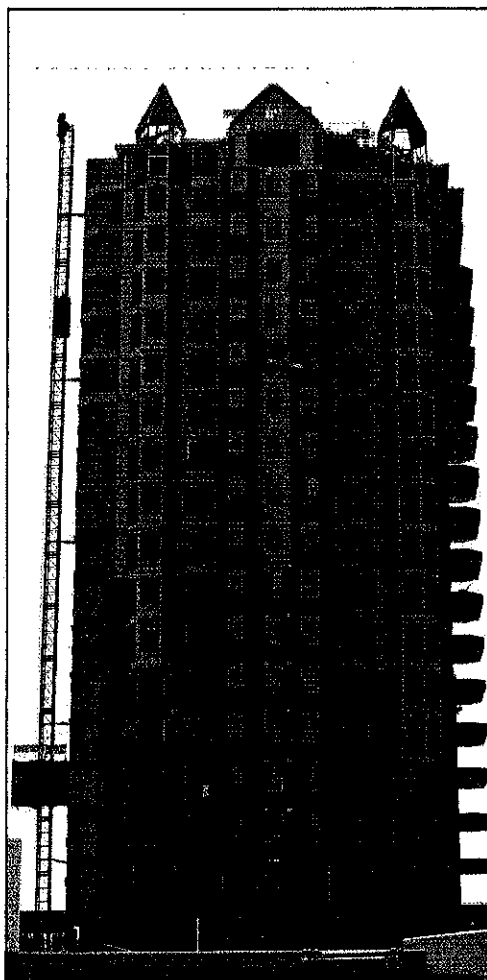
Radiant heating systems manufactured by companies such as CanRay Incorporated, Chromalox Inc., Gyp-Crete Canada Inc., Infloor Canada Inc. and Novaflex Inc. sell directly to the comfort and life-style appetites of home owners. They offer room-by-room thermostat control with no furnace in the basement, no registers, baseboards or duct work.

One type of radiant heating system involves heating panels which transfer heat to finished ceilings by conduction. The warm ceiling radi-

ates its heat to cooler solid objects, including floors, and these objects then give off a warm air flow to uniformly heat the space in the room. As opposed to conventional heating systems, radiant heating has no high-temperature heat source.

The other type of radiant heating system available in Canada from about a dozen manufacturers is an in-floor panel type, based on electric cables or hot water tubing. Infloor Canada Inc., of Edmonton, for example, has a hot water package system.

Ken Farrish, president of Farrish Marketing ▶ 63



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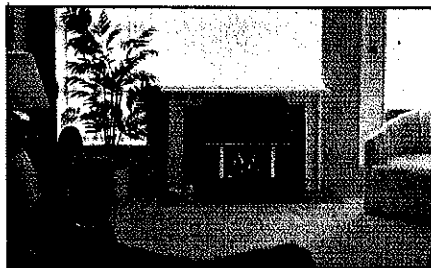
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## AND AIR CONDITIONING

**Conventional forced air furnaces still dominate the Canadian heating market, but there is a growing role to be played by heat pumps, high-efficiency furnaces and specialized heating systems.**



There are no definitives in determining the best way to heat a home. The calculation is a case-specific one and the variables include whether the priority is cost efficiency or comfort. If it is cost efficiency, there are more variables such as the balance between initial costs and ongoing operating costs.

There are three basic types of home heating systems used in Canada today: warm air based systems; hydronic systems and unitary systems. Each has its own advantages and disadvantages and each can make a case for itself depending on the priorities of the purchaser.

Conventional forced warm air systems dominate the Canadian residential market by a long shot. These include the gas, oil, propane and electrically-powered furnaces installed in most new homes, along with the duct work required to distribute air. They are relatively inexpensive to install, provide uniform distribution and facilitate central cooling and ventilation.

What type of furnace to install is another equation entirely. Energy efficiency is the main concern but the factors vary with relative fuel prices

and from one part of the country to another.

In Ontario, according to Ontario Hydro comparisons, the gas furnace can be operated for \$483 per year (based on an annual requirement for 14,000 kwh of heating energy). For the same house it would cost \$689 per year to run a conventional oil furnace, \$756 for an electric furnace and \$967 for a propane unit.

That's in Ontario, however. Move east to the Maritimes, for example, and natural gas costs rise due to lack of supply while propane furnaces become more attractive due to local availability. Electric furnaces cannot yet beat their main competitor in any local market, but proponents say just wait until the next energy crisis and the choice of electrical heat will look like a stroke of genius.

So far, we've talked about 'conventional' forced air furnace systems. There are also high-efficiency products on the market today which have a higher initial cost but deliver much greater ongoing energy savings. Higher-efficiency gas furnaces, such as Lennox's market-leading 'Pulse' series, can offer 30%-40% savings in

ongoing operating costs.

About a dozen manufacturers dominate the gas furnace market in Canada, a few less control the electrical furnace market and there are even fewer manufacturers producing oil furnaces. Generally, the big players are active in both gas and electrical markets — companies such as Carrier, York, ICG, Canadian Coleman and Lennox.

Figures from the Canadian Gas Association show that there were 155,000 factory shipments of gas-fired warm air furnaces in 1988. This compares to 30,000 shipments of electric furnaces and about 19,000 oil-based units.

### Renewed Interest in Heat Pumps

The general category of warm air heating systems also includes heat pumps, an entirely different concept from conventional furnaces and one which has yet to make a major market impact.

Heat pumps have the ability to warm the house in winter and supply air conditioning in summer, with energy efficiency unmatched by a regular furnace/air conditioner combination (delivery is typically 180% to 300% of energy purchased). Heat pumps use energy, usually electricity, to run a motor to produce coolness in the house the same way a refrigerator does and, in the winter, the process is reversed. Piping systems contain a liquid refrigerant which collects, transports and releases heat.

Heat pumps caught on in the early 1970s when the energy crunch hit. But they are relatively expensive upfront and some early units had technical problems, so interest waned with lower energy prices in the late 1970s and 1980s. Now they are again gaining attention as energy conservation is back in the headlines.

In the same model mentioned earlier, where it would cost \$483 per year to heat a house with a gas-fired furnace, the equivalent energy costs with a full ground source heat pump would be \$291.

The interest being shown by manufacturers in this is also an indication that the technology will enjoy growth in the future. The major companies involved in conventional furnace production tend to dominate the market for air source heat pumps, primarily because these systems are most likely to be add-ons to existing forced-air furnaces and represent a logical product diversification. There are many more manufacturers in the ground source heat pump field, typically smaller companies serving more regional markets and with a great variety of system types.

While less than five per cent of builders across

## Les PRF et la restauration historique

La mode étant à la restauration ou à la rénovation des bâtiments anciens ou historiques, en tâchant, s'il y a additions ou construction neuve, de leur donner un caractère d'authenticité, Fiberglas Canada Inc. dit avoir les produits en plastique renforcé de fibre (PRF) idéals pour réaliser les éléments décoratifs comme les corniches, frontons, fleurons et pilastres.

Alors que ces éléments étaient originellement faits de granit, terra cotta ou métal, la compagnie rappelle que leur remplacement peut être très dispendieux, surtout si l'on ne peut pas s'en procurer dans le voisinage, s'il faut les faire venir de l'étranger ou les tailler. Outre que l'ornementation en pierre qui exige un renforcement de la charpente, les produits PRF, qui sont légers, nécessitent peu d'entretien et sont bon marché.

Victoria, en particulier, où l'on s'intéresse beaucoup à la restauration historique, architectes et entrepreneurs découvrent les grands avantages des éléments décoratifs en PRF.

À titre d'exemple, Fiberglas Canada présentait récemment la démonstration de ses produits dans un entrepôt sans fenêtres, Buckerfield Building, qui n'avait que deux étages et lequel on a transformé en un complexe résidentiel et commercial de quatre étages où le revêtement en brique d'origine a été imité. D'autres éléments compatibles, tels que linteaux, corniches et denticules, font ressortir les possibilités du PRF, moulés et réalisés par Custom Industrial Fiberglas Ltd., de Victoria.

"Les propriétaires voulaient d'abord utiliser du bois pour les pièces, dit Jack Kuyvenhoven, directeur général de Custom Industrial; ils sont enchantés du résultat."

HB

41► Services, in Vancouver, has been consulting in the radiant heating market for about 10 years. He says the product is aimed at the upper-end of the market right now; custom homes where comfort is the main priority.

The West Coast is currently the major market for radiant heat, says Farrish, and some municipalities like Richmond, B.C., are now using almost 100% radiant heat. In Richmond, homes are built on concrete slabs and in an area where water tables are high, radiant heat is the answer to cold floors.

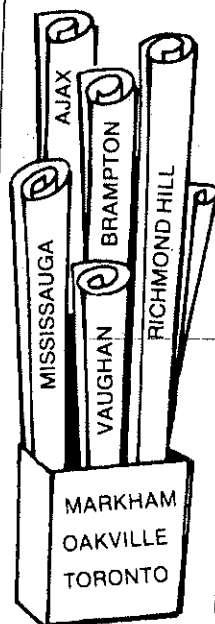
"I don't see radiant heat taking over the whole market," says Farrish, but he does see a 50% potential market share across Canada — higher in certain markets. Ontario and Quebec haven't yet gone for radiant heat in a big way, but as energy-efficiency concerns mount, they offer an excellent heating source in conjunction with high-efficiency systems such as water-source heat pumps.

Over the next five to 10 years, Farrish sees radiant heat catching on in high-rise condominium construction and, combined with energy-efficient packages, for more lower-end housing applications.

Material on ground source heat pumps edited from an article by Sean Finlay, prepared for the Institute for Research in Construction, National Research Council.

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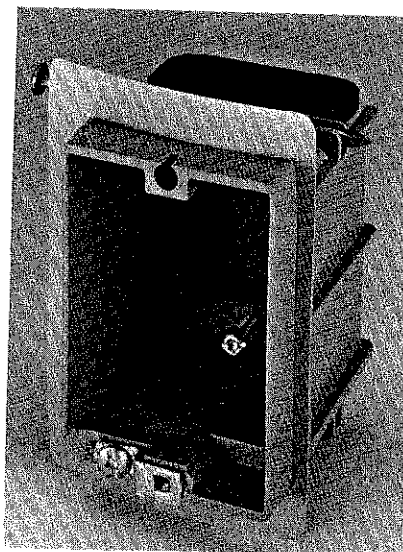
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