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MECHANICAL • ELECTRICAL • FIRE PROTECTION • ENGINEERING

Ground Source Heat Pump Systems



TLJ Engineering Consultants Ltd.

Check out the Advantages of Ground Source Heat Pumps

Each year, more offices, hotels, retail stores and commercial buildings are discovering how to save tens of thousands of dollars on heating and cooling costs through Ground Source Heat Pump (GSHP) systems. Cost and space savings, proven technology, extended life in comparison to traditional systems, greater comfort, quieter operation, lower maintenance and equipment life cycle costs, individual zone control and environmental conservation are just a few benefits of this earth-friendly technology.

The Ground Source Heat Pump (GSHP) process has a tremendous future, but it is as old as the earth itself. By tapping into the relatively constant temperature of the earth below the frost line, GSHP Systems heat and cool buildings at significant savings – 25% to 40% savings when compared to traditional systems. It's the world's most efficient way to heat and cool commercial buildings.

These savings translate into many income-generating solutions. Lower heating, ventilating and air conditioning (HVAC) costs could help make office leases more attractive for tenants, while ensuring maximum earning potential for building owners. Or money saved could be invested elsewhere in the building. The smaller space requirements of GSHP systems could also produce more room for additional offices, retail operations or other profit centers.



Condensers and other air conditioning equipment are usually mounted outside on the roof of buildings. GSHP systems do not require this and as such, structural and architectural building cost savings are realized.

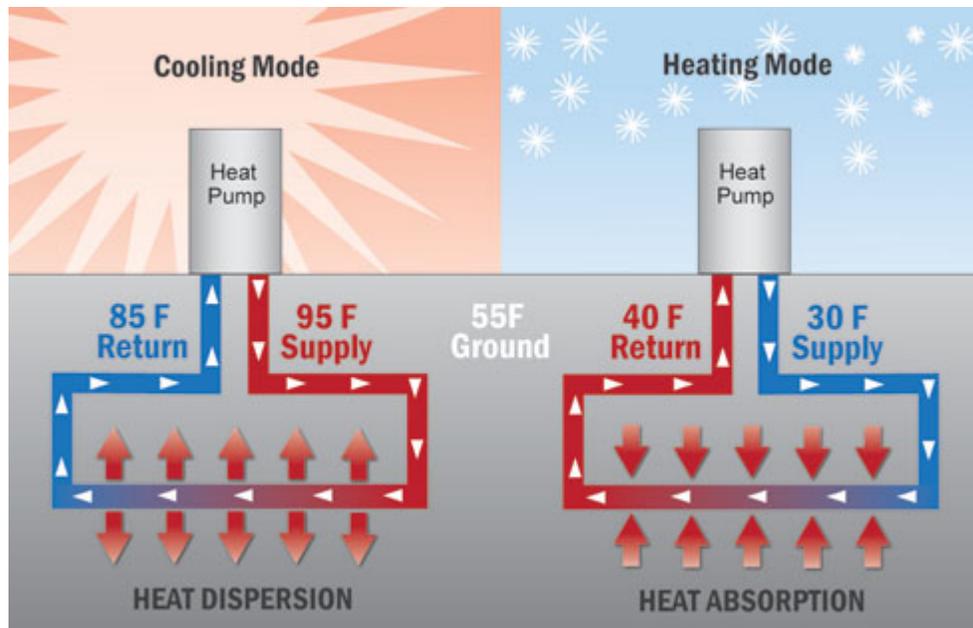
Ground Source Heat Pump (GSHP) is ideal, whether you're constructing a new building, renovating an existing one or simply replacing your old HVAC system. Please read on, the more you learn about Ground Source Heat Pump (GSHP), the more you will understand how comfortable, cost-efficient and environmentally conscious your building can be.



Simplicity of Design & Operation – From the Ground Up

Unlike traditional furnaces that burn fuels for heat and require separate air conditioning & ventilating units, Ground Source Heat Pump (GSHP) systems transfer heat from one place to another using a simple process to provide both warmth and cooling.

A GSHP system taps the earth's inexhaustible supply of renewable thermal energy, underground or underwater, where temperatures remain fairly moderate at 35 – 45 F, year-round.



“Closed loop” systems use the earth as the heat transfer medium, employing a mixture of water and non-toxic antifreeze pumped through a continuous loop of sealed polyethylene pipes buried beneath the ground, vertically or horizontally. The mixture never comes in contact with the earth.

In winter, Ground Source Heat Pump (GSHP) systems bring the earth's natural warmth up to a building and then transfer it into each room or zone via a heat pump. In summer, they work in reverse to provide air conditioning — absorbing the heat from inside a building and transferring it to the cooler earth below.

HIGHER EFFICIENCY THAN OTHER SYSTEMS

The Canadian Environmental Protection Agency found that, even on a source fuel basis — accounting for all losses in the fuel cycle including electricity generation at power plants — Ground Source Heat Pump (GSHP) systems average 40% greater efficiency than air source heat pumps, 48% greater efficiency than the best gas furnaces and 75% greater efficiency than oil furnaces.

Today's best Ground Source Heat Pump (GSHP) systems outperform the best gas technology, gas heat pumps, by an average of 36% in heating mode and 43% in cooling mode.



Outstanding Comfort Inside, Virtually Invisible Outside

Traditional systems have two major shortcomings. First, they heat or cool an entire building at once, with little or no ability to control comfort levels in individual rooms or zones. Second, they occupy tremendous space both inside and outside the building.

A Ground Source Heat Pump (GSHP) system creates an exceptionally comfortable working environment, giving tenants or building occupants precise temperature control, by room or by zone. Humidity levels are ideal. There's no "blast" of hot air, or "cold blow." Temperatures don't fluctuate, so thermostats don't need constant adjustment.

Ground Source Heat Pump (GSHP) systems can compensate for morning or afternoon shade, heat build-up or temperature variance anywhere in a building. Larger areas such as conference or banquet rooms, auditoriums, indoor pools or fitness centers can also be controlled by separate heat pumps — so there's no need to heat or cool the rest of the building if these spaces are used only occasionally.



Ground Source Heat Pump (GSHP) systems are also much more compact than traditional systems, and out of sight. Mechanical rooms can be smaller. There are no boilers, smoke stacks or fuel tanks. No massive rooftop chillers requiring added structural support, labour and construction costs. No holes drilled in roofs to secure them either, reducing the risk of leaks. No above-ground equipment to be seen at all. In fact, the surface above a ground loop can be used for parking lots, walking paths or courtyards — an added plus for communities that want to protect or expand precious green space. And because GSHP equipment is usually underground (wells and piping) and inside (heat pumps), it's not exposed to damage from weather or vandals.



More Design Flexibility, More Available Space.

Traditional systems limit architects, designers and engineers to traditional thinking. Ground Source Heat Pump (GSHP) permits them to envision a new world of exterior and interior design possibilities.

A Ground Source Heat Pump (GSHP) system needs only about one-third the space of a traditional boiler room. Pipes hidden above the ceiling transport warmth to or from concealed individual room heat pumps. Large blower units and radiators need no longer be a visual detriment inside offices or rooms. And the eyesore of above-ground and rooftop equipment completely disappears from view.



The result? Unlimited architectural creativity. GSHP systems permit more-unusual, more-attractive exterior and roof designs. They allow historic buildings to be modernized without negatively impacting their appearance. They also permit more room in every room, with higher indoor air quality. More overall space available throughout the structure. And preservation of the landscaping or natural beauty that surrounds your building.

ENVIRONMENTALLY SAFER IN THE AIR AND THE GROUND

Even the most advanced fossil fuel systems release emissions into the air during combustion. The possibility of carbon monoxide fumes in buildings and leaks from underground fuel tanks are serious concerns, too. Ground Source Heat Pump (GSHP) is environmentally responsible, creating warmth without combustion while meeting the most stringent indoor air quality standards and drastically reducing greenhouse gas emissions. In fact, GSHP systems currently in use aid in removing more than 1.5 million metric tons of carbon emissions from our atmosphere annually. All of which helps to keep Canadian blue skies blue.



A CONSTANT SUPPLY OF HOT WATER

Another Ground Source Heat Pump (GSHP) extra is plentiful hot water — an added plus for in-building cafeterias or restaurants, restrooms and maintenance facilities. In the summer, hot water is virtually free — produced by the waste heat extracted from interior air during the cooling cycle. Year-round, Ground Source Heat Pump (GSHP) systems help make hot water abundant and up to 30% less expensive, by reducing the amount of electricity or gas consumed by hot water heaters.



LESS MAINTENANCE, FEWER INTERRUPTIONS

It's a fact that traditional HVAC systems can be complex and costly to maintain. Oil and gas-fired boilers demand regular cleanings and component maintenance. Chillers need routine check-ups, fluid testing and replacement. Both systems require the attention of skilled technicians to ensure reliable operation. And should either system fail, your entire building could shut down with it. Ground Source Heat Pump (GSHP) systems, however, are remarkably simple and reliable. They consist of standard heat pumps and ground loop piping. The polyethylene pipes underground can last up to 50 years.

Routine maintenance consists primarily of air filter replacement — which can be done by maintenance staff — no on-premises technician is required. And in the unlikely event that an individual heat pump, water pump, pipe or valve should fail, that component can be taken off-line and repaired, without affecting the rest of the units in the building. In recent Canadian studies operating and maintenance costs of GSHP systems were estimated to be 12% to 19% lower than traditional systems over a 20-year period. It has been estimated to save up to 50%, with maintenance costs averaging 12¢ to 15¢/sq. ft. versus 30¢/sq. ft. for conventional systems.

QUICK PAYBACK PERIOD

Ground Source Heat Pump Systems provide an excellent return on investment for any business that chooses the technology. New drilling and trenching techniques have also helped bring loop installation costs down in recent years to where GSHP systems are on par with traditional systems. They frequently pay for themselves in less than 10 years — often, under 5 years. And continue to save thousands in annual heating and cooling costs for the life of the system.



Why you should consider a GSHP system

Ground Source Heat Pump (GSHP) Systems are the earth's most efficient, most environmentally responsible heating and cooling technology for commercial buildings.

For a world of good reasons (summary of the benefits):

- It is unrivalled for its economics — comparable to traditional systems on first-installed costs and vastly superior over the long term — with energy cost savings of 25% to 40% annually.
- It offers precise control of comfort levels in individual rooms or zones.
- It affords exciting new architectural possibilities, inside and out.
- Its simple design and equipment ensure years of reliable performance with much less maintenance than traditional systems, too.
- GSHP systems also enable buildings to demonstrate good environmental stewardship, by utilizing a limitless supply of natural heating and cooling energy with no impact on the environment.

EXPERTS IN THE KNOW – TLJ ENGINEERING CONSULTANTS

The Ground Source Heat Pump (GSHP) industry is steadily growing in Canada, with an expanding infrastructure and diverse group of professionals with varied levels of skills and knowledge, from design engineers and architects to well drillers, pipe fitters, HVAC contractors and equipment suppliers. The critical step is finding a highly qualified Ground Source Heat Pump (GSHP) engineer that can tailor a system precisely to your building's present and future needs.

You need not look any further, TLJ Engineering is the answer. The team at TLJ can put you “in the loop” quickly, bring you up to speed on the latest technology, equipment standards and warranties, and show you other commercial buildings in your area that have benefited, economically and ecologically, from Ground Source Heat Pump (GSHP) heating and cooling. Our team has the expertise and the experience you require.

If you'd like to learn more about the very real benefits of Ground Source Heat Pump (GSHP) heating and cooling for your building, contact TLJ Engineering Consultants at 403-289-8852, email: info@tlj-eng.com or visit our web site at: www.tlj-eng.com



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