GROUND SOURCE HEAT PUMP PROGRAM
RESIDENTIAL

PROGRAM GUIDE

EFFICIENCY MANITOBA

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Please visit **efficiencyMB.ca/gshp-home** for the most current information.

PROGRAM OVERVIEW

Efficiency Manitoba's Ground Source Heat Pump Program provides financial support to homeowners who install a ground source heat pump (GSHP).

Offer

Customers must have their project approved by Efficiency Manitoba prior to purchasing and installing a ground source heat pump system. Customers who have started a system installation without written approval from Efficiency Manitoba won't be eligible.

Qualifying homeowners can install a ground source heat pump with no upfront cost* and an interest-free monthly payment of $75.00 for 15 years on their Manitoba Hydro energy bill, for a total of $13,500.

We'll provide payment for the ground source heat pump system cost directly to the contractor.

*Upgrades required to a home's equipment due to the ground source heat pump installation may require upfront payment to the contractor by the homeowner. Projects exceeding $38,000 will require an upfront contribution.

Homeowners will receive a free follow-up inspection and maintenance service one year after the heat pump is installed, performed by the contractor.

Eligibility

Existing and new homes are eligible if they're served through a Manitoba Hydro electric rate class and aren't currently being heated by a heat pump system. New homes can also participate in our **New Homes Program**.

The ground source heat pump must be installed in the homeowner's primary (not seasonal) residence.

For retrofits, the ground source heat pump must be replacing an existing electric furnace/boiler, electric baseboards, or natural gas heating system. Homeowners who are converting from propane are also eligible for incentives. Homes currently heating with oil may be eligible for the federal **Oil to Heat Pump Affordability Program**.

The contractor must be registered with Efficiency Manitoba. Our registered ground source heat pump contractors are active members of the **Manitoba Geothermal Energy Alliance**.

HOW TO FIND A GROUND SOURCE HEAT PUMP CONTRACTOR

To participate in the Ground Source Heat Pump Program, you must use a registered Efficiency Manitoba contractor. Our registered ground source heat pump contractors are active members of the **Manitoba Geothermal Energy Alliance**. You can use the **Find a Supplier tool** on our website to locate contractors in your area.

We recommend you obtain multiple quotes and check references before choosing a contractor. Ask the contractor about their proposed heat pump system design and how it will meet the specific heating and cooling needs of your home. Ensure the quote indicates the warranty periods included with the heat pump system and ask what options are available for extended warranty.

If your contractor isn't already registered with us, they can still participate but must join our **supplier network** before submitting any applications.

APPLICATION PROCESS

Step 1: Read the terms and conditions & choose a registered contractor

The homeowner will read the **terms and conditions** and the program eligibility criteria and then choose a registered Efficiency Manitoba contractor.

Step 2: Submit an application

The registered Efficiency Manitoba contractor will lead the application process and submit the following to us:

- The completed Ground Source Heat Pump Program - Residential application
- A copy of the building heat loss calculation, including a breakdown of the unoccupied base transmission and infiltration loads
- Ground heat exchanger (loop field) design drawings
- A quote (including make, model, and quantity)

The homeowner will then be sent a link to agree to the terms and conditions. Once the application is fully submitted, we'll review the application for eligibility. Be sure to wait for approval before starting any work, including purchasing or installing any portion of the heat pump system.

Step 3: Receive approval & install the ground source heat pump

After we issue written approval, the heat pump system can be purchased and installed.

Permits:

The contractor is responsible for acquiring all relevant permits and licences before starting the installation. These may include (but aren't limited to):

- Manitoba Geothermal Energy Alliance permit
- Electrical permit (certificate of electrical approval)
- Water rights licence (if applicable):
    - All open loop (well-to-well) ground source heat pump installations require a water rights licence through Environment and Climate (Province of Manitoba) allowing the use of groundwater for heating and cooling purposes. Contact Environment and Climate at **204-945-6784**, toll free at **1-800-214-6497**, or at **sd@gov.mb.ca** for more information.

Valid copies of required permits must be provided to us before the offer is paid.

Step 4: Complete the project & submit completion declarations

Once the heat pump system is installed, the contractor and homeowner both submit a completion declaration. This declaration certifies that all of the heat pump equipment has been installed and is fully operational.

The contractor must first submit their completion declaration to us, along with copies of the following:

1. Invoice (including equipment make, model, and quantity)
2. Manitoba Geothermal Energy Alliance commissioning/completion form
3. Site drawings of the ground loop (if revisions were required during installation)
4. Water rights licence (if applicable)

Then, we'll send a link to the homeowner to sign their completion declaration.

Step 5: Receive payment confirmation

After the application has been completed and approved, we'll provide payment for the heat pump system directly to the contractor and add a monthly payment to the homeowner's Manitoba Hydro energy bill.

The homeowner will pay to Manitoba Hydro equal consecutive payments of $75 per month for 180 months (equal to 15 years) at 0% interest, for a total of $13,500.

The payment to the contractor will be based on the total installed cost of the ground source heat pump system as shown on the invoice to a maximum of $38,000, including taxes. For projects that exceed $38,000, the homeowner is responsible for paying the additional costs directly to the contractor. The homeowner is also responsible for any costs that are not directly related to the heat pump installation.

PROGRAM ELIGIBILITY CRITERIA

Read the full **terms and conditions** on our website.

- The program applicant must be the owner of the building.
- The program applicant must be a Manitoba Hydro customer receiving electrical service. Homes primarily heated by electricity, natural gas, or propane are eligible. Unheated buildings don't qualify.
- Financial support isn't available for projects in progress or already completed.
- Direct expansion (DX), standing-column well, air source, internal source, or other heat pump systems aren't eligible.
- Buildings must be heated for the entire heating season (September to May) and use the installed heat pump system as the primary heating source.
- The owner must occupy the building as a principal residence on a year-round basis. If the building is a rental property, then the owner must rent the building to a tenant on a year-round basis. Vacant properties aren't eligible.
- A heat pump system sized to provide up to 100% of the base building transmission and infiltration heating loads will be eligible.
- Products, equipment, and their applications and installations must be new and meet or exceed energy efficiency regulatory requirements in Manitoba.
- Products which are benefiting from financial assistance from any other federal, provincial, or Manitoba Hydro, or Efficiency Manitoba energy efficiency program must disclose their intention to apply for funding from multiple sources. In such situations, we can provide financial assistance; however, it'll be reduced by the contribution(s) from any other organization for the same project, so that the maximum payable from all funding sources doesn't exceed the total product cost for the project.
- We must be notified in writing of any changes to the building design or ownership that affect the original application before any energy-efficient equipment is installed in order for the changes to be eligible.
- The owner is solely responsible for selecting, contracting, managing, evaluating, and releasing the contractor for any and all work, and for the selection, installation, ownership, warranty, and maintenance of installed products.
- All payments are limited to not exceed the product and installation cost, including taxes.
- Our decisions relating to product or customer eligibility, energy savings potential of the proposed projects, payment amounts, or other related issues will be final and binding on all parties.

Equipment specifications

- Installed water source heat pump units must be certified by CSA or ARI/ISO 13256 Water - Source Heat pumps - Testing and Rating for Performance Part 1 or Part 2 as applicable for type of unit.
- All systems must be designed and installed in accordance with the current edition of ANSI/CSA C448 Design and installation of ground source heat pump systems for commercial and residential buildings.
- Ground loop heat exchangers must be designed:
  - for a minimum lifetime entering water temperature of -1°C (30°F);
  - allowing for a maximum internal electrical load of 20W/m^2 for sizing the ground loop for heating loads; and
  - with accessible thermo-wells complete with inserted thermometers with minimum –15°C to 40°C range and 1°C accuracy must be installed on the main return and supply loop(s) to allow for long-term temperature monitoring of the ground loop and visual flow type meter(s) must be installed on the ground loop system so they can be used to establish the heat transfer fluid flow rate through the ground loop.

In order to qualify, we must approve the Ground Source Heat Pump Program application in writing before any portion of the system is purchased or installed.

Alternatively, installations can be outfitted with a heat pump manufacturer's optional performance monitoring package that provides the owner with direct access to both live and historical trends of (as a minimum) loop flow rates, water, and air flow temperatures.

- Circulating fan motors in water-to-air units must be DC type.
- Reduce pumping energy costs by designing systems:
  - to a maximum ground loop circulating pump power of 35W/kW of heat pump heating output; and
  - to have all pumps within the system automatically controlled to only operate when there's a demand for heating or cooling.

INSTALLER & DESIGNER PROJECT REQUIREMENTS

Installer requirements

- The ground source heat pump system installer must be an accredited installer in good standing on the Manitoba Geothermal Energy Alliance (MGEA) list of installers.

  You can confirm your installer is a member in good standing by contacting the MGEA directly at 204-334-5194 or going to **mgea.ca/member-list**.

- The installer must employ a refrigeration mechanic licensed in Manitoba.

Building code compliance

- All building renovation projects including heating system replacements that are required to comply with the Manitoba Building Code (MBC) must be designed and constructed to do so.

Ground loop heat exchanger design requirements

- The ground loop design must be performed using recognized ground loop design software such as GLD, GshpCalc, GLHE-PRO, or an approved and equal alternative.
- A software design report must be submitted with the application form.
- Dimensioned or scaled site plan drawings of the ground loop heat exchanger, groundwater wells, all headers, and piping must be submitted with the application form.

Professional designer requirement for Part 3 buildings

- Professional designers (architects and structural, mechanical, and electrical engineers) are required on most building renovation and heating system retrofit projects. For Part 3 buildings, an engineer-sealed drawing of the building mechanical system and ground loop/groundwater heat exchanger must be provided upon request. Exemption from this requirement can only be granted by the local authority having jurisdiction.
- If the local authority having jurisdiction has exempted your project of the professional designer requirement, a copy of official documentation from the authority to prove this must be submitted along with your Ground Source Heat Pump Program application. The documentation from the code authority having jurisdiction must indicate the reason for the exemption.
- Some common reasons that a building project may be exempt from the professional designer requirement may include (but aren't limited to) the following:
  - The National Farm Building Code of Canada applies.
  - The building isn't an Assembly occupancy.
  - The building area doesn't exceed 6,450 square feet.
  - The building height doesn't exceed three storeys.
- The alteration to the existing building systems is judged by the authority having jurisdiction to not significantly effect the integrity of any one of the following:
  - Fire safety systems
  - Fire compartments and fire separations
  - Structural systems
  - Environmental separation systems including building envelope
  - Heating, ventilation, and air conditioning systems
  - Usable floor area through the addition of a mezzanine, in-fill, or similar element
- The professional designers are responsible for the following:
  - Preparing signed and sealed plans of the construction work
  - Reviewing building construction or alteration to determine conformity with the design
  - Reviewing all shop drawings and related documents to determine conformity with the design
  - Reviewing the workmanship, materials, and material tests during the construction process

The above interpretation is an approximate summarization of the MBC. For a detailed description, refer to the MBC Division C amendments to Section 2.2.2.3 through 2.2.7.4 (1) of The National Building Code of Canada (2010).

Designer requirements for Part 9 buildings

- Water-to-air heat pump systems must have ducting systems designed by a designer who has completed a recognized commercial air distribution course (such as HRAI Small Commercial Air System Design). We may request design drawings.
- Water-to-water heat pump systems must have the hydronic piping system designed (at minimum) by a designer who has completed a recognized hydronic system design course (such as HRAI Radiant Hydronic Design). We may request design drawings.
- Ground loop heat exchangers must be sized by a designer who has been fully certified by International Ground Source Heat Pump Association (IGSHPA) or Canadian Geothermal Coalition (CGC) to do so. Designs must be submitted with the application.

APPENDIX 1 – GROUND SOURCE HEAT PUMP PROJECT REQUIREMENTS

For review by mechanical engineer or system designer

1.0 Project eligibility

Heat pump systems sized to provide up to 100% of the base building transmission and infiltration heating loads only will be eligible for the program. Eligible heating systems must be designed to operate a minimum of 1,500 full load hours in one heating season (September to May).

We reserve the right to reject applications for installations which are deemed to be a significant risk of not producing predictable, sustainable savings or which wouldn't meet our energy efficiency objectives.

Direct expansion, standing-column well, air source, internal source, or other heat pumps aren't eligible.

Please review the detailed program eligibility criteria.

2.0 Heating & cooling load calculations

2.1 Manual or spreadsheet methods

Manual or spreadsheet (Excel or equal) methods in accordance with methods found in the ASHRAE Handbooks, HRAI Digest (technical manuals), or CSA F280 for residential and small commercial buildings are acceptable.

2.2 Software methods

Commercially available building energy modelling software or heat load calculation software which use ASHRAE or HRAI methods are acceptable.

2.3 Envelope unoccupied base heating loads

Heat pump systems sized to provide up to 100% of the base building unoccupied transmission and infiltration heating loads will be eligible. The maximum infiltration allowance is 0.2 to 0.3 air changes per hour.

2.4 Continuous ventilation base heating loads

Ventilation air heating with air-to-air heat recovery is considered by the program as base case. Continuous ventilation base loads incremental to the loads that the heat recovery system can service will be considered on an individual basis.

2.5 Non-continuous or intermittent ventilation and infiltration heating loads

Non-continuous and intermittent heating loads (mechanical or passive ventilation and door openings) aren't eligible.

2.6 Service water heating loads

Service water heating loads aren't eligible at this time.

2.7 Technical review

Results of the heating load calculations obtained through manual, spreadsheet, or software methods will be reviewed by our technical staff to ensure they're acceptable, realistic, and meet program requirements. Copies of model or spreadsheet files must be provided for review upon request.

2.8 Supporting documentation

A summary report showing the heat loads broken down into the major categories of conduction (transmission), infiltration (air leakage), and ventilation (if applicable) for each major component of the building envelope including windows, above grade walls, below grade walls, roof, and floors is required. A complete copy of the detailed heat loss calculation report must be provided.

4.0 Heat Pump Coefficient of Performance (COP)

Savings claims should be based on detailed engineering calculations and estimates of the system's COP at design conditions and over several heating seasons. The seasonal heating COP is defined as the total output energy over a heating season divided by the total input energy over a heating season at average operating conditions that could be expected over an expected 20-year operating life. The CSA C13256 standard for rating heat pump equipment performance only requires inclusion of the portion of the fan and pump power required to overcome internal resistance. The additional fan and pump power and energy required to overcome all external pressure drops must therefore be added to the system loads. Performance ratings also don't account for cycling losses and imperfect field operating conditions and maintenance practices. Not all equipment is independently tested and certified.

We've found the most important factors affecting the long-term performance of the heat pump system is the proper design, installation, and maintenance of the system. These factors include the design and installation of the earth loop or groundwater heat exchanger, heating and cooling distribution system, and maintenance of the heat pumps, filters, coils, heat exchangers, and well systems. These factors are generally unknown, so conservative performance estimates are justified. Currently, no minimum standards or regulations are enforced for earth loop design and installation.

Due to the many factors that affect the actual system efficiency, Efficiency Manitoba expects that the average long-term design condition COPs and seasonal COPs for ground source heat pump systems installed and operating in Manitoba fall between 1.5 and 3.0, depending on the amount of pump, fan, and auxiliary heating energy consumed by the system. We won't endorse performance claims exceeding this range.

Phone: 204-944-8181
Toll free: 1-844-944-8181
gshp@efficiencyMB.ca
efficiencyMB.ca/heat-pumps

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