HEAT PUMP PROGRAM
- GROUND SOURCE

PROGRAM GUIDE

EFFICIENCY MANITOBA

HEAT PUMP PROGRAM - GROUND SOURCE

Program Guide

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This publication is subject to change.
Please visit **efficiencyMB.ca/heatpump** for the most current information.

PROGRAM OVERVIEW

Efficiency Manitoba's Heat Pump Program provides financial rebates to customers who replace an existing heating system with a ground source heat pump (GSHP).

Financial Rebates

Customers must have their project approved by Efficiency Manitoba prior to purchasing and installing a GSHP system.

Customers who have started a system installation without written approval from Efficiency Manitoba won't be eligible for financial rebates.

System Installation Rebate

The rebate for installing a GSHP is calculated as being the lesser of:

1. $2.50 per square foot of floor area heated by a GSHP system

OR

2. $120 per MBH (1,000 BTU/hour) of installed GSHP space heating capacity

OR

3. $120 per MBH (1,000 BTU/hour) of the building/home's eligible base transmission and infiltration heating load.

Program Eligibility

Existing homes and buildings are eligible for rebates if they're currently served through a Manitoba Hydro electric rate class and aren't currently being heated by a heat pump system.

New construction projects aren't eligible for Heat Pump Program rebates; however, they may be eligible for energy efficiency rebates through the New Buildings Program (**efficiencyMB.ca/business/new-buildings**) or New Homes Program (**efficiencyMB.ca/my-home/building-a-home**).

Homes that are currently heated with natural gas, propane, fuel oil, or coal may be eligible for rebates.

Commercial buildings currently heated by natural gas may be eligible for rebates.

HOW TO FIND A HEAT PUMP INDUSTRY PROFESSIONAL

Find a Ground Source Heat Pump Contractor/Installer

The Manitoba Geothermal Energy Alliance can provide you with a list of certified heat pump installers in your area. You must use a certified refrigeration contractor who is a member in good standing with the Manitoba Geothermal Energy Alliance to participate in the Heat Pump Program.

Manitoba Geothermal Energy Alliance (MGEA)

mgea.ca/member-list
35-2855 Pembina Highway
Unit 440
Winnipeg, MB R3T 2H5
Phone: 204-334-5194
Toll free: 1-877-334-4186
Email: info@mgea.ca

Find an Engineer or Architect

Engineers Geoscientists Manitoba (EGM)

EngGeoMB.ca
870 Pembina Highway
Winnipeg, MB R3M 2M7
Phone: 204-474-2736
Toll free: 866-227-9600
Email: info@EngGeoMB.ca

Consulting Engineers of Manitoba

acec-mb.ca/members
PO Box 21036
Winnipeg, MB R3R 3R2
Phone: 204-774-5258

Manitoba Association of Architects

mbarchitects.org
137 Bannatyne Avenue, 2nd floor
Winnipeg, MB R3B 0R3
Phone: 204-925-4620
Email: info@mbarchitects.org

INSTALLER & DESIGNER PROJECT REQUIREMENTS

Installer Requirements

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

  You can confirm that 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 — 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/ground water 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 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 are not limited to):
  - The National Farm Building Code of Canada applies
  - The building is not 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 shall be responsible for:
  - 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 — 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). Design drawings may be requested by Efficiency Manitoba.
- 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). Design drawings may be requested by Efficiency Manitoba.
- 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.

REBATE APPLICATION PROCESS

These steps outline how to qualify and apply for financial rebates for GSHP projects:

Step 1: Review the Program Eligibility Criteria

The customer reviews the program eligibility criteria and the terms and conditions. These can be found in this program guide and at **efficiencyMB.ca/heatpump**.

Step 2: Apply for the System Installation Rebate

The customer's contractor submits the following to Efficiency Manitoba:

- The completed Heat Pump Program application
- A copy of the building heat loss calculation, including a breakdown of the unoccupied base transmission and infiltration loads
- A copy of the ground loop heat exchanger software design report with an affixed engineering seal (for Part 3 buildings) or the designer's name and signature (for Part 9 buildings)
- A copy of dimensioned or scaled drawings of the ground loop heat exchanger, groundwater wells, all headers, and piping

Once the customer submits the signed application, Efficiency Manitoba reviews the application for eligibility and to calculate the conditional rebate.

Heat Pump Program applications and documents can be submitted by an MGEA accredited member online at **efficiencyMB.ca/heatpumpapply**.

Step 3: Have the Heat Pump Installed

After written approval is received, the customer can purchase and begin installation of their heat pump system.

Permits:

The customer's contractor is responsible for acquiring all relevant permits and licences before starting the installation.

These may include (but are not limited to):

- Manitoba Geothermal Energy Alliance Permit
- Building permit (Occupancy Certificate)
- Electrical permit (Certificate of Electrical Approval)
- Water rights licence (if applicable):
  - All open loop (well-to-well) GSHP installations require a water rights licence through Climate and Conservation (Province of Manitoba) allowing the use of groundwater for heating and cooling purposes. Contact Conservation 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 Efficiency Manitoba before the rebate is paid.

Step 4: Finish the Project & Submit Completion Documents

Once the heat pump system is installed, the customer and/or installer/engineer performs an inspection and completes the Completion Declaration. This declaration certifies that all the heat pump equipment has been installed and is fully operational. Following the customer inspection, submit the following to Efficiency Manitoba:

1. Installer/vendor Completion Declaration;
2. Customer Completion Declaration (customer to complete);
3. Copies of paid project invoices including labour and materials (specify equipment make and model number);
4. Site drawings of ground loop including headers and piping.
5. Copy of MGEA permit;
6. Copy of MGEA Commissioning/Completion Form;
7. Copy of approved electrical permit;
8. Copy of Occupancy Certificate (for commercial buildings);
9. Licence to Use Water for Heating/Cooling Purposes from Conservation and Climate (open loop well to well systems only); and
10. Valid copies of any other required permits.

All documentation requested above must be completed in full and sent to Efficiency Manitoba before final approval can be issued.

Step 5: Receive Your Rebate

After Efficiency Manitoba receives the documentation requested in step 4, an Efficiency Manitoba representative may perform a site visit to confirm the make and model of the equipment installed.

The conditional rebate may be increased or decreased if the actual system, installed equipment, or building design have changed. The final rebate amount will then be calculated and approved. The rebate is then processed and sent to the payee specified by the customer.

HEAT PUMP TERMS & CONDITIONS

Program Eligibility Criteria

- The program applicant must be a Manitoba Hydro (MH) customer receiving electrical service.
- The Program applies only to renovation and retrofit projects where the heat pump is replacing another type of heating system. The sole exception is new construction farm buildings which must meet specified building envelope criteria to be eligible for rebates.
- Rebates are not available for projects in progress or already completed.
- One rebate will be issued for each eligible project.
- Direct Expansion (DX), standing-column well, air source, internal source, or other heat pump systems are not eligible for rebates.
- Buildings must be heated for the entire heating season (September to May) and use the installed heat pump system as the primary heating source.
- A heat pump system sized to provide up to 100% of the base building transmission and infiltration heating loads will be eligible for an rebate. Additional installed system capacity to handle ventilation or water heating loads won't be applied when calculating the rebate.
- 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 MH or Efficiency Manitoba energy conservation program must disclose their intention to apply for funding from multiple sources. In such situations, Efficiency Manitoba can provide financial assistance; however, it will be reduced by the contribution(s) from any other organization for the same project, so that the maximum payable from all funding sources does not exceed the total product cost for the project.
- Efficiency Manitoba must be notified in writing of any changes to the building design that affect the original application before any energy-efficient equipment is installed in order for the changes to be eligible for rebates.
- All rebates are limited to not more than the product and installation cost paid for by the customer, including taxes.
- Efficiency Manitoba's decisions relating to product or customer eligibility, energy savings potential of the proposed projects, rebate amounts, or other related issues will be final and binding on all parties.

Equipment Specifications

- Installed forced air (water-to-air) heat pump units must be certified by CSA or ARI/ISO 13256-Installed Fluid-to-Fluid heat pumps must be manufacturer rated in accordance with ARI/ISO 13256-2.
- All systems must be designed and installed in accordance with the current edition of ANSI/CSA C448 Design and installation of GSHP 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/m2 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.

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.

In order to qualify for an rebate, this entire application must be approved in writing by an authorized Efficiency Manitoba Heat Pump Program representative before any portion of the system is purchased or installed.

APPENDIX 1 – GROUND SOURCE HEAT PUMP PROJECT REQUIREMENTS

For Review by Mechanical Engineer, Architect, 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 an installation rebate. Eligible heating systems must be designed to operate a minimum of 1,500 full load hours in one heating season (September to May).

Efficiency Manitoba reserves the right to reject applications for installations which are deemed to be a significant risk of not producing predictable, sustainable savings or which would not meet Efficiency Manitoba's energy efficiency objectives.

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

Please review the detailed Heat Pump Program eligibility criteria.

2.0 New Construction Project Eligibility

2.1 New Construction projects

New construction projects may be eligible for an rebate through the New Buildings Program or New Homes Program. For more information about new construction rebates, visit: **efficiencyMB.ca/newhomes**; or **efficiencyMB.ca/newbuildings**

New farm buildings, which are exempt from the Manitoba Building Code, may be eligible for rebates if they are designed to meet or exceed Efficiency Manitoba's building envelope requirements.

2.2 New additions to existing buildings

An addition to an existing building receiving additional heating/cooling equipment must go through the New Buildings Program or New Homes Program. An addition to an existing building, where existing heating/cooling infrastructure is being upgraded to heat pumps and expanded to meet the heating/cooling requirements of the new and existing buildings, may be eligible for financial rebates through the Heat Pumps Program for the existing portion of the building only.

3.0 Heating Loads Eligible for Rebates

The Heat Pump Program rebates are calculated based on the eligible design heating load, or equipment heating capacity (whichever is less), but are limited to $2.50 per square foot of floor area heated. The section below outlines which loads are eligible for rebates.

3.1 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 for an rebate. The maximum infiltration allowance is 0.2 to 0.3 air changes per hour.

3.2 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.

3.3 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 for rebate.

3.4 Service water heating loads

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

4.0 Heating & Cooling Load Calculations

4.1 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.

4.2 Software methods

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

4.3 Technical review

Results of the heating load calculations obtained through manual, spreadsheet, or software methods will be reviewed by Efficiency Manitoba 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.

5.0 Required 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 on request.

6.0 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.

Efficiency Manitoba has found the most important factors affecting the long term performance of the heat pump system is the proper design, installation, and maintenance of the systems. 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 COP's and seasonal COP's for GSHP 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. Performance claims exceeding this range, won't be endorsed by Efficiency Manitoba.

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