

*Notes on Discussion with Mr. Doug Powell re.—  
Ground Water Heat Pump/Geothermic Heat Pump Systems*

1. There are, at least, three ways to do this—a) a two well ground water system, b) a geothermic buried loop or c) an open water source.
2. If you use an open water source, there must be a sufficient water source from a creek, stream, river, lake or pond.
3. The water draw is a maximum 12 gallons per minute; if you use two wells (one for intake and the other to put the groundwater back), the wells must be able to produce/take at least 12 gallons per minute.
4. For a pond, we would recommend an 8 to 10 foot depth.
5. From wells in this area (Ottawa), water comes out of the well at 49 degrees Fahrenheit.
6. Water comes in a 49 degrees and the furnace extracts 7 degrees; so the water is returned to the pond or second well at 42 degrees.
7. A minimum distance between water intake and outlet in a pond or creek is 75 to 100 feet to allow the cooler and warmer water to mix properly.
8. You need three electric motors—one to operate the compressor, one for the circulating fan (to move air in your house or building) and one for the circulating pump (in your well or pond). You will have the latter anyway for a rural lot plus you need a circulating fan in most well insulated homes to keep the air fresh. (You can add an air heat exchange as well to keep the air fresh and not lose much of the heating or cooling effect).
9. This system works for both air conditioning and heating—adding temperature to the intake water in summer and the reverse in winter.
10. You can get the same effect by using an in-ground loop; the loop must be buried 3.5 to 4 feet below grade and be at least 1,000 feet long. You simply circulate the water in the loop endlessly gaining and subtracting heat.
11. The outtake water is not contaminated in any way save for a temperature gradient change.
12. The electricity to run this system for a typical 2,500 square foot home is about what a refrigerator requires.
13. The system is very quiet.
14. The cost of installation in a new home or building is about the same as a conventional heating system (within 5% of the cost). The main difference is that hot air from a conventional furnace comes out at 170 to 180 degrees Fahrenheit versus 110 degrees for this type of furnace. As a result, instead of using 3 inch ducts everywhere, you need to use 4” ducts to move a larger volume of air. So retrofitting an existing home could get expensive if you have to replace all the existing duct work.
15. In Ottawa, there are successful examples of this for both domestic uses (like the Powell’s residence) and large buildings such as the Governor General’s Residence and Guest House and various buildings at Carleton University.