

## **Summary of Pond / Spring Closed Loop System Analysis**

rah

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### **Summary:**

#### **Financials**

The GSHP system will result in a 50% reduction in overall life cycle costs.

compared to the most efficient oil fired system available (heating only)

Cost savings will actually be substantially more for most homes that use a great deal of AC in the summer, as GSHP AC is massively more efficient due how much lower earth temps are from air temps in the summer.

The initial cost of the GSHP system is nearly twice that of an efficient oil or gas system

However, nearly half the cost difference for the GSHP system is for improved distribution that will result in better thermal comfort and better air quality in the home.

Substantial government incentive programs make up approximately 25% of the cost of the GSHP system. Lesser incentives are available for an efficient fossil fuel system.

#### **Pond / Spring - Analysis as a thermal heat sink**

Thermal energy available from pond / spring is adequate except in most extreme conditions.

Due to remote location and fragility of electrical supplies at times of heavy storms a substantial backup gas furnace is required, which could be used to supplement geothermal energy if necessary.

#### **Pond / Spring - Comparison of piping contact areas**

Pond loop system has approximately 1/2 the contact area of other systems

However, overall contact area of pond basin, which will be the element transferring thermal energy to the earth is 10 times that of other systems

If thermal stratification becomes an issue in energy transfer, a small 12 volt (solar powered) trolling motor used by fishermen could be added to the system to eliminate stratification.

#### **Pond - Indirect Open Loop System Analysis**

Surface or near surface insulation can easily provide

insulative equivalence of typical installed depths for tubing

Proposed 2 inches may need to be increased to 3 inches at pond

Proposed structure and insulation at garden is equivalent to 5 foot depth

Cost of insulation VS traditional excavation are comparable

Insulating in lieu of excavation may well be less expensive

Proposed insulating system for pond scheme is least expensive methodology

Note: Rock free backfill costs similar each methodology

Note: Use of pond as thermal sink should allow for reduced tubing costs also

#### **Pond / Spring - Cost of Filling or Decking over Pond**

Repairing and decking over pond with insulation on support frame is

less than cost of filling and draining pond / springs, and cleaning

6 inch deep reflecting pool atop thermal sink will be easier than

cleaning pond is now, along with reduced life safety issues.