Cold Geothermal Heating System (Underground Heat Pump)

- High Temperature Heat Reservoir at $T_H$ (House air at 80°F)
- Low Temperature Heat Reservoir at $T_L$ (Ground at 14°C)
- Heat Pump
- Compressor
- Condenser
- Evaporator
- Valve
- $Q_H$
- $Q_L$
- $W_{net}$

Cold Geothermal Cooling System (Underground Refrigerator)

- High Temperature Heat Reservoir at $T_H$ (Ground at 14°C)
- Low Temperature Heat Reservoir at $T_L$ (House Air at 10°C)
- Refrigerator
- Compressor
- Condenser
- Evaporator
- Valve
- $Q_H$
- $Q_L$
- $W_{net}$
Combined Cold Geothermal System

Ground

Condenser

Ground HE

Evaporator

House

Condenser

House HE

Evaporator

Valve

Compressor

Blue represents the cooling system.
Red represents the heating system.
Two way valve