The background of the slide is a photograph of industrial equipment, specifically large white pipes with several pressure gauges attached. The gauges have white faces with black markings and numbers. The scene is dimly lit, with some light reflecting off the pipes and gauges. The overall tone is industrial and technical.

Daniel Meyer Pool Renewable Energy Assessment

Reducing GHG Usage for the City of
Ashland



Existing Daniel Meyer Pool Heating System

Historic Annual Heating Consumption

- 20,000 Therms
- 117 tons of CO₂ emissions

22.9

gasoline-powered passenger
vehicles driven for one year



Emission-reducing Heating Sources

Solar

- Solar Thermal Arrays

Ground

- GSHP
- Direct-Use Geothermal

Electricity

- ER Boiler

Air

- Air-to-Water Heat Pump

Emission-reduction Heating Sources

Solar

- Solar Thermal Array

Ground

- GSHP
- Direct-Use Geothermal

Electricity

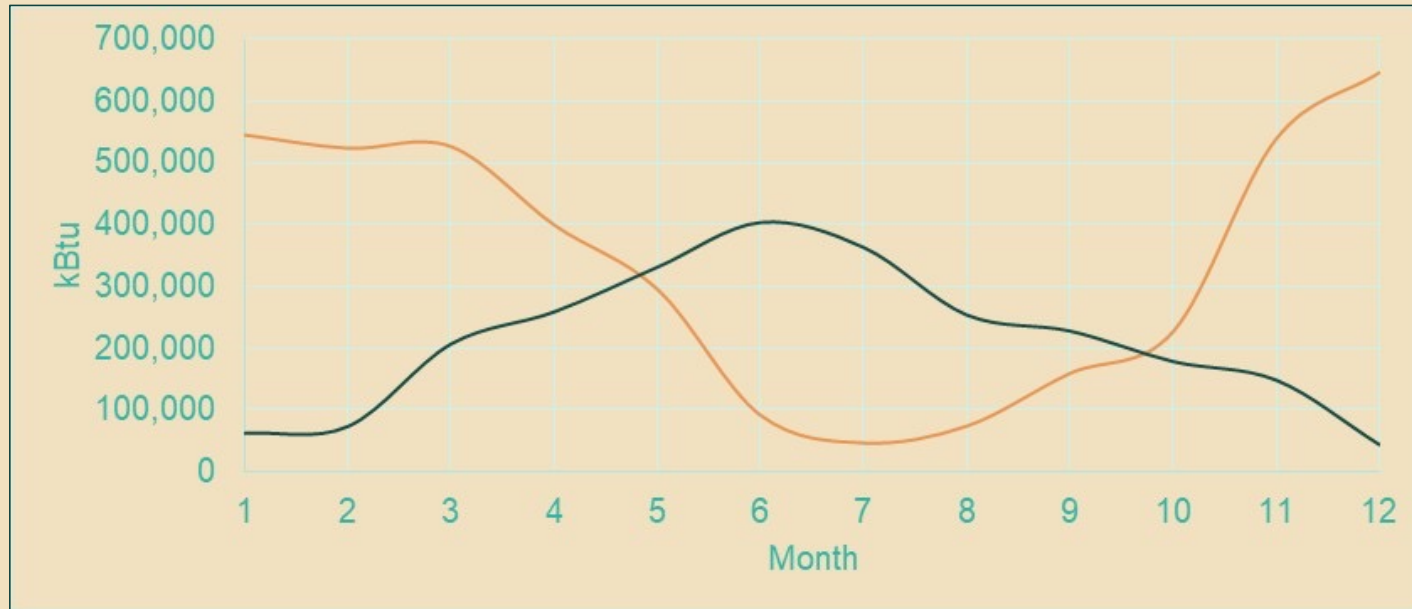
- ER Boiler

Air

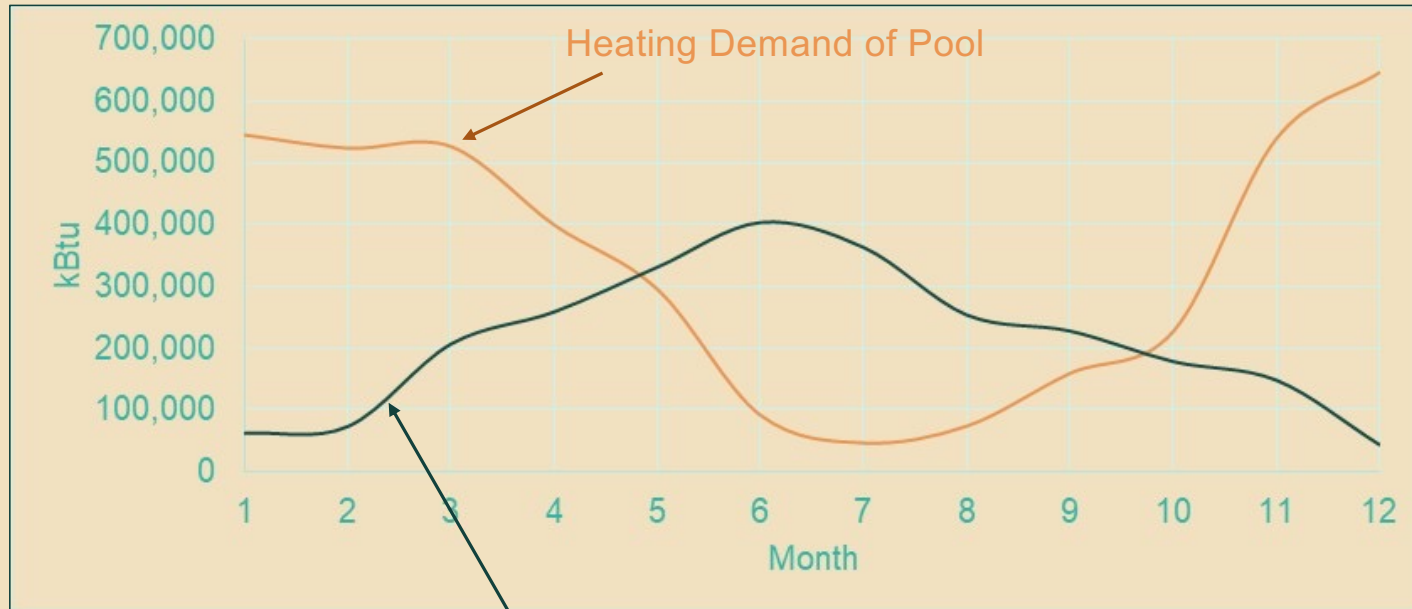
- Air-to-Water Heat Pump

Recommendation

Solar Thermal

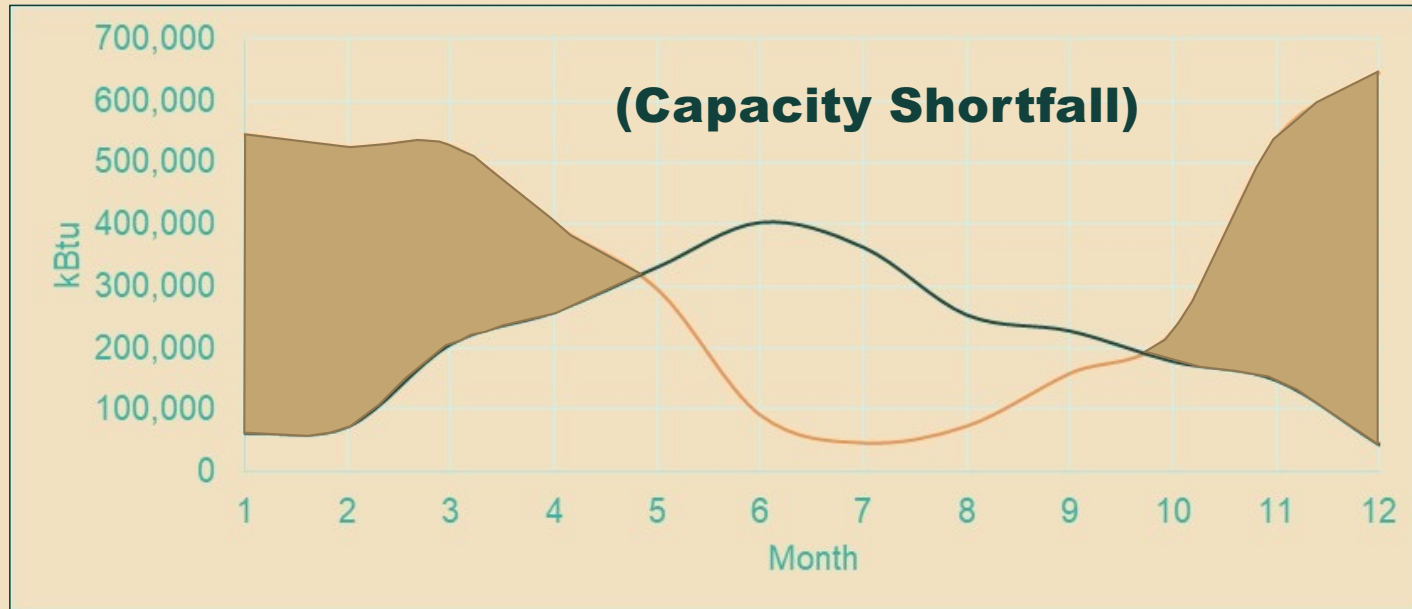


Solar Thermal



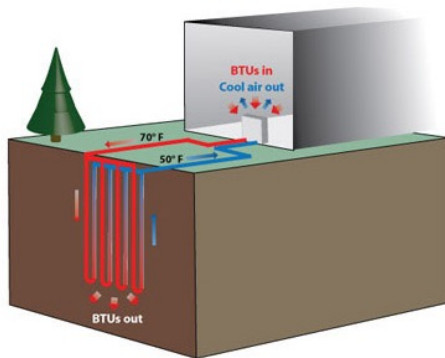
Capacity of Solar Thermal Array
(assumes maximum site coverage)

Solar Thermal



Ground-Source

Vertical closed-loop system operating in cooling mode:



Vertical closed-loop system operating in heating mode:

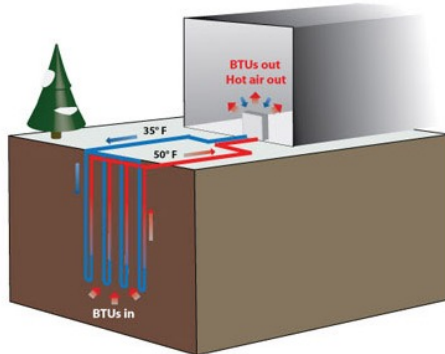
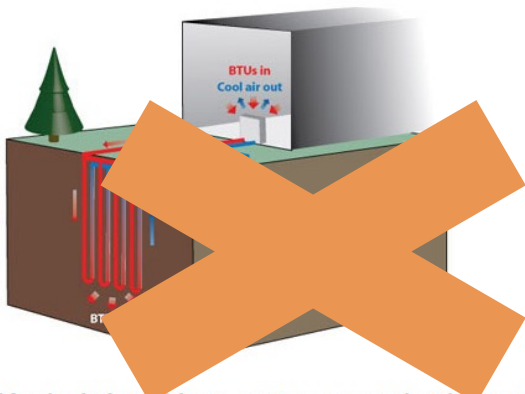


Image source: nyserda.ny.gov

Ground-Source

Vertical closed-loop system operating in cooling mode:



Vertical closed-loop system operating in heating mode:

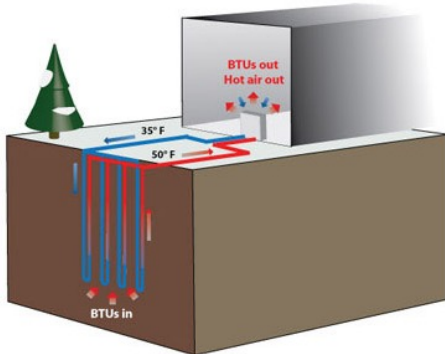


Image source: nyserda.ny.gov

Pools never recharge ground source of heat since they are always in heating mode

Constant heating requirement will eventually degrade heat quality of ground source

Direct Use Geothermal

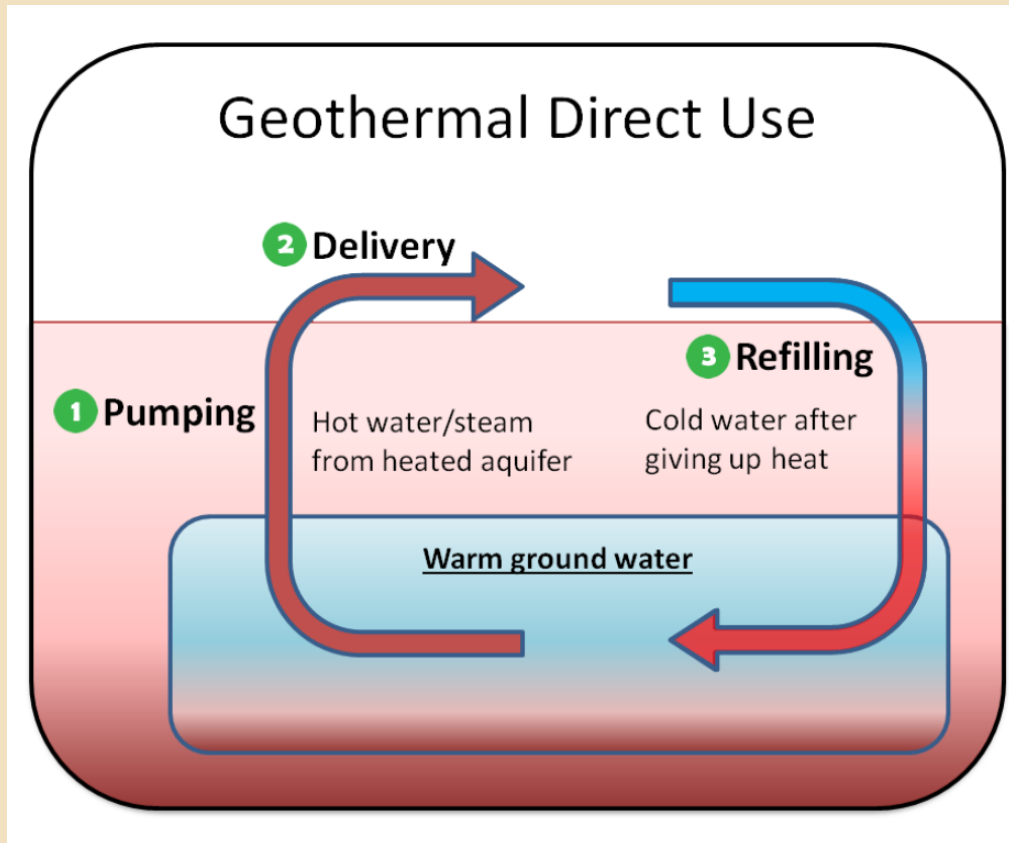


Image source: epa.gov

High Variation by site in:

Heating Quality

Water Quality

GPM availability

**Given best conditions,
estimated well depth =**

1,500 meters (\$3-4M)

Electrification of Heating

Most Cost Effective Path

Existing NG Boiler

**117 Tons
CO₂**

22.9 gasoline-powered passenger
vehicles driven for one year ?



Electric Boiler

**28 Tons
CO₂**

5.5 gasoline-powered passenger
vehicles driven for one year ?



**Electric Boiler with Air-to
Water HP**

**14 Tons
CO₂**

2.7 gasoline-powered passenger
vehicles driven for one year ?



Electrification of Heating

**Incremental Cost for
this Reduction ~ \$600k**

Electric Boiler

**28 Tons
CO₂**

5.5 gasoline-powered passenger
vehicles driven for one year ?



**Electric Boiler with Air-to
Water HP**

**14 Tons
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2.7 gasoline-powered passenger
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Electrification of Heating

**Incremental Cost for
this Reduction ~ \$600k**

**PV costs for same
reduction ~\$3.5M**

Electric Boiler

**28 Tons
CO₂**

5.5 gasoline-powered passenger
vehicles driven for one year ?



**Electric Boiler with Air-to
Water HP**

**14 Tons
CO₂**

2.7 gasoline-powered passenger
vehicles driven for one year ?



Electrification of Heating

**Incremental Cost for
this Reduction ~ \$600k**

**~\$4M SHW system cannot
reach this level of reduction**

Electric Boiler

**28 Tons
CO₂**

5.5 gasoline-powered passenger
vehicles driven for one year ?



**Electric Boiler with Air-to
Water HP**

**14 Tons
CO₂**

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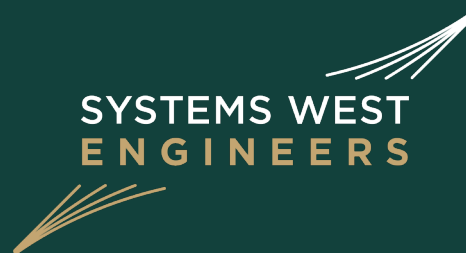
Summary

Reduce 88% of existing GHG emissions by installing Air-to-Water HP with Electric boiler backup

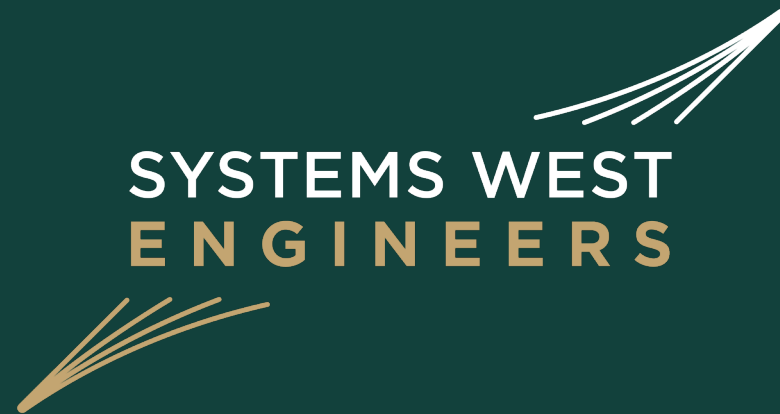
Install minimum PV array size to abide by GET requirement (~23 kW) at Pool Deck or Parking Lot Cover

Consider purchasing carbon offsets to mitigate 14 tons of CO₂

Thank you!



Springfield & Bend, Oregon // SystemsWestEngineers.com



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