

Report Shows Ground Source Heat Pumps are economically viable in many areas of Alaska

The Alaska Center for Energy and Power (ACEP) and Cold Climate Housing Research Center (CCHRC) recently released a joint report on ground source heat pumps in cold climates. The study indicates these systems - which extract heat from the earth for use in space heating - are technically and economically viable in areas with high heating costs and low electric costs. The report, funded by the Denali Commission, offers the first in-depth assessment of ground source heat pumps in Alaska.

"There recently has been quite a bit of excitement about ground source heat pumps, as people are seeking more affordable heating options. Our report helps explain the technology in the context of Alaska, and analyzes its potential throughout the state," said co-author Colin Craven, head of product testing at CCHRC.

There are roughly 50 heat pumps in Alaska, including high-profile commercial installations at Weller Elementary School in Fairbanks and the Juneau Airport Terminal as well as several residential installations around Southcentral. A heat pump transfers energy from the earth or water to use for space-heating (or cooling). The system consists of underground tubing (filled with heat-transfer fluid), a pump (which runs on electricity), and a heat distribution system.

Researchers reviewed the state of the industry in Alaska, interviewed ground source heat pump owners, and assessed the performance and economic viability of the technology in five cities, each representing different regions and conditions—Fairbanks, Anchorage, Juneau, Bethel and Seward.

Researchers compared the cost and performance of heat pumps (over 15 years) with traditional heating systems in an average-sized new construction home in each city—for example, an oil-fired boiler in Fairbanks, a natural gas furnace in Anchorage, and a Toyo heater in Bethel. They found that heat pumps could match or beat out other heating systems in Fairbanks, Juneau and Seward.

"Even though the ground source heat pumps have high up-front capital costs, which is what deters people from installing them, they end up costing less over 15 years just because you save so much money on annual energy costs," said Dominique Pride, graduate researcher at ACEP and co-author of the report.

They are most economical in Juneau and Seward, where heating oil is expensive and electricity costs are low. They also potentially make sense in Fairbanks, which

has more expensive electricity than Southeast and Southcentral but also higher heating demand and costs, thus more room for energy savings.

The analysis found they are not economical in Anchorage, which has low heating and power costs thanks to inexpensive natural gas. And they are not viable in Bethel and most of rural Alaska because of its extremely high electricity costs.

In addition to economics, researchers looked at cold climate considerations on system performance, including the impact of ground source heat pumps on soil, as extracting heat could create more permafrost if the ground temperature doesn't recover in the summer. Though the long-term impact on soils is unclear, the ground source heat pump to be installed at CCHRC next year will shed light on this and other remaining questions.

The study also found that proper design and installation of systems impact performance and *that a limited number of certified designers, installers and drillers in the state have an impact on current performance. (this last clause doesn't make sense to me...are you saying bc there are a limited number of installers, that it negatively impacts the performance of heat pumps? Or that only a limited number of installers have an impact on heat pumps? Is the main point that there are only a limited number of good installers?)*