

How does geoenergy work?

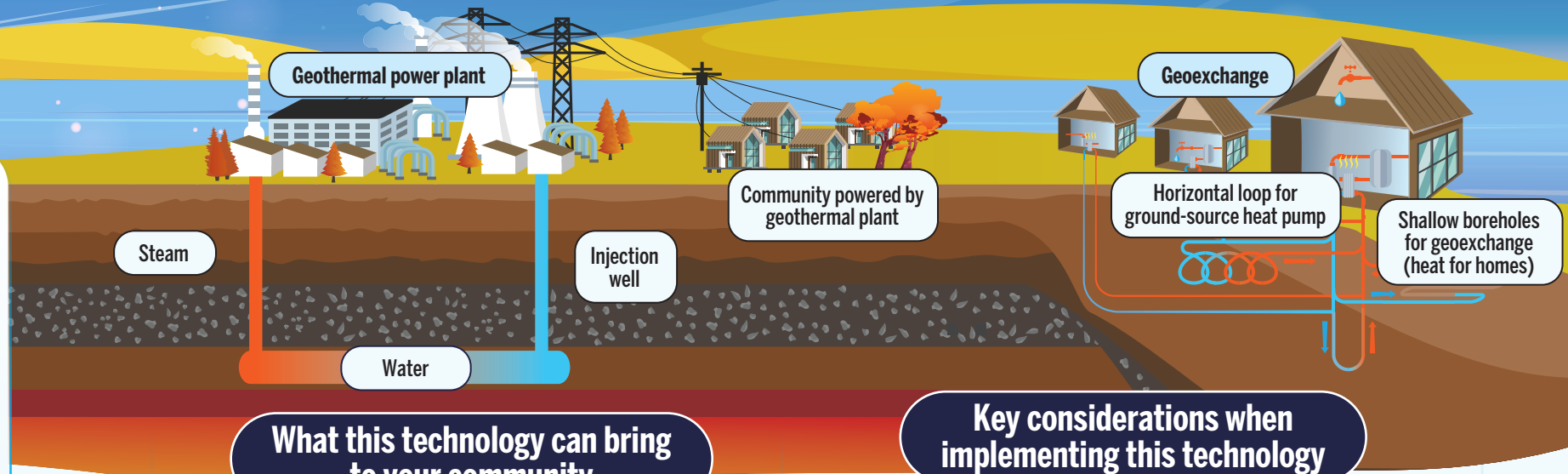
- Water is pumped deep underground where the hot rocks and sediment raise the water's temperature.
- **Geoexchange:** At shallower depths, the heated water is pumped back to the surface, where it can be used to heat buildings.
- **Geothermal:** At greater depths, if high enough temperatures exist, steam can also be produced, which drives a turbine connected to a generator to produce electricity.
- Ground-source heat pumps leverage the lower temperatures of shallower depths to provide heating in the winter and cooling in the summer.

Deep underneath the Earth's crust heat is generated and stored in rocks and sediment that increase in temperature with depth. By tapping into this abundant source of energy, it's possible to generate electricity and heat for our homes and buildings. Although drilling is required to access it, geothermal energy delivers clean, reliable, and sustainable energy that can help Northern and remote communities cut back on their use of diesel and other fossil fuels.

Cost of Geoenergy^{1,2}: \$\$\$\$

Geoenergy

Transforming heat and power in Northern and remote communities



What this technology can bring to your community

- Because most of the system is underground, the infrastructure can occupy less land than other renewables, like wind or ground-mounted solar PV.
- It delivers consistent, reliable energy that isn't dependent on the weather.
- If you have existing oil and gas infrastructure, like pre-drilled wells or detailed information about the geology (the types of rocks) under your community, you may be able to re-purpose it for a geothermal system.
- Geothermal energy projects offer new employment opportunities for skilled tradespeople in your community and region.
- Geothermal systems can offer opportunities for people who already work in the oil and gas industry because of the similar skills involved (such as drilling).

Key considerations when implementing this technology

- Deep underground drilling is expensive, so the upfront costs are higher than other renewables.
- Geothermal systems are big and difficult to scale up or down. They should be designed to meet both your current and future energy needs.
- The geology of your community plays a big part in whether a geothermal system is a good choice or not:
 - Sedimentary basins are easier to drill but may have less heat in the rocks.
 - Very hard rock in the Canadian Shield needs even deeper drilling, adding to the costs.
 - Areas of permafrost may not be stable enough to support geothermal systems.
- To find out if your area is a good fit for accessing thermal energy, detailed assessments (including sub-surface drilling) may be required.

The bottom line Geothermal systems may cost a lot upfront, but they can provide a reliable and locally accessible energy source that reduces fossil fuel consumption and creates opportunities for skilled tradespeople in your community.

Want to learn more?

For more information, please send us an email:
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¹ The levelized cost of electricity (LCOE) measures the lifetime costs of running an energy source divided by how much energy it produces over that span (typically in megawatt-hours).

² Estimated range of LCOE for geothermal in Canada (\$100–\$600/MWh) according to the Canadian Energy Regulator. (2022). Canada's Adoption of Renewable Power Sources – Energy Market Analysis. <https://www.cer-rec.gc.ca/en/data-analysis/energy-commodities/electricity/report/archive/2017-canadian-adoption-renewable-power/canadas-adoption-renewable-power-sources-energy-market-analysis-costs-trade-offs.html>. Additional costs may apply depending on location.



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