

A New Way to Heat Hinton

Canadian Geographic's March/April 2018 issue explores the research that is currently underway in Hinton, Alta., to access geothermal water via abandoned oil and gas wells. The work on the project is projected to begin by 2019, but funding and regulatory frameworks haven't yet to be put in place. With your students, use the infographic and the following questions to learn about this innovative project and the potential of geothermal heating and energy systems in Canada.



Check for understanding

1. What makes a geothermal energy and heating system a renewable source of power and heat?

2. How will the stakeholders in this project, as well as the city of Hinton, the University of Alberta's Future Energy Systems research group, and Epoch Energy, select which abandoned wells to use in their system?

3. What are the benefits of this geothermal energy project, both for the local community and for Canada's environmental footprint?



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Draw the System

Use the five steps listed in the “Brought to the Surface” section to design your own drawing of how the geothermal heating system works.



Extend your geographical thinking

What is where and why there? Geothermal energy is not a new phenomenon. After the Second World War, many countries around the world developed geothermal power plants to take advantage of this economically competitive and locally sourced energy. Locate 10 of the largest geothermal power plants in the world and map out these locations using Google Tour Builder. Include photos and a brief description of the benefits each power plant has for its community and country.

Why care? Should Canada invest in more geothermal heat or energy development projects? Consider how these projects will increase sustainability, influence other industries, impact the surrounding environment and affect the lives of Canadians. Participate in a class debate.

Resources

- [International Geothermal Association](#)
- [Introduction to Geothermal Energy Video](#)
- [Geothermal: How it Works Detailed Video](#)
- [World's Largest Geothermal Power Plants](#)

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Accessing geothermal water via abandoned oil and gas wells

By Sabrina Doyle

Transforming abandoned oil and gas wells in Alberta into the key components of a first-of-its-kind geothermal heating system in Canada might seem like an implausible transformation — but that's exactly what could happen in fewer than two years in Hinton. The town of about 10,000 just outside of Jasper National Park sits atop reservoirs of water that at 140 C and five kilometres below the surface are some of the hottest and deepest in the province. And although it's not uncommon in Canada to use ge-exchange systems (a type of ground-source heat pump) to heat and cool individual buildings, Hinton wants to tap into that thermal energy on a much wider scale by implementing a district geothermal heating system that uses heat recovered from disused oil and gas wells.

Funding isn't completely in place and regulatory frameworks have yet to be determined, but work could begin by 2019 on the system, which would heat public buildings — including the hospital, the RCMP station and two schools — in a town that largely relies on natural gas.

GEOHERMAL GEOGRAPHY Hinton's geography is the key to its geothermal potential. The layered rock formations of the Western Canadian Sedimentary Basin and the fractured rock of the Rocky Mountain Trench naturally trap the hot briny water. Ranging from 70 C to 175 C, the water in the aquifers beneath Hinton has some of the highest temperatures measured anywhere in the Alberta Basin, the deepest stretch of the Western Canadian Sedimentary Basin.

GEOHERMAL ENERGY A geothermal reservoir (1) is created when hot water or steam is trapped in cracks and pores under a layer of impermeable rock. In a power plant, the water or steam is transported to the surface to drive a turbine. Sometimes, however, the water or steam is used solely as a heat source.

REPURPOSED OIL AND GAS WELLS Hinton has partnered with the University of Alberta's Future Energy Systems research group and Epoch Energy, a geothermal-energy development company, to choose 14 abandoned wells, the majority of which are about 2,500 metres deep, as viable candidates for the system. The next stage of the study will more specifically weigh the pros and cons of each, such as its proximity to town, the existing infrastructure that surrounds it and its stability.

THE BENEFITS Resurrecting abandoned wells for geothermal use would reduce greenhouse gas emissions and help protect people from the costs associated with an unpredictable energy commodities market. The typical Canadian home uses about 120 gigajoules per year, but Hinton's system could provide between 60,000 and 100,000 gigajoules per year, enough to heat between 500 and 800 homes.

BROUGHT TO THE SURFACE Specific engineering details haven't been confirmed, but the preliminary network model would pipe hot water to select public buildings through a series of closed loops. The first loop would bring the naturally heated water through a production well (2) and into a heat exchange unit (3), where it would heat separate, inert water. That water would then circulate through the public buildings (4) in a second loop before it cools and is returned to the reservoir via an injection well (5) to start the process all over again.



Teachers! Bring this and other scientific innovations into your classroom by visiting cangeoeducation.ca/resources.