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GEOHERMAL TECHNOLOGY AT CHAMPLAIN COLLEGE

A case study on the geothermal heating and
cooling system installed on the campus of
Champlain College.
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CHAMPLAIN COLLEGE Environmental Policy: Class of 2015

In 2010 Champlain College broke ground on a project that would forever change the infrastructure on campus. A well had been drilled just outside one of the most recognizable buildings on campus, Perry Hall. The well reached down more than 300 feet, a depth where a natural water aquifer was present. This aquifer would soon be a part of a geothermal heating and cooling system that would take the place of standard heating and air conditioning units within Perry Hall.

The first phase was completed in 2010 and proved to be a huge success, the system drastically reduced the buildings environmental foot print. The success of the Perry Hall project also demonstrated to engineers that the same water aquifer that was tapped into for the geothermal system had the potential to heat and cool the majority of the buildings on campus. This discovery would forever change the campus master plan, moving forward, the college would incorporate geothermal technology to all new buildings on campus.

There are many reasons Champlain College decided to commit to a geothermal heating and cooling system. First, the college wanted to stay true to their sustainability principle, which reads *"We are seeking alternative practices and procedures to reduce our fossil fuel energy consumption and minimize negative impacts on the environment"* (Champlain College). To put it simply, Champlain College truly wants to do the right thing. In addition to the desire for greater sustainability, the college also saw the potential long term savings that comes with investing in geothermal technology. Based on the project's initial success, the college made the decision to expand the system as much as feasibly possible.

As of spring 2015, a total of five buildings on campus have been connected to the geothermal system. These buildings include Perry, Juniper, Valcour, Butler, and Whiting halls with a combined area of 125,000 square feet that needs to be heated in the winter as well as cooled in the summer. The geothermal system currently pumps 360 gallons of water up from the ground and through the system every minute. The system has proven to be very successful, achieving a 30% reduction in energy consumption, half of which being in reduced fossil fuel use.

Champlain College is always looking to expand the geothermal system. Wells are drilled, and piping is installed with future expansion of the system in mind. This policy makes it easy to connect a building to the system once it has been retrofitted. This strategy has proven to be very cost effective and, at the end of the day, Champlain College has managed to connect six buildings to the geothermal system, at a cost of a mere \$1.66 per square foot.

Champlain has big plans for their geothermal system. By September 2015, two more buildings will be added to the system, the new Center for Creative Media building (*including the existing Hauke & Alumni buildings*), and the existing Bader building. This expansion will almost double the floor space the system will heat and cool from 125,000 sq ft, to 213,000 sq ft. Summer 2015 will prove to be the biggest year yet for the geothermal system, as it doubles in size and expands on campus.

The five year plan for the geothermal system is very ambitious. By the year 2020 Champlain expects to have thirteen buildings, large and small, connected to the geothermal system. These buildings will bring the total square foot area to 272,900 sq. ft. When comparing this total to the campus gross square feet of

638,500, the geothermal system will be used to heat and cool 42.7% of campus buildings.

Champlain is looking to expand their geothermal system well after the year 2020. The college has many more existing buildings on campus that have the potential to be heated and cooled by the geothermal system. Even nearby homes could one day be connected to the colleges system, truly making Champlain College apart of the local community. The college has shown the potential to be a leader in renewable energy in the state of Vermont, and is showing no signs of scaling back.

Attached you will find a financial spread sheet that shows the current financial information for the six existing buildings on campus that have been connected to the geothermal system. Also, you will find sample pictures of the infrastructure that makes the geothermal system possible. These pictures are meant to show how inconspicuous the geothermal system is on campus.



Above is production well located behind Perry Hall. This well is responsible for providing the system with the majority of its water supply.

Below is a water-to-water heating unit. Units such as this one are used in buildings that have been retrofitted to be connected to the geothermal system. These units can heat fairly large room with ease.



Above is an industrial heat exchanger. These units are used in buildings that were built with the geothermal system in mind. This unit is responsible for providing the energy to heat an entire building.

Below is a picture of an injection well. Once water has flowed through the geothermal system, its pumped back into the ground using injection wells such as this one. Can you spot the injection well?



Injection wells are small and not easily visible.