

GOING UNDERGROUND

Carleton College is set to introduce geothermal wells underneath its soccer pitch as part of its environmental efforts.

Carleton College is on its way to a more environmentally-friendly campus for students and the future to come.

A small, liberal arts college in Northfield, MN, Carleton College is home to 2,014 undergraduate students every year.

Martha Larson, CEM, is the Manager of Campus Energy and Sustainability for Carleton College, and there she is spearheading the college's geothermal efforts.

Partnering with Jay Stadler, Grounds Manager for Carleton College and STMA (Sports Turf Managers Association) member, Larson and her team developed a plan to build geothermal well fields within Carleton's 1,000 acres.

GEOTHERMAL FIELDS

The project will include three different geothermal well fields, two of which will be vertical, while the third will be horizontal.

In a 10x10ft grid, the vertical wells will extend 520ft underground and will be 6-inches in diameter, while the horizontal field will have two different layers, positioned at 15ft and 30ft below the surface. Used as an alternative heating

and cooling system, the well fields use the constant temperature of the ground to absorb and reject heat.

"In the summer time, when we're rejecting waste heat, they transfer that heat into the ground. This is happening through a closed-loop water system with fully-grouted wells. In the winter time, we use that same water-loop to pull that heat out of the ground to supplement our heating needs," Larson explained.

The vertical well fields transfer more heat per square foot, making them more efficient. However, due to geological conditions, the team had to opt for the horizontal field to complete their project.

With colleges and universities becoming more common for geothermal projects, Larson believes that there are three different variables that make these markets ideal:

"They do long-term planning. Universities are going to be around for 100 or more years, so they can invest in something like this. They always have dedicated green spaces that will often remain dedicated green spaces. Universities are out ahead of carbon reduction efforts. They have taken this seriously."

THE PROCESS

As a member of the American College and University President's Climate Commitment, Carleton College produced a climate-action plan that targets a net-zero carbon footprint for the whole campus by the year 2050.

This helped guide the project team when deciding between keeping their 100-year-old steam-heating system, or committing to a hot water heating system tied to geothermal well fields.

Their current system is a district-energy system, meaning that all heat is created out of one building and distributed through tunnels and pipes to all other buildings on campus.

With many parts of their current system being 70 to 100 years old, Larson recalls the decision to forgo repairing it: *"When we compared the cost of repairing and replacing that system with the cost of installing a new hot water system, we found that the incremental difference in those two costs could be paid back in less than 20 years with the hot water system. This system - once all phases are implemented - would reduce our operating expenses by 30% every year, and our carbon emissions by over 30%. So, when we looked at everything; maintain the old versus*



ABOUT STMA

STMA is the not-for-profit, professional association for men and women who manage sports fields worldwide. Since 1981, the association and its 34 local chapters have been providing education, information and sharing practical knowledge in the art and science of sports field management. Its more than 2,600 members oversee sports fields and facilities at schools, colleges and universities, parks and recreational facilities, and professional sports stadiums.

replacing it, the replacement looked more attractive.”

After running multiple tests, the team could lock down the locations for the well fields. They will sit underneath athletic turf and recreational green spaces.

The horizontal well will be located underneath the varsity soccer pitch, while the vertical wells will be under two campus common green quad spaces.

The project was approved in February 2017, and will begin construction in June 2017. It will be a five-year process. Construction of the well fields will occur over the next two summers, to minimise disruption during the academic year.

A PARTNERSHIP

As the voice for the grounds and the athletic fields within the project, Jay Stadler came into the process at an early stage. Stadler assisted in solidifying the locations for the well fields, worked closely with the contractors who performed the test well procedures and developed specifications on the cleanup of waste water and storm water management.

“Jay (Stadler) has been very instrumental in looking at two things.

Number one being the schedule and phasing; how we work this in between our campus activities and our varsity sports schedule. Secondly, the restoration specifications; how are we going to restore the fields once we are done, how long will that take, what materials or contractors should be specified for that work. We really put a lot of trust in Jay,” Larson added.

The project will have short-term effects on how Stadler will approach field management differently, however, his biggest concern is managing compaction to avoid settling within the turf.

“It’s a lot harder to fix something the second time around. So, it’s important that we are involved in hiring the right contractors for the job to make sure they have the tools necessary to achieve the compaction we need,” Stadler said.

IMPACT & TAKE-AWAY

The basic premise of the project is that geothermal energy reduces Carleton’s overall energy use and moves the College from a primary source of natural gas to electricity, which is much easier to address with renewable energy. The geothermal energy will

enable Carleton to decrease their carbon emissions, all while making their leftover carbon emissions to be easier to attack with renewable energy solutions. This sets up their future generations with a system that is easier, more flexible and more fuel-diverse.

As the team gears up to break ground in June, Larson and Stadler both accredit their partnership as a vital aspect to the project thus far.

“We really collaborated well early on. If there were any surprises, we could work through the problem. The fact that I have been involved early on, I would complement the design team and Martha for allowing that to happen. Many times, the contractors show up and the grounds team is more of a support, but I feel that I am very much a part of this project. I think that is important,” Stadler said.

Their collaboration has also led to new plans regarding the sports turf irrigation and drainage systems. Due to having to dismantle parts of the soccer pitch, the team plans to reconstruct the systems in a way that is better than before. When all is finished, both parties win, according to Larson:

“If we work together, we get a better outcome for the both of us in the end.” ■

