

Lake Land College



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VISION Holistic Approach to Promote Self-Sustainability and to be a Leader in Environmental Stewardship

GOAL Reduce Energy Consumption, Strive Towards Carbon Neutrality, Replace 35-Year-Old Deteriorating Infrastructure Across Campus

PROJECT TYPE 17 Phase/14 Year \$70M Capital Life Cycle Infrastructure Master Plan

ACCUMULATIVE SAVINGS Over \$45M in Energy and O&M Costs and 400 Metric Tons of CO₂



“Lake Land College selected CTS as our long term business partner to help make our vision of self-sustainability and environmental stewardship a reality. Our goal was to reduce energy consumption, and to strive toward carbon neutrality while replacing a 35 year old deteriorating infrastructure across campus. We selected CTS based on their unique approach to a campus wide geothermal system, offerings in solar and wind energy, and creating educational opportunities for our students. We have already exceeded projected energy savings while making major renovations to support our education departments and curriculum. Without hesitation, I encourage anyone that is considering building renovations or strategic energy initiatives to consider the CTS Group.”

— Ray Rieck, Former Vice President of Business Services

Situation Overview/Customer Challenges/Project Goals:

Lake Land College is taking great strides to becoming the first sustainable college campus in Illinois. Wind, passive solar, photovoltaic, daylight harvesting, and geothermal systems are all playing a part to achieve a carbon neutral campus.

Past projects include renovations to the original, aging campus infrastructure. The deteriorating heating, ventilation and air conditioning (HVAC) infrastructure outlived its useful life of 25 to 30 years. To continue serving the Lake Land College district in an efficient but comfortable learning environment, the buildings have undergone extensive HVAC renovations. These systems were replaced in phases with an innovative geothermal design where the entire campus (9 buildings, 413,000 square feet) is served by a new campus-wide hybrid geothermal system. The college has installed a 12” geothermal diversification loop (1,450-ton capacity) around the outside of the campus building ring, allowing for load diversification and the flexibility to locate future well fields where needed. Lake Land College is one of the first postsecondary institutions in the U.S. to use such a large-scale hybrid geothermal system.

Domestic hot water needs across campus are served by the Geothermal system and/or solar thermal panels to be located on the roof of the campus buildings.

Other energy management efforts include energy saving lighting initiatives, a computer-based building control system utilized to control building temperatures, low flow faucets and toilets, vending machine controls, and daylight harvesting through new innovative skylights. These are just a few of the ways Lake Land College is stepping up its sustainability efforts to become a more environmentally friendly institution.

The College’s ultimate goal is to be totally self-sustaining campus through wind and solar generation. In addition to generating electricity, the new piece of cutting-edge environmental technology will provide faculty and students at the College with an opportunity to do research on this important alternative energy supply.

“We are very excited about this opportunity to demonstrate the use of this important alternative energy source right here on campus,” said Technology Division Chair, Tim VanDyke. “It will give our students and faculty a unique chance to work with and evaluate the significance of renewable energy on a first-hand basis.”

Project Scope/Highlights:

Original projections and results of completed phases of this \$70 million renewable, infrastructure master plan:



The Field House was completed in the first phase back 2008. Prior to geothermal, the building was never air conditioned. Even with air conditioning, the building's utilities have dropped 44%, operating at 1.4 watts per square foot.

The solar thermal system installed at the field house heats the entire domestic hot water load. Over the first 18 months of operation, the supplemental natural gas boilers operated less than five hours.



The second phase was completed in the summer of 2009. The Northwest Building is tracking at 3 watts / square foot – more than 2/3 less than a typical building that operates at 9 to 12 watts per square foot.

Based on its past usage, the College expects to avoid or offset 14,500,000 BTUs of electricity and natural gas a year. To put this in perspective, this represents nearly 6 million pounds of carbon dioxide per year. That's equivalent to planting more than 402,900 trees or removing 422 cars from the road. To generate clean energy the college has installed multiple photovoltaic arrays.



This approach uses the sun to generate electricity instead of fossil fuels that emit CO₂ into the atmosphere. The college is striving to become carbon neutral. There are days in the “shoulder months” that the 3 larger solar arrays’ energy production will exceed actual building loads on sunny days.

Project Highlights

- 2008 Campus Condenser Loop Installation and First Well Field
Initial Vo-Tech Renovations
Field House Renovations
(Included Solar Thermal for domestic hot water, providing 99% of the hot water demand in the building.)
- 2009 Northwest Building Renovations (daylight harvesting)
- 2010 Learning Resource Center Renovations
- 2011 Installation Class 2 Wind Turbines
Second Geothermal Well Field tied to Condenser Loop
- 2012 Webb Hall Renovations
- 2013 Northeast Building, Neal Hall, & Student Center Renovations
- 2014 Third Geothermal Well Field and two Photovoltaic Solar Arrays
- 2015 Original West Building HVAC Renovations
- 2016 Vo-Tech Phase II Renovations
- 2017 West Building Addition HVAC Renovations
- 2018 Construction of New Board Administration Center, renovations to Luther Student Center, and Construction Management services to oversee 18,000 building addition to the Student Center
- 2019 Construction of Maintenance Facility, the addition of 4th geothermal well field and integration with campus diversification loop.
- 2020 Construction of the new Foundation Alumni Center (6,000 SF) and the new Workforce and Technology Building (17,000 SF). Installation of 4 new solar arrays leveraging Illinois SRECs and IGEN grants to fund a combined 475 KW solar array system.

Project Size:

Multiple phases representing over \$70,000,000 in infrastructure improvements, energy conservation, and new construction.

Project Type:

Comprehensive Energy Project & Follow-on Services. Most recently worked with JMS to develop, engineer, procure, & in the process of constructing four (4) new Solar Arrays (Combined 475 KW).

Year Completed:

On-Going Master Plan to continue to play an integral role in campus renovations and expansions. Current renovations in 2020 include installation of the four new solar arrays in June 2020, new construction of the Foundation & Alumni Center – completed in August 2020, and new construction of the Workforce & Technology Building in December 2020.

Length of Implementation:

Typically building renovations have been completed over the summer, 82 days between spring and fall semester classes.

Number of Prior Completed Projects / Length of Customer Relationship:

We have worked with Lake Land College for the last 12 years and have completed nearly two dozen major renovations.

Energy/Operational Savings:

In excess of \$45,000,000 (energy and maintenance)

Project Financing:

Self-Funded through Local Bond Issuances

Building Lifecycle Attachment:

As Program Manager, CTS provides a single source responsibility for the Lifecycle Program Management of the infrastructure improvements & new construction to the College facilities. Driving design development, we have provided energy modeling simulations that help balance up-front capital costs with the ongoing operational expenses created by the various equipment and control options. We have guaranteed construction budgets and operation outcomes including temperature, relative humidity, and energy usage.

Sustainable Design concepts have been introduced to provide optimal environments and economical performance. Where cost-effective, CTS has promoted sustainable concepts. This includes:

- renewable energy sources
- commissioning
- operations & maintenance practices
- regional construction materials
- renewable materials
- Daylighting/views
- IAQ management

Building Lifecycle Pull-Through (stages completed after initial project)

The initial Pilot Phase of Performance Contracting represented \$4.7M. CTS has subsequently worked with the College to implement and manage \$65M of additional renovations and construction on campus.