



CHP
TECHNICAL ASSISTANCE
PARTNERSHIPS

Colorado College Tutt Library

245 kW CHP-based Microgrid System

CHP Microgrid Helping Library be Net Zero



Tutt Library at Colorado College

Quick Facts

LOCATION: Colorado Springs, CO

MARKET SECTOR: Higher Education

FACILITY SIZE: 94,317 ft²

Microgrid Capacity: 245 kW

EQUIPMENT: 2 Capstone C65 Turbines; 115 kW rooftop solar array

FUEL: Natural Gas and solar

CHP TOTAL EFFICIENCY: ~86%

ENVIRONMENTAL BENEFITS: The renovated building offsets over 1500 metric tons of CO₂ annually.

TOTAL PROJECT COST: \$ 45 million

YEARLY ENERGY SAVINGS: \$83,000/year

PAYBACK: 15.6 years for total system

CHP IN OPERATION SINCE: 2017

Site Description

Colorado College in Colorado Springs, CO has built what is expected to be the first net-zero academic research library in the United States. The major renovation, including a data visualization lab, space for new and emerging technology and a geospatial information system laboratory, was driven by a need to meet the significant technological and digital evolution. Further, the renovation will help the library to better accommodate the college's new block schedule which has resulted in the bulk of students on campus utilizing the resources of the library at the end of each block.

The recently completed \$45 million dollar renovation, with \$1.2 million for the energy systems installed, added 25,000 square feet and provide a new look and improved functionality for the 1962 era building. A key component of this upgrade was the addition of a CHP-based microgrid. The microgrid includes CHP and an on-site solar power system. Even with the significant addition of \$28,000 square feet and significant increase in plug load, the energy saving measures and the microgrid CHP system will allow the library to save \$83,000 per year in utility bills.

Reasons for CHP

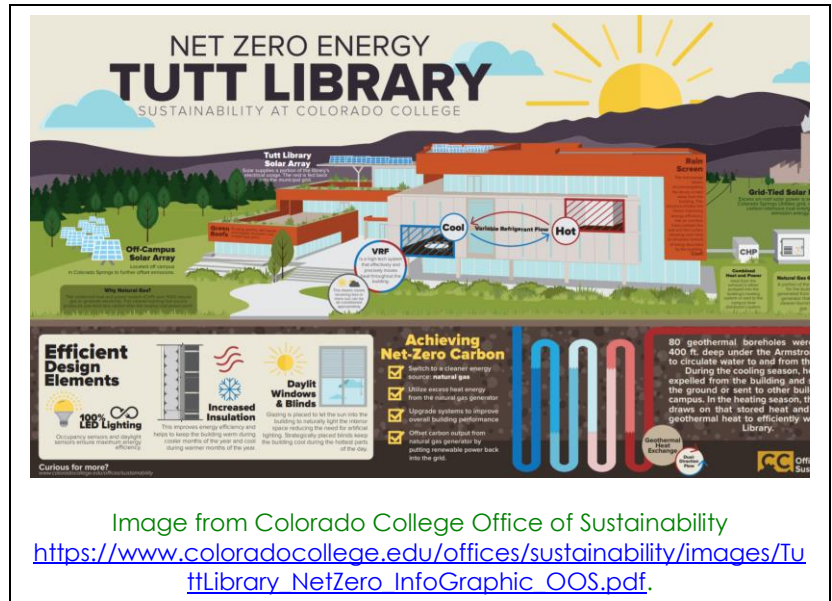
A key motivator for the CHP microgrid system was to ensure the resilience of the library, lower operating costs and reduce the college's overall carbon footprint. When the facility was first designed in 1962, energy consumption was not a significant concern. However, with increasing energy costs there was a growing impetus to improve efficiency of this building and other buildings across the campus.

CHP Equipment & Operation

A geothermal energy field on Armstrong Quad, a 115-kilowatt rooftop solar array and a 130-kilowatt combined heat and power system are all part of the renovation. The library gets additional power from a 400-kilowatt offsite solar array. This system has improved operational effectiveness and reduces the risk of service interruptions.

The CHP system consists of 2 natural gas-fired microturbines (model – Capstone C65) operating in parallel with the grid. Should power to the building be lost, the turbines will maintain critical infrastructure.

Electrical metering modulates the building's automation system to match demand while connected to the grid.



National Industry Recognition

The National Association of College and University Business Officers (NACUBO) acknowledges individual and institutional excellence and achievement with their annual awards program. In 2017, Colorado College's Tutt Library received NACUBO's Innovation Award, recognizing the Carbon-Neutral Net-Zero Energy Library.

Lessons To Share

"This project put into motion years of planning and actions intended to reduce Colorado College's carbon footprint, and it has redefined our approach to achieving high-performance buildings by emphasizing collaboration and communication at all levels."

***- Mark Ferguson
Campus Operations & Plant Manager***

The campus learned from previous design approaches and recognized that to design a high performance sustainable building within project budget, you must begin to integrate sustainability factors at the programming phase of design. The college took a proactive approach of setting net zero for the library and provided performance specifications to the design team. The team was also very focused on considering hourly weather data, space utilization and historical data to properly model the energy and carbon performance of the building. This approach saved significant time and money during the construction process and will result in long-term high performance.

For More Information

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More CHP Project Profiles:
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