



**MIDWEST  
CHP  
APPLICATION  
CENTER**

In Partnership with  
the US DOE

# Albert Lea Wastewater Treatment Facility

## 120 kW CHP Application

### Project Profile

combined heat & power in wastewater treatment plants

### Quick Facts

**Location:**  
Albert Lea, Minnesota

**Fuel Type:**  
Digester (Methane) Gas

**Prime Movers:**  
(4) 30 kW Capstone Microturbines

**Annual Energy Savings:**  
\$40,000 - \$60,000

**Implementation Cost**  
\$250,000

**Project Co-Funding:**  
\$85,000 - MN Dept. of Commerce  
\$89,000 - Alliant Energy  
\$76,000 - City of Albert Lea, MN

**Simple Payback:**  
Less than 2 years - City of Albert Lea  
4-6 years - Total Project

**Year Installed:**  
2003 by Unison Solutions

### Reason for CHP

In 2002, Alliant Energy, a leading power distributor in the Midwest, partnered with customers that could benefit from renewable energy as part of a state Conservation Improvement Program, co-sponsored by the Minnesota Department of Commerce. Wastewater treatment centers are ideal facilities for microturbine CHP applications due to the availability of digester gas created from the waste effluent. An alternative option to flaring digester gas is utilizing it as a fuel in a boiler; however the low Btu gas can be put to a much more efficient and profitable use in a CHP system. The fuel flexibility of a microturbine based CHP system allows the digester gas to be utilized to generate a portion of the facility's electric requirements, with the recycled heat from the microturbine used to satisfy a portion of the facility's heating requirements. The Albert Lea Wastewater Treatment Facility was determined to be a prime candidate for a microturbine installation, and today, because of the partnership arrangement between the Municipality, the local electric utility and the State Energy Office, the CHP system is saving energy and reducing air pollution.

### Project Overview

In the summer of 2003, the Municipal of Albert Lea Minnesota installed a 120 kW CHP system at their wastewater treatment facility. The system integrates four Capstone C-30 microturbines and utilizes the recovered heat from the turbines to both maintain the proper operating temperature of the anaerobic digester and provide a portion of the facility's space heating requirements. The microturbines operate on methane gas created in an anaerobic digester. The anaerobic digester is utilized to treat the wastewater effluent in order to control odors and render the effluent inert.



*Albert Lea Wastewater Treatment Center  
Albert Lea, Minnesota*

### Key accomplishments of this project include:

- Successful integration of a CHP system utilizing a renewable resource fuel
- Successful partnership arrangement between municipal, utility, and state entities.
- Energy and cost savings for the municipal with reduced air emissions for local citizens

## CHP System Benefits

### Energy Savings:

800,000 kWh/yr of 3,600,000 kWh/yr (25%)

### Opportunity to Use Waste Fuel:

Methane produced in an anaerobic digester

### Heat Recovery Options:

28 Million Btus of heat recovery per day utilized for:

- anaerobic digester temperature control
- meeting a portion of the buildings space heating requirements

### Electrical Reliability:

120 kW of backup power to operate critical systems during a utility power outage

### Low Maintenance:

Does not need constant attention, only routine cleaning of air and fuel filters.

### Environmentally Friendly:

These microturbines use digester gas that would have otherwise been flared and emitted to the atmosphere. Microturbines themselves are also lower in emissions compared to other prime movers of comparable size.

### Clean Quiet Operation:

Operate with very little vibration or noise.

### Clean Quiet Operation:

Unison Solutions of Dubuque, IA maintains the system under a 5 year agreement



*30 kW Capstone Microturbine  
at the Albert Lea Wastewater  
Treatment Facility*

"It gives us the ability to use the methane gas already generated at the plant. We are able to take a waste product and use it for something beneficial."

Steve Jahnke –  
Albert Lea's Manager

"We are impressed with the effectiveness of the technology, and hope to encourage other Minnesota cities to consider capturing methane biogas to not only protect Minnesota's environment, but to save energy."

"The possibilities of the turbines don't end with energy production; they could also bring new businesses; and businesses are looking for cities that have vision."

Lois Mack –  
Conservation Improvement  
Program Manager,  
Minnesota Department of  
Commerce

## Additional Notes

### Project Funding

With a total installed project cost of \$250,000 for the 120 kW CHP system and projected annual energy savings from \$40,000 to \$60,000, the CHP project was to experience a simple payback of approximately 4 to 6 years. Thanks in part to project cosponsoring from the Minnesota Department of Commerce's Conservation Improvement Program (\$85,000) and the methane gas compressor provided by the local utility, Alliant Energy (\$89,000), the City of Albert Lea was only required to put forth \$76,000, thus experiencing a projected simple payback of less than two years.

### Governor's MnGREAT Award

In 2004, the City of Albert Lea received the Minnesota Government Reaching Environment Achievements Together (MnGREAT) Award for the CHP installation fueled by methane gas from the wastewater treatment process. The Governor's MnGREAT Award program recognizes environmental achievements by government employees focusing on the prevention of waste and pollution, the reduction of waste at its source, conservation of energy and water, recycling, and composting.

### Conservation Improvement Program

Since 1992 Minnesota public electric and gas utilities have been required to spend about 1.5% of their annual revenue on energy conservation improvement programs. Minnesota's Conservation Improvement Program (CIP) includes special programs for homeowners and renters, commercial businesses, manufacturing enterprises, and other industrial customers. CIP provides rebates, grants, energy audits, and education that focus on energy-saving improvements and technologies. Minnesota customers pay for these programs through their electric or gas bills.

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