



Technical Education and Analysis for Community Hauling and Anaerobic Digesters **TEACH AD** *Project Profile*

Urbana and Champaign Sanitary District (UCSD)

GREEN BEFORE IT WAS COOL

UCSD's Northeast Plant is marked by innovation from its origin. UCSD embraced anaerobic digestion (AD) technology in the 1960s to capture and make good use of the gas by-product from UCSD's anaerobic digesters. It was a "no-brainer" to utilize the free gas instead of paying for electricity to run the aeration blowers. The waste heat was also recovered reducing the natural gas purchases for heating the digesters themselves. UCSD has continued to innovate over the years. Today, they are looking ahead to maximize their AD biogas production by accepting more food waste. Reducing food waste in landfills is a national issue, so UCSD is again leading Green.

COMMUNITY

Like other sanitary districts distant from major metropolitan centers, UCSD provides service for a diversity of clients that would otherwise have to do their own waste processing or haul it 30 miles away to the next mid-sized city.

RECEIVING STATION

An 18,000-gallon receiving station with a mechanical mixer blends the feedstocks, which are trucked in daily. The blending improves the feedstock quality and controls the feed rate to the digesters.



Delivery to Feedstock Receiving/Mixing Station

HIGHLIGHTS

LOCATION: Urbana, Illinois

SECTOR: Wastewater

FEEDSTOCK: primary and waste activated sludges, restaurant grease waste, Kraft-Heinz processing plant food waste, University food waste and septic tank waste.

REVENUE STREAM: Receive tipping fee for trucked in feedstock. Sale of REC's from electrical production

DIGESTER TYPE: Four Wet, Anaerobic Digesters loaded average 20,600 lbs. VS/day

BIOGAS YELD: average 226,700 ft³/day

CHP: Three, 214 kW generators; run total average 315 kW

ELECTRICITY APPLICATION: 2 million kWh/year provides 33% of all total electric demand

THERMAL APPLICATION: provides 50% of total thermal demand of the facility, including 98% of the digester heat

CHP IMPLEMENTATION COST: \$1.5 Million - Grant Funding: \$500,000 from Department of Commerce and Community Affairs (DCCA)



One of four anaerobic digesters, aerial view

CHP IS NEXT ADVANCE

UCSD decided to use the digester gas to generate electricity that could be used at the plant instead of purchasing it from the utility, and using the generation heat to optimize the anaerobic digestion process by maintaining a steady 100 F temperature.

TEN-YEAR ANALYSIS OF CHP

"The CHP equipment that came online in 2006 has been effective in giving UCSD the most flexible value from the digester-produced gas. The CHP system reduced the facility's electric costs by 33% and the natural gas costs by 50%. In addition, the generators have been a very useful hedge against higher energy costs. In our latest utility contract our electric rates have increased by 30%, so the generators provide more value as energy rates increase. Finally, the CHP generators incentivize us to pursue accepting more food waste, further extending the lifespan of the community landfill while generating more biogas which will generate more electricity and more savings for us." - Rick Manner, Executive Director

UNIQUE ASPECTS

- ✓ Innovative from inception and continues to generate renewable energy and provide community services
- ✓ The third CHP unit provides resiliency, and allows continued operation during scheduled maintenance downtime

COMMUNITY BENEFITS

- ✓ Extending the community landfill's lifespan by reducing food waste
- ✓ Fostering environmental sustainability through accepting grease waste from restaurants
- ✓ Partnering with University to educate students by accepting Grind2Energy food waste from 4 residential dining halls
- ✓ Providing sanitary waste processing service to 155,000 citizens in the Champaign-Urbana area
- ✓ Providing service to support and retain KRAFT manufacturing, which employs 1,000 people



One of three 214 kW CHP generation units

LESSONS LEARNED

- ✓ The economic analysis of payback for the CHP unit capital costs was based on assuming an average avoided cost of energy of 7 cents/kwh (which was obtained by dividing \$ and kwh from an average bill. This level of savings did not result due to fixed and demand charges. This reality increased the actual payback time from 6 to 11 years.
- ✓ The receiving/blending tank is an asset that enhances the entire operation
- ✓ The sludge-holding tank upstream of the centrifuges allows struvite to form and settle out. This serves as a collection and removal point for struvite, which is generated during anaerobic digestion

"Anaerobic digestion is succeeding in turning waste food into the gold of renewable energy."

Rick Manner, Executive Director

FOR MORE INFORMATION

Marcello Pibiri

Energy Resources Center-University of Illinois Chicago (UIC)
1309 South Halsted Street (MC 156) Chicago, Illinois 60607
Tel: (312) 355-3823
Email: mpibir2@uic.edu
TEACH AD Website: erc.uic.edu/bioenergy/teachad

Urbana & Champaign Sanitary District Northeast Treatment Plant
1100 East University Avenue, Urbana, Illinois 61802
Tel: (217) 367-3409
Email: engineering@u-csd.com