

# Dubuque Resource Recovery Facility Keeps It Sustainable

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**An Iowa city's \$38 million facility renovation includes combined heat and power, biosolids reuse, effluent heat recovery, water-saving landscaping, and more.**

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When leaders in the Iowa city of Dubuque began seeking proposals for a wastewater treatment plant upgrade, they made one thing clear.

"The RFP clearly stated that the facility must meet the city's sustainability principles," says Jonathan Brown, plant manager of what is now called the Dubuque Water & Resource Recovery Center. Those 12 principles, adopted in 2006, guided the planning for a 38-month, \$68 million renovation.

The project added biogas recovery and improved biosolids handling by converting from fluidized bed incineration to temperature-phase anaerobic digestion. UV disinfection (OZONIA) replaced chlorine. Work on the 1970s-era, 10 mgd plant was completed in May 2014 using plans developed by Strand Engineers and IIW Engineers.

## Combined heat and power

The switch to anaerobic digestion enabled the facility to harness biogas for digester heating and electricity generation. The combined heat and power system is from Unison Solutions, headquartered in Dubuque and local dealer for the three 200 kW Capstone microturbines. The draft tube mixers and digester covers were supplied by Ovivo, and the sludge heat exchangers came from CleanTek Water Solutions/Lackeby Products.

"We have good digesters that produce almost 70 percent methane in our biogas, which is higher than normal," says Brown. There is room for two more turbines in the modular CHP system, which already generates about 80 percent of the plant's needs — some 530 kW of the 650 kW demand on

a typical day. That saves about \$250,000 a year in the plant's \$3.5 million annual budget and provides long-term cost stability.

The plant added a septage receiving station and is looking at other options to increase biogas production. Two nearby biodiesel plants already deliver high-strength waste, and Brown is negotiating with a food processing plant and a firm that manufactures gelatins. "We'd get a little revenue and produce extra methane, and they would save money on trucking costs," he says.

Also under consideration is a food scrap program to help keep that material out of landfills, where the methane it creates gets into the atmosphere. "We've done some preliminary investigation," says Brown. "We're also looking at using methane for biofuel production because the city is considering converting some of the vehicle fleet to biofuel. We already have about 85 percent of the infrastructure needed at the plant."

### **Reuse of biosolids**

Biosolids that used to be incinerated — just over 5 tons per day of Class A material — are now used to fertilize corn and soybean fields. Distribution is contracted to Nutri-Ject Systems. "I didn't want to get into the biosolid-hauling business," says Brown. "Having a good company that knows how to talk to the neighbors and keep them informed so they're not overly concerned goes a long way toward making things simple.

"Farmers in Iowa have been using biosolids for generations. They understand the value. There are places in Iowa getting 10 to 15 percent increase in yield, and the soil is better at withstanding drought. For where we are, a smaller city in a heavy agricultural state, it was the most environmentally sound in the long run."

### **Keeping it green**

The plant recovers more than biogas and biosolids: An ENERGY STAR administration and laboratory building includes an effluent heat recovery system for heating and cooling. The effluent, at 50 and 64 degrees F, feeds 17 water source heat pumps (McQuay).

"This was just an addition to the plumbing system," notes Brown, who is president of the Iowa Water Environment Association. "We had process water pumps throughout the plant for seal water, the accumulators, centrifuge cleaning, rotary drum thickeners, and washing the grit and screening systems." It did require the addition of a filtering unit.

Other work across the plant included a new SCADA system, a new primary clarifier, grit removal equipment and odor control covers for the four primary clarifiers. Landscape features added for sustainability and cost savings include a pair of 2,000-square-foot rain gardens, native plants and flowers, and no-mow grass that needs little, if any, watering.

It was a big change for Brown, who has been plant manager for 10 years after starting his career there as a lab technician on graduation from college in 1972. "I've seen what has been accomplished and see the work that needs to be done," he says. "I'm not sure that if you're 25 years old you can understand how dirty this world used to be. It's pretty remarkable how things have changed."

### **More than a name change**

The Dubuque Water & Resource Recovery Center used to be called the Water Pollution Control Plant. As part of its rebuilding, the name was changed to reflect its new focus on sustainability.

Jonathan Brown, plant manager, uses a Latin phrase to explain the name change: "Aqua est vita. Water is life. Resources are those other things we need for life. Recovery is bringing those resources back for our use. Center, the place where it all happens."

The plant's role in the community goes beyond protecting public health and the environment. "As long as we're doing that, let's see if we can extract some more good out of it," Brown says. "We're taking material that other people want to get rid of and making something useful out of it. And we're taking dirty water that people have thrown away and making nice clean water that we can safely return to the environment."

The city's 12 sustainability principles fall under three categories:

- Economic prosperity: Community design, smart energy use, resource management, regional economy
- Environmental and ecological integrity: Clean water, healthy air, native plants and animals, reasonable mobility
- Social and cultural vibrancy: Community knowledge, green buildings, healthy local foods, community health and safety