

# CAPTURING STEAM AT METRO PLANT FACTS



## Focusing on energy efficiency

Energy conservation and efficiency is major goal of Metropolitan Council Environmental Services (MCES), a division of the Metropolitan Council and the operator of the seven regional wastewater treatment plants. As part of MCES' goal, the General Manager set a target of reducing annual "purchased energy" 25 percent by 2015 (compared to base year 2006). To move toward that goal, staff worked to increase the use of steam generated from the wastewater treatment process.

The Metropolitan (Metro) Plant in St. Paul uses fluidized bed reactors, or incinerators, to burn the biosolids removed from the treated water. Waste heat boilers take the heat created during the incineration process and generate steam. These boilers can produce up to 93,000 pounds per hour of steam. This steam is a valuable source of heat and electricity. Harnessing it helps save money and natural resources.

## Heating the plant

Being the largest treatment plant in the system, it takes a lot of energy to heat the Metro Plant. In 2011, the plant used approximately 3,940,000 therms to heat the facilities. That's enough energy to heat nearly 3,345 homes for one year in Minnesota.

The priority for the steam being created during the solids incineration process is to supply the plant heating and processing needs. In order to accomplish this, the steam pressure must be reduced in order to distribute throughout the plant. Utilizing the steam reduces the need to use auxiliary boilers which burn natural gas to create heat for the plant.



Photo caption: The new 830 kilowatt (kW) turbine generator at the Metro Plant stands in a climate-controlled room. This turbine generator helps offset heating costs, making the facility more energy efficient.

## Generating electricity

### Recovering energy from steam heat

While the use of steam for heat is an efficient utilization of resources, there is some energy lost when reducing the pressure in the system. In the spring of 2011, MCES began construction and installation of a \$1.88 million dollar 830 kilowatt (kW) turbine generator at the Metro Plant. This turbine generator reduces the pressure of the steam coming off the waste heat boilers and captures the energy of the steam to produce electricity to be used elsewhere at the facility. The cost of the project was offset by grants from the Minnesota Department of Commerce, Division of Energy Resources and the Public Facilities Authority, as well as rebates from Xcel Energy's Conservation Improvement Program.

### Utilizing steam when not needed for heating

With decreased need for heat in warm weather, more steam is available to create electricity. The Metro Plant is equipped with a 4.7 megawatt (MW) turbine generator to create electricity from large quantities of steam. The electricity from this turbine generator is used at the plant.

Outside temperatures aren't the only factor in deciding if the steam is used for heat or electricity. Staff also closely monitors natural gas prices to determine the best and

most efficient use for the steam. Depending on the cost of natural gas, it may be more cost-efficient to use the steam for electricity generation and run auxiliary boilers to heat the plant. This close, ongoing monitoring of conditions translates into maximum cost savings.

## **Saving money**

With a focus on energy conservation in the wastewater treatment process, MCES is able to provide a cost-effective service to the ratepayers of the metro area. By installing the 830 kW turbine to create electricity from the steam pressure reduction, MCES will save up to \$200,000 a year on electric costs. This is on top of the approximately \$1 million saved each year from the use of electricity generated from the larger 4.7 MW turbine.

## **The biggest in the system**

The Metro Plant is the largest of the seven wastewater treatment plants owned by the Metropolitan Council. When it first opened in 1938, it was the first plant in a metropolitan area on the Mississippi River. Today it is among the nation's largest treatment plants.

The Metro Plant serves 65 communities and 1.8 million people in the Twin Cities region. It treats an average of 185 million gallons of wastewater each day.

## **For more information**

To learn more about MCES' energy conservation work:

Visit [www.metrocouncil.org/environment/energy/subindex.htm](http://www.metrocouncil.org/environment/energy/subindex.htm)  
Or call 651-602-1005

See related fact sheets:

[Environmental Services](#), [Environmental Service Awards](#)

*By installing the 830 kW turbine MCES will save up to \$200,000 a year on electric costs.*

