Appendix I.

Olmsted County Waste-To-Energy Facility (OWEF)
Olmsted County has an integrated system, which includes a Joint Powers Agreement with Dodge County for use of the waste-to-energy facility until 2028. Olmsted has privatized recycling and compost operations in the County. The County operates both the Olmsted County Household Hazardous Waste and waste-to-energy facilities.

The facility is a mass burn, municipal waste combustion facility that started operation in 1987. The two burner facility construction cost was approximately $22 million. Olmsted County added a third unit into operation at the facility in 2011. The OWEF now consists of two 100 ton-per-day and one 200 ton-per-day (TPD) MSW incinerator-boiler units that are mass-burn, water-cooled wall design; three steam turbine-generators; municipal solid waste receiving area; ash handling systems; air pollution control equipment; necessary auxiliary installations; the medium-voltage work necessary to connect with the utility grid; and a natural gas fired backup boiler. The two 100 ton-per-day Riley/Takuma incinerator-boiler units commissioned in 1987 are rated at 46.5 million BTUs* per hour which corresponds to 100 TPD at 5500 BTU/lb. Unit 3 is a 200 ton-per-day Austrian Energy and Environment Von Roll (AEEVR) AEEVR/Duro Dakovic incinerator-boiler unit and was commissioned in 2010 and is rated at 93.5 million BTUs* per hour which corresponds to 200 TPD at 5610 BTU/lb. The facility construction cost was approximately $96.5 million.

The facility operates a potable water system using groundwater and a sewer system that serves the Campus, the Department of Natural Resources (DNR), and the Federal Medical Center (FMC).

A steam absorber chiller is installed in the old power plant. An 800 kW emergency diesel generator is installed in the old power plant.

The third unit also impacts emission limits under the proposed federal Emission Guidelines (EG). The EG separates small Municipal Waste Combustors (MWCs) into three categories. The facility was defined as Class C for units at plants where the aggregate capacity is less than 250 tons per day. Since a third unit has been added, the two existing units will be redefined as Class A or small MWCs located at facilities with an aggregate capacity greater than 250 tons per day. The new unit will be a Class I Unit. Emission limits will be more stringent for all regulated pollutants, especially with regard to the Class I Unit.

In 2003, a major upgrade to the air pollution control system was undertaken, with a cost of about $11,000,000. Electrostatic precipitators were replaced by dry scrubbers and fabric filters to better control particulate emissions and a carbon injection system for mercury reduction was added. Under federal and state laws WTE plants must control for and monitor various acid gases (sulfur dioxide and

hydrogen chloride), nitrogen oxides, furans, dioxins, heavy metals and particulate emissions which result from combustion. This is accomplished by: 1) monitoring what is placed into the combustors (i.e. keeping mercury laden thermometers and batteries out of the waste stream; 2) controlling the combustion process itself with temperature control and air flow; 3) cleaning the flue gases as they are emitted at the back end. A new continuous emissions monitoring system was also installed at that time, bringing the plant into full compliance with the U.S. EPA Best Available Control Technology (BACT) air emissions regulations for small municipal waste combustors (equal to or below 250 tpd).

The Air Pollution Control (APC) system assures compliance with current and future air pollution control limits. The APC system is composed of distinct subsystems providing lime slurry injection, powder activated carbon injection, ammonia injection, fabric filtration, and continuous emissions monitoring to control well below compliance requirements. The lime slurry injection neutralizes acid gases present in the flue gas, (primarily hydrogen chloride and sulfur dioxide) while reducing flue gas temperature to a level that promotes effective control of mercury and condensable pollutants such as dioxin.

The powdered activated carbon system removes condensable pollutants, primarily heavy metals including mercury & lead. The fabric filter collects dust composed of fly ash, scrubber residue, and powder activated carbon. The fabric filter also enhances acid gas neutralization reactions. Emissions from this system are cleaner than any conventional fuel with the exception of natural gas.

A Continuous Emissions Monitoring (CEM) system utilizes the latest measuring technology to constantly monitor carbon monoxide, oxygen, sulfur dioxide, opacity, unit load, flue gas temperature, and carbon addition rate.

Regulatory Compliance

The Olmsted Waste to Energy Facility has had only one regulatory compliance infraction in its history. The Olmsted WTE received a Notice of Violation related to sulfur dioxide emissions in 1989. Since that time, the Olmsted WTE facility has only had minor issues with the MPCA related to short increases in carbon monoxide, the SO_2 Non-Attainment Status of the Rochester area, and continuous emission monitoring downtime. The high availability and superior operating performance of the OWEF is an indication of the excellent environmental performance that has been realized by the management and staff of the plant.

Operations:

When entering the OWEF, commercial haulers stop at the scale house to have their trucks and garbage weighed. When leaving, the trucks are again weighed to calculate the weight of garbage deposited and the cost for disposal.

The pit dimensions are 79 feet inside height (25 feet deep and 54 feet above ground elevation) by 50 feet wide by 100 feet long. The pit capacity is 2,000 tons

of refuse. Approximately 90% of the MSW generated in Olmsted and Dodge Counties is delivered to this pit.

Approved refuse trucks enter through the west door, back up to one of five bays, and tip loads into the storage pit. The trucks exit through the east door.

From their perch 30 feet above the tipping floor, operators guide the movement of the bridge crane and grapple from a central control room equipped to monitor and operate the facility. More than two thousand remote devices allow the operators to monitor and control equipment and systems throughout the OWEF.

100 feet above the tipping floor elevation, two huge grapples are suspended from 7-1/2 -ton bridge cranes. The cranes travel from one end of the pit to the other as the grapple descends to take bites of the stored refuse. The grapple "fluffs" the refuse to create a homogenous mix so that it will burn more consistently. The grapple's tines measure 12 feet across when open and can grasp more than 3 cubic yards of refuse weighing up to 7 tons. Non-combustible materials are placed in a bypass container for later transport to the landfill.

The feed hopper and feed chute direct MSW into the combustion chamber. Level transmitters monitor the level in the chute and provide the operator a gauge to determine when another load is needed. There are three chutes, one for each furnace. If all three units are online, the operator feeds a load about every 10 minutes.

The refuse moves through the combustion chamber, on a series of reciprocating grate stokers. There are three zones to provide efficient burning. The first zone, dries and ignites the waste, the second is where most of the combustion occurs and the third zone assures that the refuse is completely burned before the "bottom ash" is moved to the ash removal system below the furnace. Approximately 4 tons of refuse can be fed into each of the smaller units each hour (or 100 tons per day per unit) and approximately 8 tons per hour can be fed into the 200-ton per day unit.

With computer-controlled combustion, and a temperature of 1,600 degrees F., the process is efficient. Conditions in the furnaces are continually monitored. Steam pressure is stable and flow is a factor of demand. Combustion efficiency remains at a maximum, controlling pollutants such as carbon monoxide, acid gases, heavy metals, dioxins and particulate matter well below regulatory limits. A continuous emissions monitoring system constantly measures stack gas composition ensuring that the process runs properly, and that all permit conditions are in compliance.

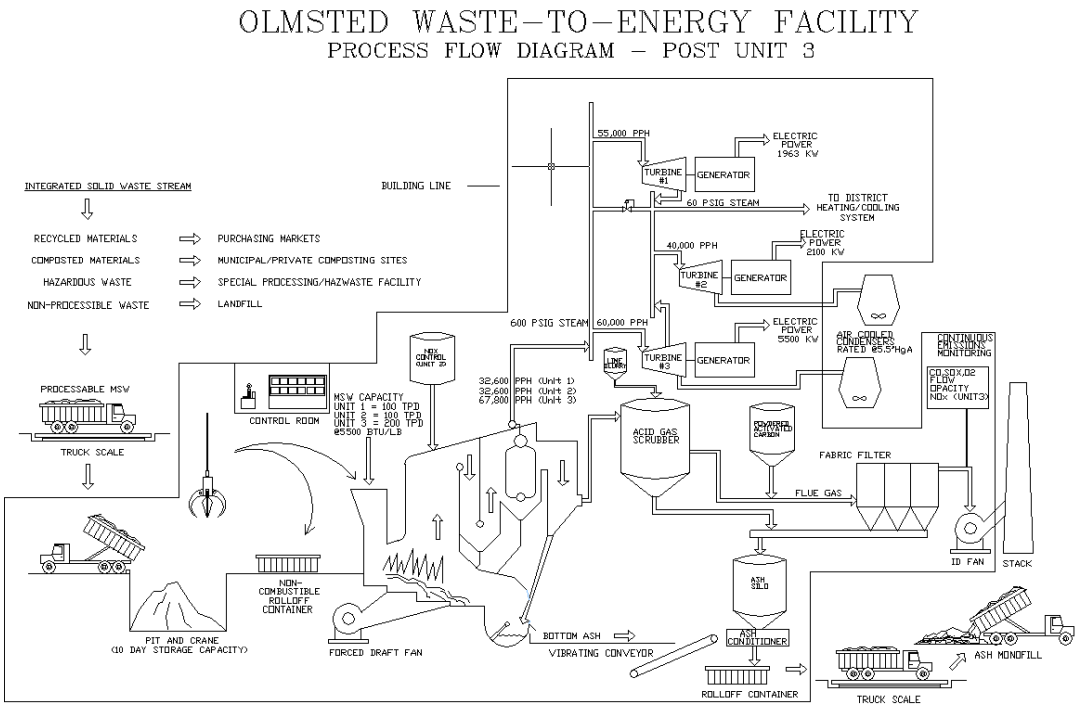
What began as 10 cubic yards of waste ends up as about 1 cubic yard of ash. Bottom ash is processed through a water-filled quench tank to reduce temperature and eliminate dust. Fly ash is stored in a silo before being processed through a conditioning mixer that converts the dry dust into a moist soil-like consistency. Both bottom ash and fly ash are conveyed to, and

deposited in, roll-off containers. These containers are loaded on a truck, covered, and taken to the ash mono-fill (an ash-only cell) at the Kalmar Landfill where the ash is deposited in specially constructed cells.

Steam from the boiler is piped into the #1 Turbine Generator where about 1.9 Megawatts (MW) of electricity are generated per hour. After the #1 Turbine Generator, the steam passes into the DES for heating or for use in the district cooling system.

When steam demand in the district system is low, the steam passes into the #2 Turbine Generator, which generates up to 2.1 MW of electricity per hour. The #3 Turbine Generator is capable of condensing all of the inlet steam and generating up to 5.5 MW, or extracting a portion of the inlet steam to supplement the district heating and cooling system resulting in a maximum of 3.0 MW of electricity per hour.

Excess electricity, not needed by the nearby government buildings, is sold at wholesale cost to the local power grid and provide green energy for the Southern Minnesota Municipal Power Agency (SMMPA) and Rochester Public Utilities (RPU). Buildings on the DES include the Olmsted Community Hospital, the Rochester Community and Technical College (both campuses), the Federal Medical Center, the City/County Government Center, Mayo Civic Center, the Human Services Campus. Green energy opportunities also exist for businesses who wish to locate in the newly created energy park just east of the OWEF.



Maintenance

As the two existing boilers are aging and will need to go offline for upgrades and maintenance, the new combustion unit serves to ensure continuous waste processing, eliminating the need to bypass additional waste to the landfill and allowing for uninterrupted energy production. In addition, it will handle increased throughput due to population growth that is anticipated over the next twenty years.

Permit History

- The Olmsted WTE was originally permitted for construction and operation in 1987. The first permit was fairly simple and did not directly regulate HAPs. Olmsted was required to meet fairly stringent sulfur dioxide standards shortly after the original permit was issued because the plant had the potential for annual emissions to exceed NSR major source thresholds for sulfur dioxide and the Rochester area had not attained NAAQS at the time of permit issuance.
- From 1987 to 1995, permit amendments were issued to the Olmsted WTE facility and other WTE facilities in the state that addressed ash management, combustor operations and operator training under policies and rules developed by the MPCA.
- In October 1996, the Olmsted WTE received a variance for ash testing.
- Olmsted WTE obtained a Title V operating permit in June of 1997.
- In October 1997, an ash disposal variance was granted.
- In December 1997, a variance was granted to the Olmsted WTE facility related primarily to mercury testing

Waste Assurance

The Olmsted County system is set up with voluntary contracts with waste haulers. Olmsted County will work toward building relationships with the haulers that will lead to negotiated and renewed contracts.

* some information taken from Energy Recovery Case Study: Olmsted County by Eileen Berenyi, PhD Governmental Advisory Associates, Inc. 599 Riverside Ave. Ste. 1 Westport CT 06880 and the Olmsted County website.