

EXECUTIVE SUMMARY

OLMSTED COUNTY, MINNESOTA WASTE-TO-ENERGY FACILITY

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ENERGY RECOVERY CASE STUDY: OLMSTED COUNTY

In 1987 Olmsted County began operation of a 200 ton per day mass burn waste to energy (WTE) facility (OWEF), which it both owns and operates. Located in the southeastern corner of Minnesota covering a land area of 660 square miles, the county is comprised of 26 cities and townships with a population of 103,000 people. Rochester, the site of the waste to energy plant is the home of the renowned Mayo Clinic, the largest medical center in the world and is been on *Money Magazine's* "Best Cities to Live" lists for the past several years.

The county, in conjunction with Dodge County, which shares in the use of Olmsted County's WTE plant and landfill, generates about 163,000 tons of refuse per year. Of that amount about 40% of the waste is recycled, 37% is processed for energy at the OWEF and 23% is diverted to Olmsted County's Kalmar landfill. Due to the success of waste to energy facility, the county is expanding the OWEF, adding a third boiler. This new unit will become operational by the end of 2010 and will move the county closer to its goal of processing or recycling 90% of its solid waste stream.

Economic Impacts

- **Energy efficiencies:** The OWEF was established on a site that had a pre-existing steam loop serving hospital, education and prison buildings. Thus, the county was able to use and expand the loop, creating a highly efficient waste to energy cogeneration system. The plant produces the equivalent of about 14,000 mwh (megawatt hours) of electricity and 679 million GJ (gigajoules) of heat. This is enough energy to heat and power the equivalent of about 20,000 home and displace about 70,369 barrels of crude oil. Currently 26 federal, state, county and municipal buildings are being served by the steam loop, with an additional 4 being added with the construction of the third unit. About 25% of the energy recovered comes from non-recycled or residual plastics.

- **Employment impact:** The facility offers employment to 37 permanent skilled workers. Including benefits the average compensation of these employees is \$93,100. In total on an annual basis they are returning about \$2.5 million to the local economy. The facility also contributes indirectly to the economy, since much of its purchasing is done through local suppliers. In addition, the recently completed \$94 million plant expansion resulted in the creation of 100 skilled jobs during the design and construction phase. This project also spawned approximately 100 additional jobs as well as additional spending through indirect purchases and economic activity throughout the region.
- **Impact on public budget:** The OWEF does not rely on any tax monies. It operates as a self-sufficient enterprise fund. Revenues come from: 1) tip fees charged on a per-ton basis to refuse haulers, who bring their waste to the facility; 2) a solid waste generation surcharge levied on residential and commercial waste hauler bills; 3) steam and electricity sales. About 54% of the plant's operating expenses were financed from user fees and charges and 46% from energy sales. When Unit #3 becomes fully operational, these proportions will change, since the plant will be nearly doubling its electricity output, adding more steam customers and recovering valuable metals from the incinerator ash. Under state law, OWEF receives renewable energy credits for the electricity it sells, helping to increase energy revenues.
- **Impact of new unit:** The addition of the third unit will preserve existing capacity of the county's landfill and preclude the need to export waste out of state. It will reduce reliance on OWEF's fossil fuel back-up boiler which is used when the solid waste combustors are down for maintenance or other reasons. It will permit Olmsted County to serve its growing population with an efficient, reliable source of renewable energy, while attaining its goal of landfilling no more than 10% of its waste.
- **Real estate footprint:** Olmsted County is fortunate that it secured a site for its waste-to-energy facility in the midst of a cluster of institutions as well as nearby to populated areas. The OWEF occupies a site of about 7 acres as compared to the county's Kalmar landfill, which covers 160 acres. Only two miles from downtown Rochester, the facility is convenient to haulers, saving them the time and expense of long hauls to distant disposal sites.

Environmental Impacts

- **Recycling Levels:** A national U.S. study has demonstrated a positive correlation between energy recovery in the region and higher than national recycling rates. Olmsted County's recycling behavior reflects this finding. Both the state and county have a strong emphasis on recycling and waste diversion. In the period between 1988 and 2008, the county's recycling rate increased from 18% to 40%, refuting the claim that recycling and waste-to-energy are not compatible.
- **Landfill Diversion:** Much of the area around Olmsted County consists of sensitive Karst geology on which it is impossible to site a landfill. While the county was able to permit a non-Karst site in the late 1980s, it knew that it had to preserve the landfill's capacity to the extent possible. The inability to site a new landfill in the county was a driving force behind the decision to construct the waste-to-energy plant. Since its inception, about 1.2 million tons of solid waste have been diverted from the landfill and converted to energy. The county reduced its need for landfill space by about 90% as well as avoiding the disposal of about one-half million gallons of leachate into the public sewer system. By diverting over one

million tons of waste from the landfill, the OWEF has reduced the hazardous gaseous emissions from the landfill as well.

- **Captured energy:** The plant produces both steam and electricity, heating the equivalent of about 20,000 homes, with baseload energy from a renewable source. There are 26 buildings tied to the steam loop, which include Rochester City Hall, the Mayo Civic and Art Center, and the Federal Prison Medical Center. Several new buildings, including the local community college are being added to the district heating/cooling system.
- **Greenhouse gas reductions:** While waste combustion produces CO₂, the amount produced is extremely small, less than one percent of total output of carbon dioxide in the area per year. Approximately 99% of CO₂ comes from fossil fuel combustion such as vehicle emissions and coal fired power plants. In addition, by processing about 62,000 tons of waste per year into energy and recycling at a rate of about 40%, the OWEF is displacing reliance on fossil fuels and diverting waste from the landfill. The result is a net reduction of 24, 800 MTCE metric tons of carbon equivalent per year. This is equivalent to reducing the vehicle emissions of about 16,629 cars.
- **Air emissions:** The Olmsted County waste to energy plant operates under strictly monitored and enforced federal and state air emissions requirements. Materials separation, combustion conditions, types of air pollution control equipment operator training are all monitored to tightly specified conditions. For all measured emissions, the OWEF is well below the mandated limits. For heavy metals (lead and cadmium), dioxins and furans, opacity of the plume, the facility is operating at a small fraction of a percent of the limits.

Political/Institutional impacts:

- The OWEF has had strong political and community support since its inception. Olmsted County's goal is to eliminate landfill disposal of waste, managing as much of its waste above ground as possible. This goal is enthusiastically endorsed by its citizens. In a region with a high concentration of technical and medical personnel, the OWEF has received high marks. When the county decided to add a third unit to the plant, there was no opposition. This despite the fact that the plant is located two miles from downtown Rochester and .4 miles from the closest residential area.
- Rochester has consistently been on various "Top Cities to Live" lists. The existence of a renewable energy steam loop, linking public and non-profit institutions is a source of pride to the entire region. The Convention and Visitors Bureau touts Rochester as a "Green City" due to the OWEF and the fact that many of the city's institutions as well as the Mayo Civic Center receive heat, electricity, and air conditioning from the waste to energy facility.
- The former Olmsted County Solid Waste Manager who supervised plant operations for many years stated in an interview: "There was no opposition to the plant as it was planned or when it was built. Our community was growing and we were determined to be proactive in our solid waste planning. Our mantra was 'handle all waste above ground' if at all possible. The OWEF has certainly helped us move towards this goal."
- As a representative of Marilyn Hansmann, Vice President of Finance and Facilities of Rochester Community and Technical College said: "One of our 700,000 square foot buildings has been using steam from OWEF for heat since 1988. It is reliable, has saved us money and has gone a long way in helping us reach our goal of reducing the college's dependence on fossil fuel. It has been so successful that in the current remodel of the

building we will be adding an absorption chiller so that the building will use renewable energy for cooling as well as heating. Through the “Green Pipes” project more of our buildings will be connected to the OWEF. We are excited about the Green Energy Management program we have just started and the OWEF system will be one of the learning labs our students will use.”