

Executive Summary

Industrial energy efficiency can have a significant impact on Minnesota’s utility companies’ ability to reach their energy savings goal of 1.5% of gross annual retail energy sales, as mandated by the Next Generation Act of 2007. Prior to this study, little was known about what energy conservation opportunities exist within industrial facilities and the impact those opportunities can have on energy use. The information in this report is designed to help utility companies, manufacturers, technical assistance programs, and consultants understand industrial energy efficiency opportunities and work towards energy efficiency in manufacturing facilities.

The Minnesota Technical Assistance Program (MnTAP), in an effort to identify readily-available energy efficient technologies and practices, collected and analyzed energy data for manufacturing sectors within eight utility service areas in Minnesota. The analysis included identifying significant manufacturing sectors and sub-sectors within each utility service territory and then researching conservation opportunities that may exist for facilities within those sectors and sub-sectors. The research was conducted in this manner since the underlying assumption of the project was that facilities with similar manufacturing processes would have similar energy conservation opportunities.

Each utility was provided with information regarding the available industrial energy conservation opportunities as well as a conservative estimate of energy savings achievable through implementation of the opportunities. An example of the opportunities and savings identified for sub-sectors is shown in Table 1. The savings estimates provided are based upon readily-available technologies and behaviors that can reduce energy consumption. In Table 1, rebate information was not factored into the savings estimates; however, rebates were accounted for and reported for each utility in the report.

Table 1. MnTAP reported energy savings and technology opportunities for manufacturing sub-sectors.

Sector	Sub-Sector	Estimated Thermal Savings	Estimated Electrical Savings	Energy Efficient Technologies Identified for the Sub-Sector
Chemical Manufacturing	Ethanol Production	20%	11%	Boiler best practices, corn fractionation, motor and pump improvements, anaerobic digestion of thin stillage
	Pharmaceutical Manufacturing	18%	16%	Heat recovery opportunities, equipment and piping insulation, process controls, adding adjustable speed drives
Fabricated Metals	Machine Shops	15%	9%	Compressed air system improvements, boiler tuning and best practices, fan and paint ventilation optimization
	Sheetmetal Fabrication	24%	15%	Process heat system optimization, reduction in cure time and overheating, compressor control and intake modification
Food Processing	Poultry Processing	11%	15%	Steam, boiler, and equipment best practices; heat recovery; refrigeration improvements; motor opportunities
	Commercial Bakeries	10%	16%	Direct fired best practices, boiler blowdown heat recovery, thermal oxidizer improvements, cooling improvements
Primary Metals	Steel Products	20%	15%	Flue gas optimization, furnace optimization, process control improvements, waste heat recovery
	Aluminum Operations	14%	19%	Iso thermal melting technologies, reverberatory furnace improvements, insulation installation and improvements

From this study, MnTAP determined that there are conservation opportunities available for most manufacturing facilities and utility companies should be encouraging industrial energy efficiency as a way to meet their conservation goals. Estimated natural gas savings for the sectors identified for six gas utilities was just over 25 million therms, which is approximately 8% of recent annual consumption amounts. Electrical savings for four utilities, as estimated by MnTAP, tops 271 million kWh or approximately 7% of annual consumption. Both of these savings estimates were based upon readily available conservation technologies and practices.

While the assumption about sectors and sub-sectors held true, the study revealed that quite often a sub-sector or even sector may be dominated by a few large energy users that can benefit the most from energy conservation strategies. In those instances, utilities need to work with the facilities to provide incentives for conservation.

The information provided in this report can help utilities evaluate their current rebate programs and help shape future rebate offerings. The technologies identified as opportunities for energy savings should be included in rebate programs, if possible.

This report not only provides information about the findings of the study, including sector-specific energy conservation opportunities, but also directs readers to sub-sector summaries that provide details about processes, energy use, and savings opportunities. Additionally, MnTAP completed a benchmarking analysis as part of this project. The energy benchmarks derived from the energy use data are included in the sub-sector summary sheets and a separate benchmarking report is available online (<http://www.mntap.umn.edu/resources/DOC/index.html>).

This report also includes information about energy efficiency solutions such as the U.S. Department of Energy; and resources for supporting energy efficiency programs. Utility companies and industrial facilities should take advantage of programs within the State of Minnesota, including MnTAP, that can provide assistance for implementation of energy efficient technologies.

MnTAP, with a 25-year history of successfully providing manufacturers with pollution prevention and energy efficiency solutions, can work with facilities and utilities to further scope and study facility-specific opportunities for conservation. Additionally, MnTAP can conduct energy efficiency studies, place interns in facilities to address specific questions and implement solutions, or facilitate teams to develop company-wide support of energy efficiency options.