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Company Background

The Metropolitan Council is the policy-making body, planning agency, and provider of essential services for the Twin Cities metropolitan region. Their mission is to foster efficient and economic growth for a prosperous region. Metropolitan Council Environmental Services (MCES) is tasked with managing water and wastewater within this region, including water supply planning. MCES and MnTAP have been collaborating on industrial water efficiency projects in the metropolitan region since 2012.



“Being able to work with MnTAP this summer gave me the opportunity to apply the knowledge I have acquired in the classroom to real-world scenarios. Being able to manage my own project, with the expertise and assistance of the MnTAP staff, was an incredible experience, as few undergraduate internships allow students to learn and explore the field in this way.” ~ BM

Project Background

Industrial water use is an important component of the total water use across Minnesota and within the metro area. Past intern and technical assistance projects have indicated there are often significant opportunities available for reducing the water intensity at industrial facilities. MCES and MnTAP are interested in determining if additional guidance on industrial water efficiency opportunities can be provided to industrial water users by analyzing past project impacts. Because MnTAP assistance is industry-tailored and unique to each company served, the recommendations may not be generalizable to every industry; recommendations vary by industry, scale, and scope. This project analyzed a set of 341 water conservation recommendations made by MnTAP between 2015 and 2020 with the overarching goal of identifying recommendations that consistently yield water conservation opportunities both across and within various industry sectors.

SOLUTIONS

Water Use Areas

The way water is used within industrial facilities is diverse. Process water use recommendations are most numerous. Approximately 2/3 of the analyzed recommendations are related to processes with 75% of them categorized within six main process water use areas: ingredient, conveyance, sanitation, steam generation, heating, and cooling. Recommendations regarding domestic water use and irrigation comprise approximately 1/3 of the water recommendations, and should be considered areas of substantial water conservation. Recommendations made for irrigation and domestic purposes often have low implementation costs, short payback periods and can be applied across a variety of industries and at businesses.

Water Use Classification

A literature review was conducted to understand what is currently known about industrial water use and to inform processes used to organize the MnTAP water efficiency data set for analysis. This data has been classified by type of recommendation, the water use area and by industry sector based on NAICS classifications.

“It has been a great opportunity to have an Intern review the past water efficiency recommendations. Compiling, classifying and evaluating these recommendations is an important first step to creating resources that will help motivate water conservation across many industries.”

~ Laura M. Babcock, Director

Solutions

Recommendation	Description
Maintain	Repair equipment to run as originally intended
Manage	Perform the same operation in a more efficient way
Modify	Change the way water is used throughout the system

Process modifications yield the highest savings, both in terms of water conservation and economic savings. This can be seen across industries and manufacturing subsectors. These changes may be more cost and labor intensive, which could contribute to their lower implementation rate. Maintenance recommendations have a higher rate of implementation, despite having smaller savings associated with each recommendation. Maintenance recommendations often involve repairs and can easily be rolled into ongoing site maintenance activities which allows for needed resources to be assigned for implementation. Management recommendations tend to be automation or measurement related and have lower savings per recommendation than modifications, yet have higher implementation rates.

High Volume Recommendations

This analysis identified water efficiency recommendations that are statistically higher volume than most recommendations. Process modifications comprised 50% of these high volume recommendations compared with 36% of

overall recommendations. Modifications tend to have large water conservation values, since they are large-scale changes to a process. Of the high volume recommendations, 83% are directly related to water use within industrial processes. The percent of high volume recommendations that have been implemented is 43%, higher than the 34% implementation rate for mid-range recommendations. This suggests that while modification recommendations may be more involved than management recommendations, many businesses see value in implementation.

High Value Recommendations

There are water efficiency recommendations that are statistically higher value than most recommendations. The overall implementation rate for high value recommendations is 48%, which is higher than the implementation rate for mid-value recommendations at 34%. There is additional waste or energy savings in 39% of the high value recommendations compared with 20% of the mid-value recommendations. The cost savings from co-benefits of waste and energy reduction increase the economic value of a water efficiency recommendation, and may increase the likelihood that a recommendation be implemented. Identifying co-benefits from a water process change and including them in the overall project justification may increase implementation potential.

Type of Recommendation	Number of Recommendations	Implemented Recommendations	Total Proposed Reduction (gal)	Actual Reduction (gal)
Process	233	97	580,000,000	150,000,000
Domestic	54	18	25,000,000	7,700,000
Irrigation	55	7	61,000,000	18,000,000
Maintain	33	16	40,000,000	7,400,000
Manage	189	68	170,000,000	68,000,000
Modify	113	35	420,000,000	73,000,000

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