

Wastewater Treatment Energy and Operational Savings

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Recommended by:	General Manager of Growth and Infrastructure

Report Summary

This report and presentation by Michael Loken, Acting Director, Water/Wastewater Treatment & Compliance, provides information regarding an annual update on the electricity cost avoidance achieved through participation in the Industrial Conservation Initiative (ICI) and operational improvements made through preventative maintenance programs at Wastewater Treatment facilities.

Relationship to the Strategic Plan, Health Impact Assessment and Community Energy & Emissions Plan (CEEP)

This report supports initiatives to “Optimize Asset Service Life through the Establishment of Maintenance Plans” (1.1) and “Demonstrate Innovation and Cost-Effective Service Delivery” (1.5) as laid out in the City of Greater Sudbury’s Strategic Plan for 2019-2027.

With respect to the CEEP, this report supports the actions under Goal 5 to “Apply energy-efficient lens for routine equipment maintenance and replacement” and “Develop Best Operating Practices/Best Operating Guidelines (Operational Excellence)”.

Financial Implications

In addition to supporting CEEP goals, the work outlined in this report details:

- \$457,000 in electricity cost avoidance for 2020 at the Sudbury Wastewater Treatment Plant (WWTP) through participation in the Independent Electricity System Operator (IESO) Industrial Conservation Initiative (ICI);
- Continuing investments in preventative maintenance to prolong asset life and reduce the risks associated with unplanned or potentially catastrophic breakdowns at the Levack WWTP, Dowling WWTP and Coniston WWTP, and;
- Measureable improvements in effluent quality and regulatory compliance at the Coniston WWTP through cleaning of the oxidation ditch.

Background

This report is the third annual presentation given to Operations Committee concerning Wastewater Treatment Energy and Operational Savings. Specifically, this update will provide details on the following:

1. Cumulative electricity costs avoided through participation in the Industrial Conservation Initiative (ICI) for the period from 2017 to 2021, and;
2. Continued operational efficiencies and savings resulting from the tank cleaning and preventative maintenance activities started in 2018.

Electricity Cost Avoidance

As detailed in previous annual updates to the Operations Committee, the Sudbury WWTP participates in the Industrial Conservation Initiative (ICI) administered by the Independent Electricity System Operator (IESO). By reducing the electrical consumption at the plant during the 5 peak electrical power demand hours in Ontario during a given year, staff can significantly reduce the amount of Global Adjustment billed to the facility the following year.

The Sudbury WWTP has been participating in the ICI since 2016, resulting in mitigated electrical costs starting in May of 2017. Annual and cumulative cost avoidance achieved to the end of 2020 are shown in Figure 1.

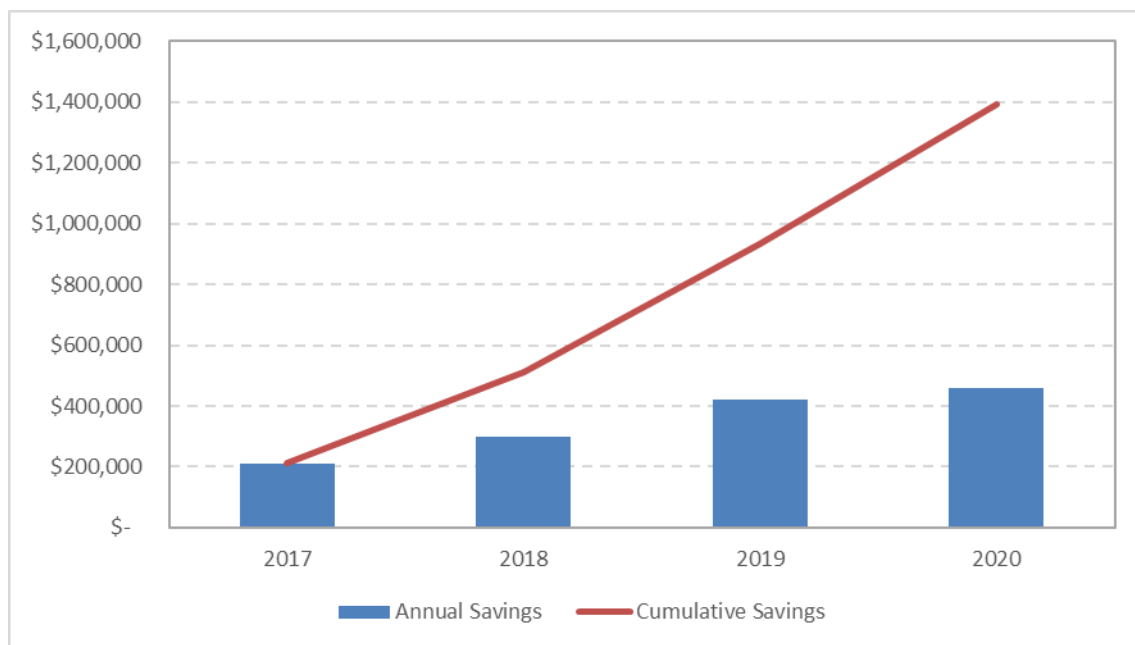


Figure 1: ICI Program Electricity Cost Avoidance

On June 26, 2020, the Ontario Government introduced a mandatory ICI peak hiatus to allow participants to focus on recovering from the impacts of COVID-19. This hiatus allowed the Sudbury WWTP to apply the peak demand factor from the 2019-2020 base period to determine their charges for the period from May 1, 2020 to April 30, 2021.

Operationally, this meant that the Sudbury WWTP did not have to curtail electricity use during 2020 and was able to use the excellent performance achieved in 2019 to avoid an additional \$457,000 in electricity costs. Since 2017, participation in the ICI has allowed Wastewater Treatment to avoid a total of \$1.39 Million in electricity costs.

With the end of the imposed ICI hiatus on May 1st 2021, Wastewater Treatment management and operators are once again focused on responding to peak periods for the 2021-2022 base period.

Operational Savings & Preventative Maintenance

The City of Greater Sudbury currently operates 10 wastewater treatment facilities, 9 of which use an activated sludge process. In this type of treatment bacteria, protozoa, and other microorganisms (the “activated sludge”) feed on organic matter in the wastewater, removing contaminants such as phosphorous and ammonia. In order to promote microbial growth and proper mixing where this process occurs, air is continually injected into the aeration tanks using high capacity blowers.

Over time, even under ideal conditions, the piping and headers used to blow air into the tanks can plug (due to dirt or sludge accumulation) or break as they reach the end of their effective service life. These failures significantly reduce the effectiveness of mixing and oxygen transfer in the treatment process. Ideally, preventative cleaning and maintenance should be performed every 5 to 7 years, however, historically Wastewater Treatment has done these tasks on a much less frequent timeframe.

To address these deficiencies, a pilot project was completed in 2018, and a three year tender issued in 2019 to clean out tanks at all CGS wastewater treatment plants. In 2020, work was completed at the Levack, Dowling and Coniston WWTPs. The aeration tanks at the Levack and Dowling WWTPs were in good condition and the preventative maintenance completed will ensure that these two locations will be able to operate efficiently in the coming years.

The Coniston WWTP presented unique challenges as the facility features a racetrack shaped oxidation ditch, instead of conventional aeration tanks. This design does not allow for part of the ditch to be isolated and drained, and as such, no records could be found to indicate if cleaning had been performed since the construction of the facility in the 1960s. It was presumed that this lack of preventative maintenance was contributing to a number of operational issues observed at the plant, including difficulties dealing with high flows and maintaining effluent quality during shoulder seasons.



Figure 2: Coniston Wastewater Treatment Plant

To overcome these obstacles, the contractor responsible for the tank cleaning, Entec Waste Management, was able to use a small scale dredge, shown in Figure 3, to clean the ditch while the facility was kept online. Using this method, over 50 tonnes of compacted grit and debris was removed from the facility in September 2020. The resulting increased volume in the oxidation ditch has improved treatment by increasing retention time and dissolved oxygen levels. This is shown in Figure 4, where the removal of Total Suspended Solids (TSS) from the influent wastewater was, on average, higher and more consistent when comparing data from September to April for 2018-2021.



Figure 3: Entec Waste Management Dredge

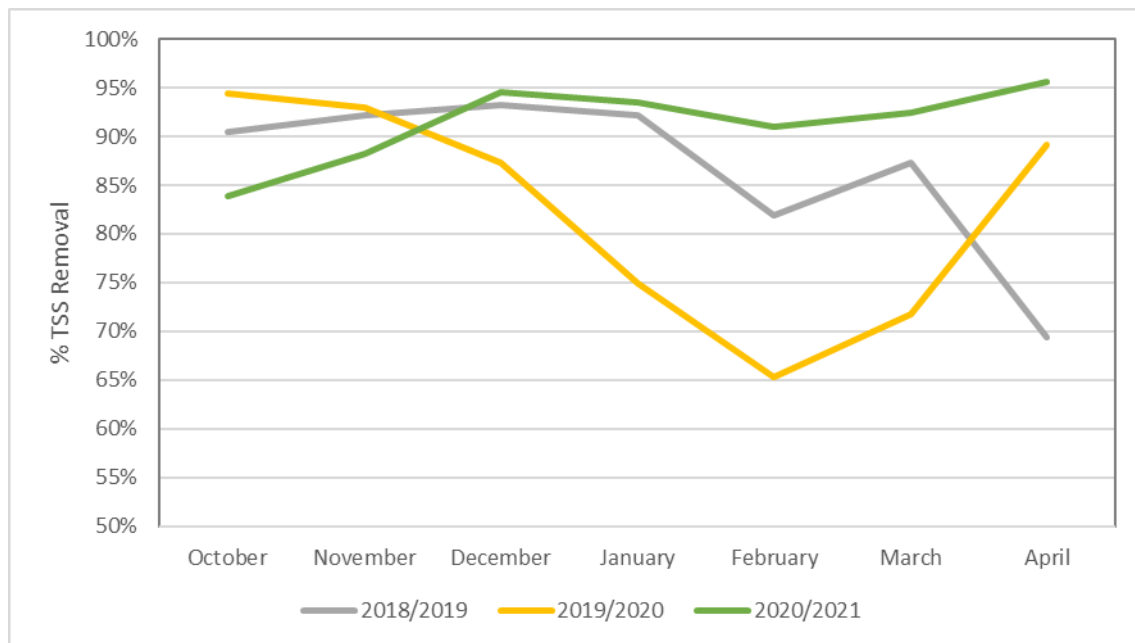


Figure 4: Coniston WWTP Total Suspended Solids (TSS) Removal

Wastewater Treatment will be continuing with the preventative cleaning program in 2021, with the goal of issuing a new tender to address lagoon dredging in 2022 and onwards. It is hoped that by continuing to perform proactive cleaning and maintenance we can effectively extend asset life, while also improving treatment facility performance.