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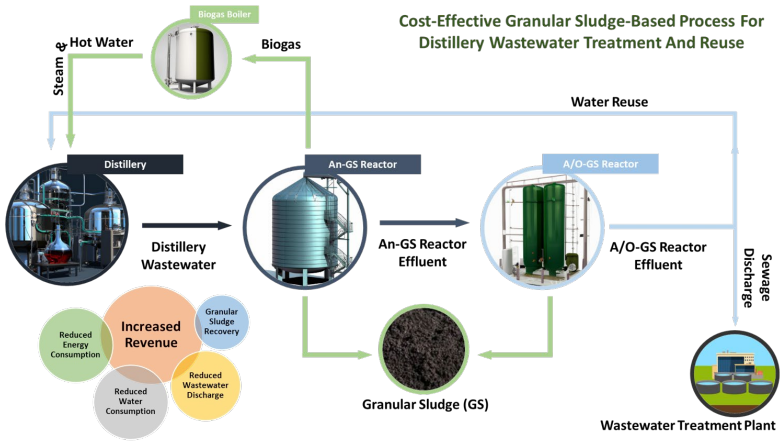
FUNDING DETAILS

Cost-Effective Granular Sludge-Based Process for Distillery Wastewater Treatment and Reuse

The distillery industry represents one of the most water-intensive and polluting industries in the world. There is a need for cost-effective and energy-efficient treatment processes for distillery wastewater (DWW). This study aims to optimize and demonstrate a cost-effective and resource recovery-based distillery wastewater treatment process at the pilot-scale. Integrated two-stage granular sludge-based bioreactors will be used to achieve energy recovery, nutrient reduction, and water reuse. Control strategies will be developed to optimize energy, nutrient, and water recovery. The study could have significant implications for the distillery industry and other industries facing similar wastewater treatment challenges.



RECIPIENT:
Yang Liu, University of Alberta

PARTNERS:
Alberta Distillers, NSERC

TOTAL BUDGET:
$527,000

AI FUNDING:
$160,000

PROJECT DATES:
APR 2023 – APR 2025

PROJECT TRL:
Start: 5
End: 7

APPLICATION

The process is designed for treating high-strength (high COD, BOD, ammonia, phosphorous and TSS) wastewater and has good resistance to influent variations. It is applicable for treating wastewater from not only distilleries, but also the winery and brewery industries. It can also be used to treat wastewater from other food and beverage industries. The flexibility and robustness of the process offer great potential to treat various types of high-strength wastewater at different scales.

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PROJECT GOALS

This study aims to develop and optimize a cost-effective process for the treatment of high-strength distillery wastewater at the pilot-scale. Specifically, this project will develop and optimize a two-stage granular sludge (GS)-based process to treat distillery wastewater at the pilot-scale. The focus is to improve process energy efficiency and bioenergy and phosphorous recovery, as well as reduce chemical costs needed for pH adjustment, and explore opportunities to enrich active anaerobic microbial communities for biomethane and P recovery in the Stage I reactor, and to develop energy efficient nitritation/denitritation/anammox nitrogen reduction pathway in the Stage II reactor. Information regarding process control, process footprint and waste management strategies will be collected for future full-scale process development.

BENEFITS TO ALBERTA

The innovation in distillery wastewater treatment brings direct financial benefits to the industry, including reduced costs for water and chemicals, improved safety measures, and decreased surcharge and power bills. Treatment of high strength wastewater on site can also reduce the burden of Alberta's municipal wastewater treatment plants, and help distilleries meet their GHG reduction and water reuse goals. The project will also create job opportunities and attract investment from other industries. The project will help reduce water consumption and wastewater generation, benefiting the environment, and reducing the carbon footprint through resources recovery, therefore, have significant implications for the distillery industry and other water-intensive and polluting industries in Alberta, contributing to the sustainable development of the province's economy and environment.

2 Publications

4 Students Trained

1 New Product/Service

CURRENT STATUS

JUN 2024

Milestone 1 is complete. The GS process has been deployed in both lab and pilot scale reactors for DWW treatment. Efforts were devoted to enhancing bioenergy and nutrient recovery while reducing contaminant concentrations to levels acceptable for sewage discharges. The recovery of phosphorus via the reactor sludge offers exciting opportunities for its utilization as a fertilizer or as a raw material within the phosphorus refinery industry, while the biomethane produced during the treatment exhibits significant energy production potential.