

UBC 45X Mechanical Engineering Project Proposal

Client: Regenerative Waste Labs

Project Title: Laboratory wastewater recycling system

Company Background

Regenerative Waste Labs (RWL), formed in January 2020, works with a variety of businesses who create bio-based products made from renewable resources and helps them to assess the biodegradation ability of their products, as well as determine appropriate end-of-life technologies to manage the waste of their products. The team at Regenerative Waste Labs also develops technologies that will ensure that bio-based products will not end up as waste.



RWL lab, located off Main St. in Vancouver



Plant growth tent used for ecotoxicity experiments

Our mission at Resgenerative Waste Labs is to help our clients develop closed-loop bio-based products that do not end up in the landfill. We strive to give our clients confidence that they are providing circular renewable products that add value to, instead of harming, our ecosystems.

Project Introduction

Water is an essential resource on this planet. It is not only required for both human existence and the sustainability of the planet, but it plays a major role in the world economy. Many stakeholders across the globe are putting great efforts into the support and development of innovative technologies that focus on water conservation, purification, and treatment. Recycling wastewater is important for the environment as it avoids straining drought-stricken areas and essential natural habitats such as wetlands.

A typical testing and research laboratory currently uses five times as much energy and water per square foot as a typical office building. Water is necessary for lab work, but to build a green lab, it is important to increase water conservation. Water reduction in the context of a research and testing lab is currently focused on utilizing waste-free condensation apparatuses and aeration devices for lab sinks.

Project Description

At Regenerative Waste Labs, we understand that water is a critical natural resource that needs to be preserved and are committed to reducing the size of our water footprint by increasing our operational efficiency and reducing wastewater flows.



Plastic sample after disintegration test



Disintegration test for plastic sample

Our testing services involve the degradation testing of bio-based products under a variety of environmental conditions. We generate a high quantity of organics-contaminated water through the process of our testing and research. In order to minimize the amount of wastewater we produce; we are interested in developing

a uniquely designed water recycling system for our lab.

This project involves the development of a wastewater treatment and recycling system that will process wastewater and return doubly distilled water to be used in lab operations.

Expected outcomes

A prototype laboratory-scale wastewater treatment and distillation system.

- Milestone 1: Complete background research and produce a design for an appropriate system that fits the requirements
- Milestone 2: Prototype of the water treatment system (with filtration and sterilization stages) including analysis of chemical oxygen demand (COD), total dissolved solids (TDS), total suspended solids (TSS) and total hardness, to show the cleanliness of treated water
- Milestone 3: Prototype of the double distillation system including analysis of turbidity and pH to show the cleanliness of treated and distilled water
- Milestone 4: Implementation of automatic or semi-automatic controls
- Milestone 5: Prototype of complete system and assessment of cleanability and easy movement of equipment

Available resources

- \$850 for materials
- In-lab/on-site supervision and guidance
- Dedicated workspace for students at our lab (located off Main St.)

Customer requirements

- 1) Multi-stage wastewater treatment system with capacity of processing 20-30 L of wastewater per day, with at least 100 L holding capacity.
- 2) Removal/separation of solid organic contamination
- 3) Utilizes a system to sterilize the filtered water before distillation

- 4) Can include a commercially available distillation unit
- 5) Able to dispense doubly distilled water at a flow rate of 4-6 L/min
- 6) Automatic or semi-automatic controls
- 7) Sink for wastewater collection
 - Up to 50 cm off the ground
 - Should be large enough to pour waste liquid from a bucket
- 8) Able to fit into a 2m x 2m space
- 9) Easy cleaning of system
- 10) Wheelable

Client contact

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