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# Algal Water Treatment: Reservoir and Offloading Design

Tyler Friesen

*Iowa State University*, [tfriesen@iastate.edu](mailto:tfriesen@iastate.edu)

Tristan Jones

*Iowa State University*, [tjjones@iastate.edu](mailto:tjjones@iastate.edu)

Josh Sutton

*Iowa State University*, [jmsutton@iastate.edu](mailto:jmsutton@iastate.edu)

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Tyler Friesen, Tristan Jones, & Josh Sutton

## Algal Water Treatment: Reservoir and Offloading Design

Client: Gross-Wen Technologies (GWT), Ames, IA

### Problem Statement

- The current algal water treatment system GWT has developed using Revolving Algal Biofilm (RAB) can be reduced in cost.
- The current automatic algal harvesting system could have an improved post harvesting process would be helpful.

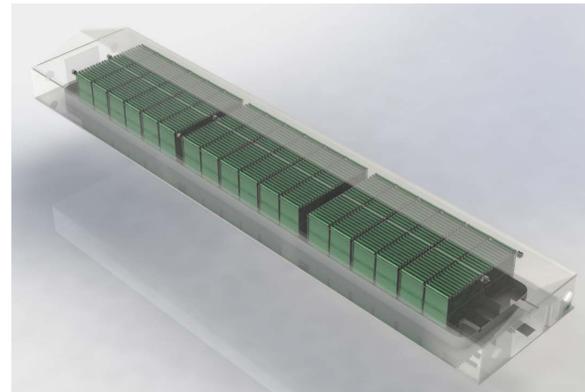
### Scope

- To determine the optimal material for the reservoir and offloading system with cost, lifetime, and structural integrity in mind.

- Identify cost-effective methods of removing harvested algal from the greenhouse.

### Objectives

- Redesign a reservoir to contain the wastewater being treated.
- Design an automated offloading system for the harvested algal to exit the greenhouse.



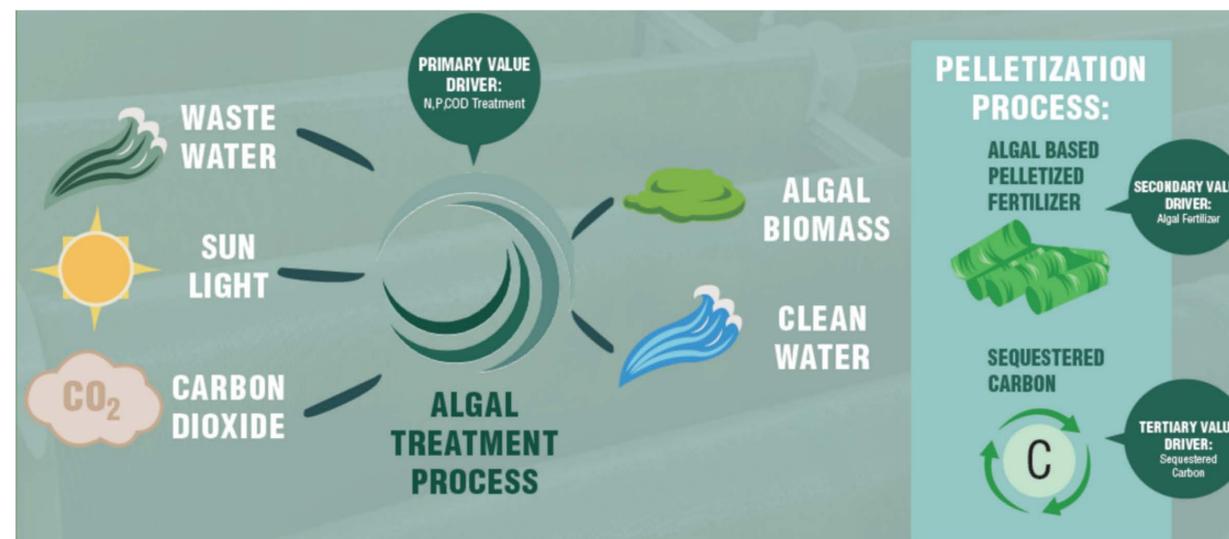
The figure seen above is a large-scale 40' x 150' greenhouse with 36 RAB reactors inside.



The figure seen above is a pelletized form of the algal after the harvest and drying processes.

### Constraints

- New Reservoir & Offloading Budgets cannot exceed current budget.
- **Timeline:** Design a reservoir and an offloading system by May 2018 to be implemented in 2019.
- **Reservoir Requirements:** must be cost-effective, last for a lifetime of 20 years, and have the ability to be drained. Must be able to fit 36 RAB reactors and a walkway down the middle.
- **Offloading Requirements:** must be cost-effective, last for a lifetime of 20 years, and have the ability to run automatically with the harvesting system.



The figure above is a graphic depiction of the Algal Treatment Process.

### Methods

- Gather current information about GWT's current reservoir and offloading systems.
- Create decision matrices using GWT's priorities to determine the correct material for the greenhouse reservoir and the correct system for the offloading process.

### Major Outcomes

- **Plan and design** a new reservoir and offloading system using decision matrices made alongside GWT using their process requirements.
- **Develop** the necessary procedures to implement and maintain the reservoir and offloading systems.

### Benefit to GWT

- The automated offloading system will be developed to negate the need for hired personnel to be present during the harvesting process.
- The reservoir material will be decided. This will reduce the total cost of the wastewater treatment facility created by GWT.
- The cost reduction from the reservoir and offloading will be passed down to the customers. The customers of GWT cities around Iowa and the cost savings passed down can result in improved city infrastructure or reduced taxes for the city.



The figure above is one full-scale RAB reactor with the automatic harvester.