


Faculty Advisor:
Dr. Natalie Cherbaka

Disposal of Foundry Waste By-Product

Kyle Cascaes Alex Pogorzelski Khaled Makkouk Yogith Tupakula

Company Contact: 
Dan Hughes

Background

Company Description

Wabtec Graham-White operates an in-house foundry and machine shop in Salem, VA. The company manufactures a variety of products for locomotives such as air dryers and electric parking brakes. Wabtec GW has a 300,000 sq. ft. facility and with approximately 277 employees.



Air Dryers



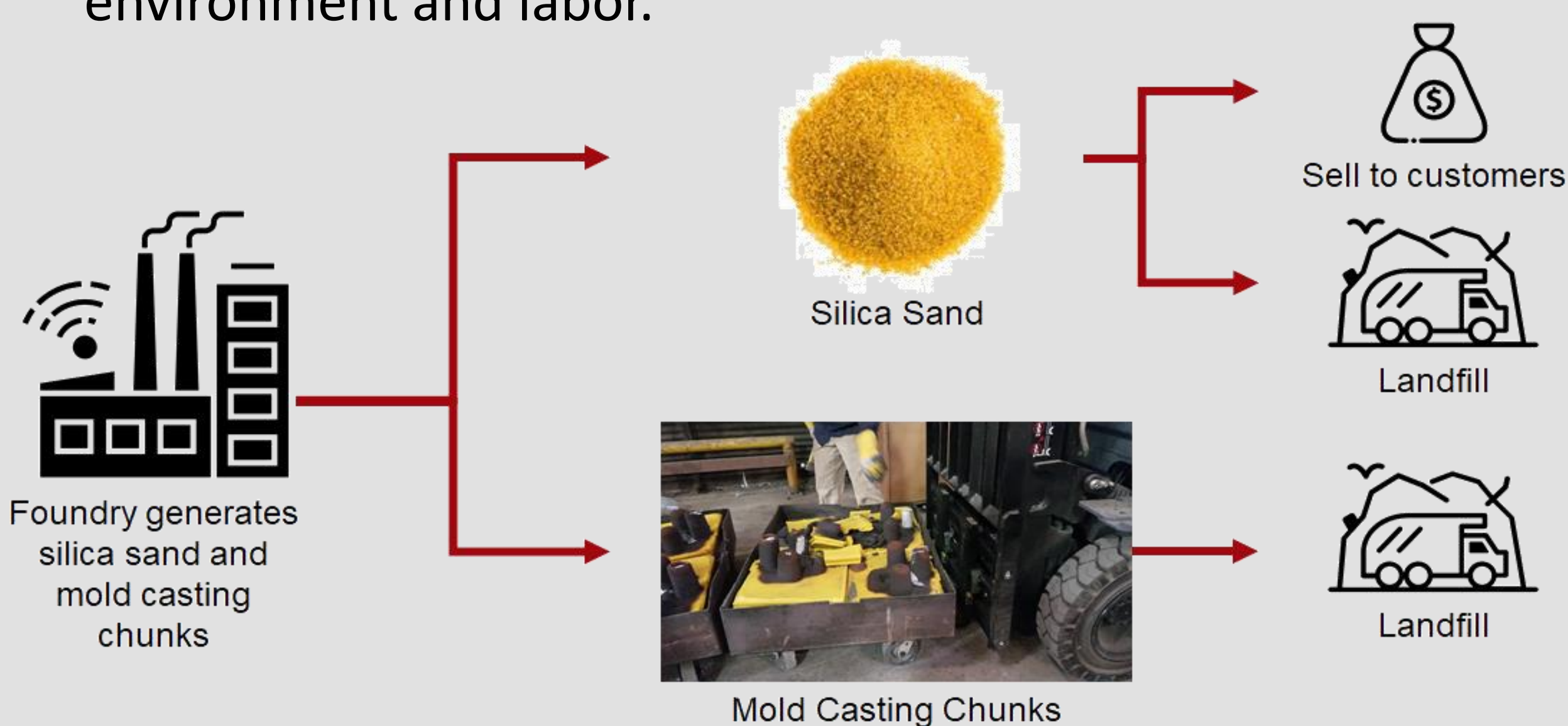
Electric Parking Brake

Project Description

The foundry uses a custom, resin-coated sand in its casting process. As a result, two types of waste are produced. The first waste stream is the silica sand that remains after the resin coating is burnt off during the casting process. The second byproduct is the broken chunks of the mold after the metal hardens.

Problem Identification

Wabtec's current waste management system is inefficient in terms of cost, its impact on the environment and labor.



Current Waste Management System

Objectives



Reduce overall waste disposal costs by 50%



Improve ergonomic standards during supersack loading

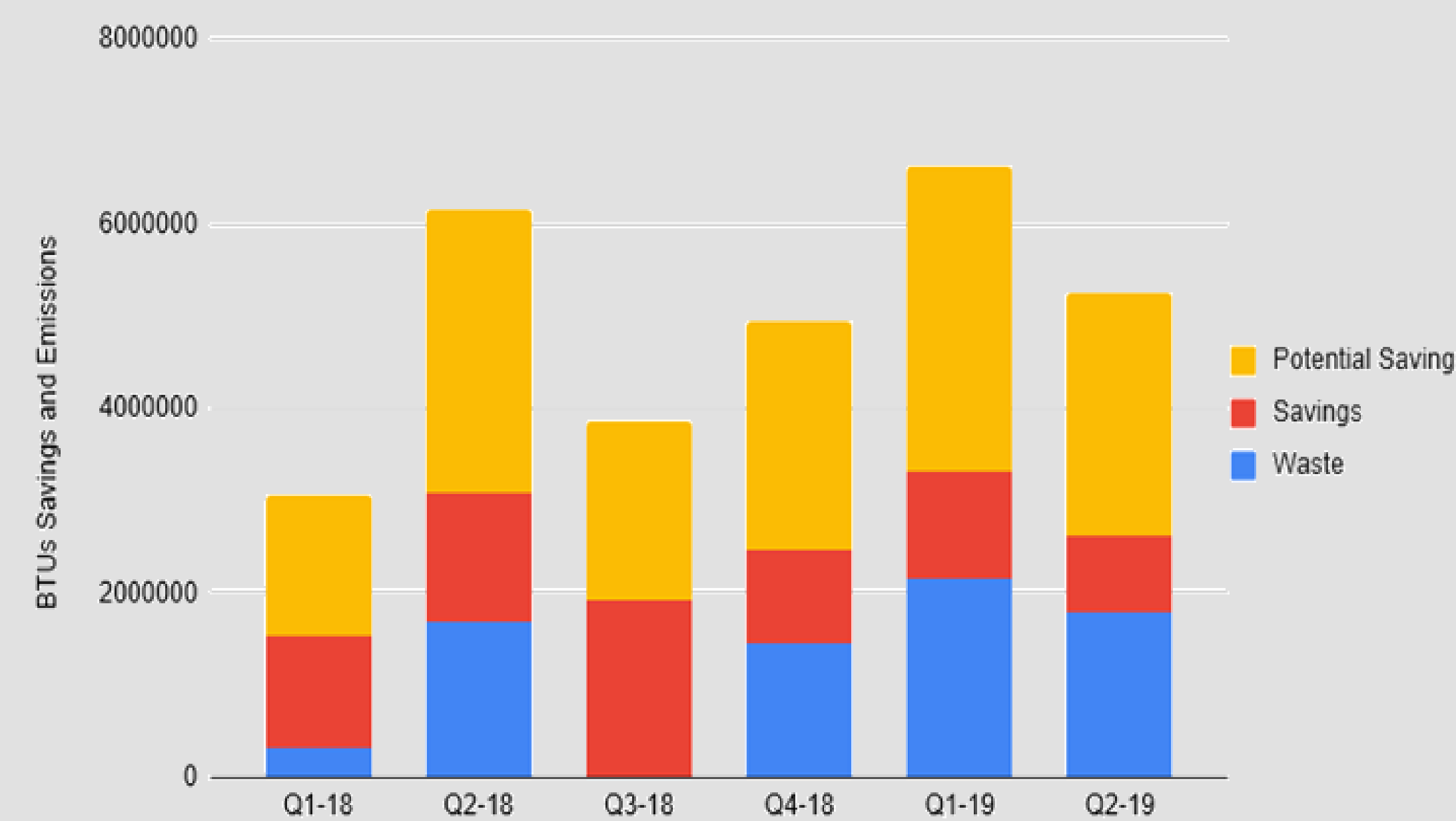


Reduce waste disposed in landfills by increasing number of potential customers by two more companies

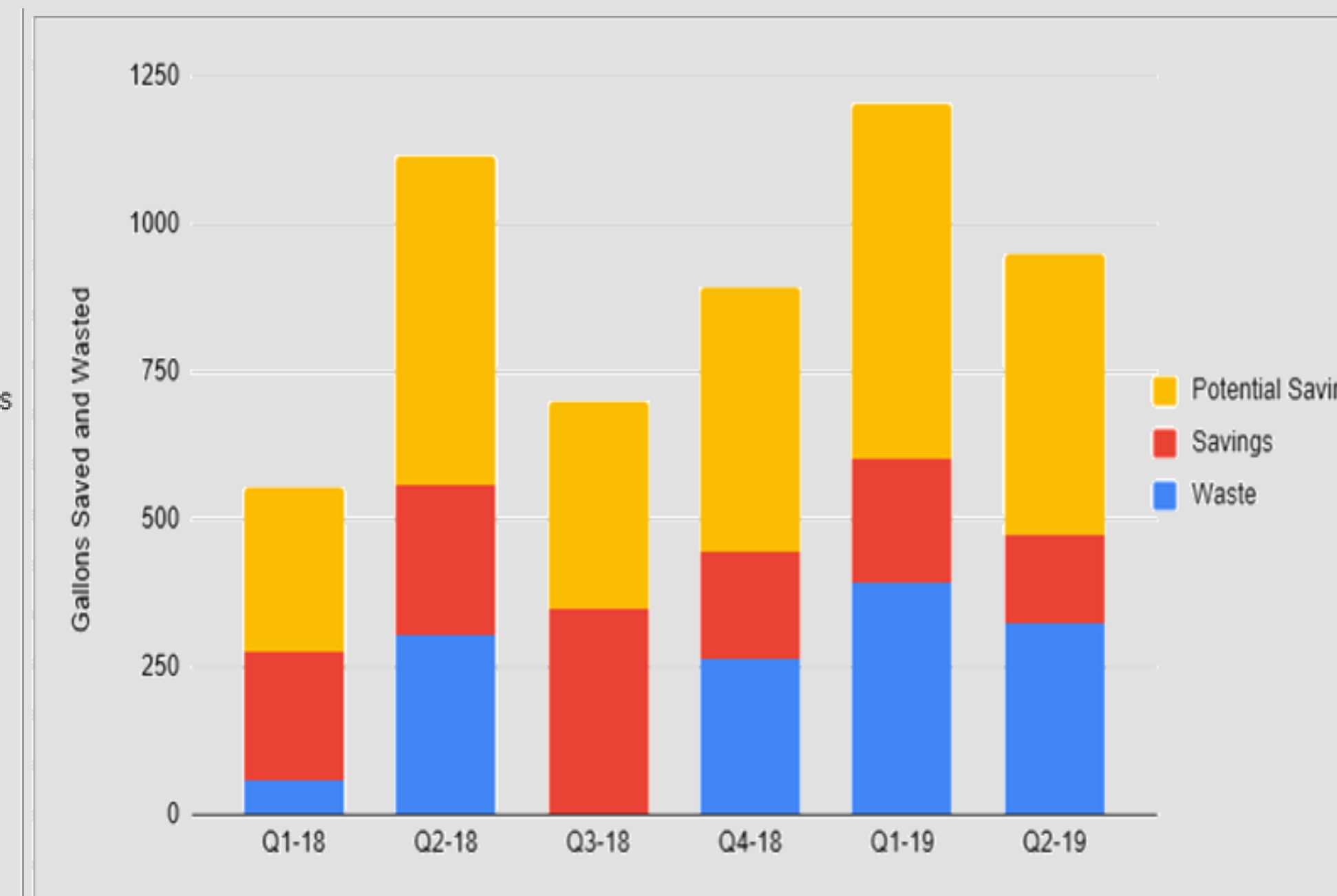
Impact

Environmental

BTU savings from Griffin Pipe



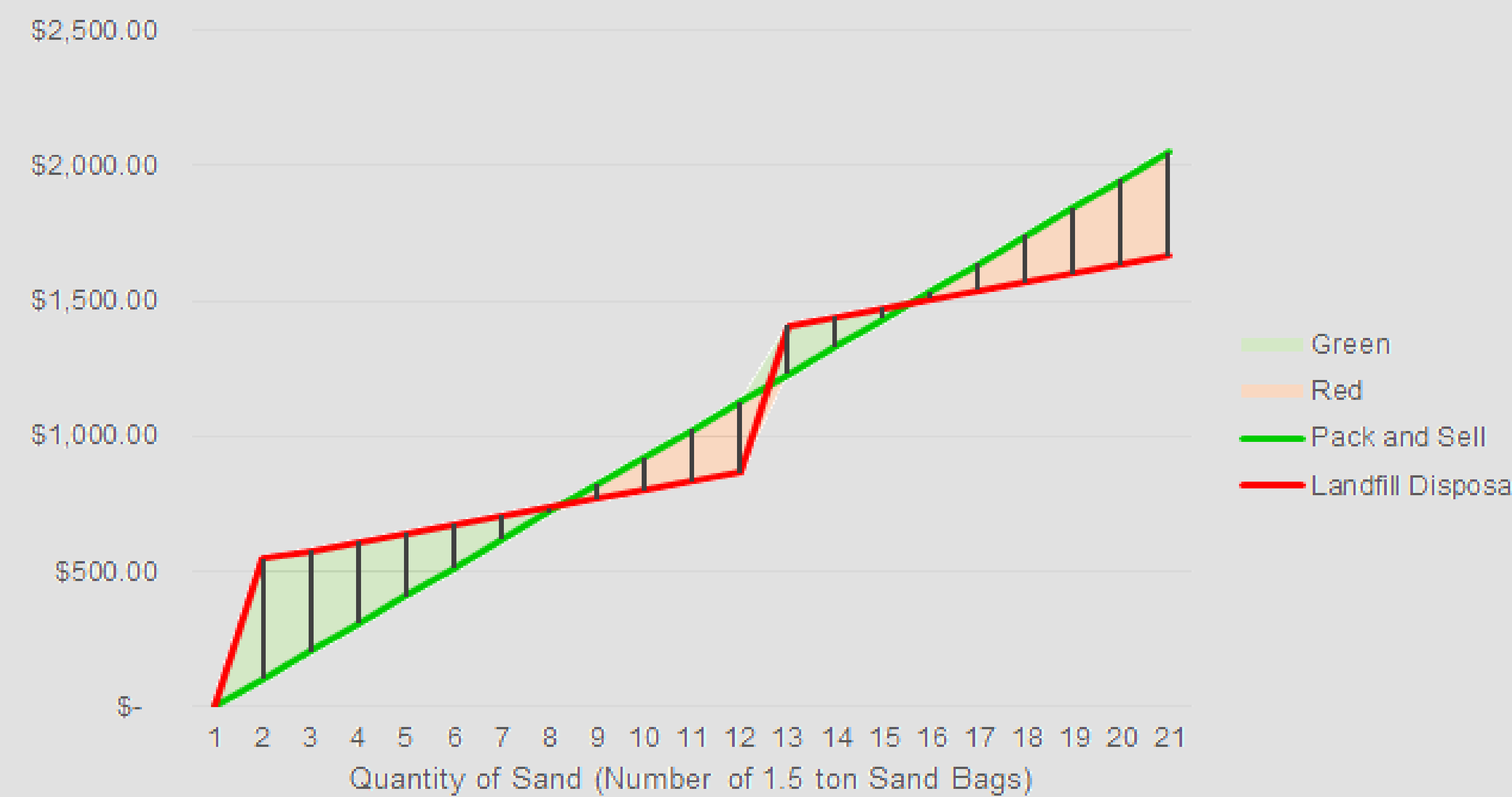
Water Savings from Griffin Pipe



The yellow shows the total potential savings for BTUs or water in the environment if all the foundry sand was reused, the red is what has been saved due to sales to Griffin Pipe, and the blue is the amount wasted by not reusing.

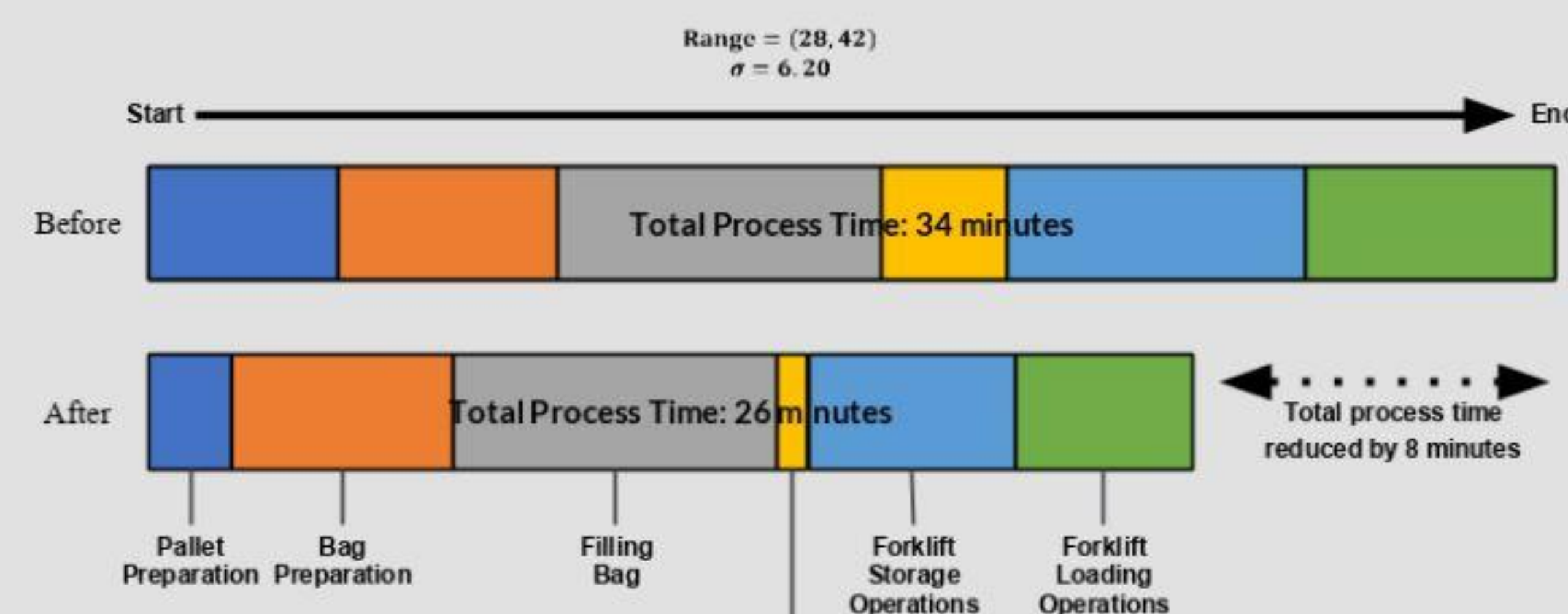
Cost

Break-Even Analysis - CVP



Disposal cost via landfill is accurately estimated based on the known cost variables.

Results



Using better equipment can reduce bagging time by 8 min

Solution Approach

Solution 1:

Find potential customers to combat the issues regarding cost and environmental impact.

Chandler Concrete Company

Distance from Wabtec: Closest plant is 0.5 miles

What they do

Concrete and masonry specialists that focus on the construction of buildings and other projects such as parking garages

How the foundry sand will be used

Can be used within the concrete mix and used within the building foundation



Gus Wells Paving

Distance from Wabtec: 36 miles - roughly 1-hour drive

What they do

Full-service paving company, in addition to asphalt, they also do seal coating, tar and gravel, and excavating

How the foundry sand will be used

Used as a subbase layer for road construction and a base for heavy construction equipment



Patterson Brothers Paving Inc

Distance from Wabtec: 36 miles - roughly 1-hour drive

What they do

Perform: Asphalt Resurfacing, Stone Installation, New Asphalt Construction, Asphalt Repair

How the foundry sand will be used

Used as a subbase layer for road construction



Solution 2:

Implement engineering and administrative controls to increase safety and improve time efficiency regarding labor.

Engineering Controls

- Implement an air ventilation system
- Add automatic conveyor belt
- Replace malfunctioned scale

Administrative Controls

- Assign storage space to store personal protection equipment (PPE)
- Enforce a strict PPE wardrobe requirement

Results were altered due to COVID-19