The client, Red Clay Brewing Company, is a local craft brewery located in Opelika, Alabama. The client is interested in implementing methods to conserve energy usage during the summer months. The brewery experiences high energy bills due to AC usage to cool the brewery taproom. The client believes that the building has minimal insulation and has expressed interest in installing additional insulation to ensure efficient cooling and decrease energy bills during the summer months. The brewery is also interested in implementing energy conservation methods related to the current brewing process.

**DESIGN OBJECTIVES**

- To design a safe and ergonomic heat recovery system that will recycle heat from hot water associated with the wort cooling process to preheat and store 300 gal of processing water at 145°F for the next batch. The total cost of the water system will be offset by the decrease in the client’s energy bill over five years.
- To design an insulation system to conserve energy by reducing the overall heat transfer through the roof by one-third over the months of May until September. The total cost of the insulation design will be offset by the decrease in the client’s energy bill over five years.

**CONSTRAINTS**

- Financial: 5-year return on investment
- Space: brewhouse, roof, and front wall
- Roof load capabilities
- Ergonomic Factors: human interactions
- Minimal yearly maintenance

**RESULTS**

- The first element of this design recirculates excess hot water to preheat initial processing water and reduce the use of the current natural gas water heaters. This system utilizes an additional pump, piping, heat exchanger (HX) and water storage tank to reclaim currently wasted energy.
- The second and third element of this design implements an insulation system to reduce heat transfer into the building. This system includes creating a “white roof” and adding insulation to the front wall.

**ANALYSIS**

- Figure 2 represents the proposed process to recirculate excess hot water to preheat initial processing water and reduce the use of the current natural gas water heaters. With the reduction of natural gas use, the proposed design decreases the CO₂, CH₄ and N₂O emissions by 42%, annually.
- As seen in Figure 3, implementing the “white roof” and front wall insulation will reduce the amount of heat transfer into the building by 67%.

**SUMMARY**

With the rise in energy cost, craft breweries are starting to implement energy efficient practices in order to save on energy bills. Red Clay Brewing Company, located in Opelika, Alabama, is currently interested in solutions to decrease energy usage and cost during the summer months. This design proposes a method to reclaim wasted energy associated with the brewing process as well as a system to decrease the amount of heat transfer into the building. Overall, this design proves to be a feasible method to reduce energy usage and cost for Red Clay Brewing Company.

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