LOUISIANA FISH PROCESSORS

LSU AGCENTER WATER AND ENERGY CONSERVATION PROGRAM

Audit Highlights

- The team's report identified five recommendations that estimated annual savings at $802,837.
- The total implementation cost of projects is estimated at $1,512,939 with an average payback period of 2.7 years.
- The recommended projects incorporate advanced IIOT for wastewater treatment.

A student team visits a fish processors wastewater treatment pond. Photo by M.P. Hayes

Facility Highlights

- This site is part of the LSU AgCenter's network of rural processors.
- The facility's corporate office has made a push in recent years for sustainable practices that provide immediate opportunities for implementation.
- Engineering and environmental students were able to meet with the facilities operations team including a corporate Environmental, Health and Safety representative.

Summary

The LSU AgCenter Water and Energy Conservation Program in partnership with Louisiana Sea Grant and LSU College of Engineering worked with a local fish processor to take the next step into a sustainable future. As part of the U.S. Department of Agriculture Renewable Energy for America Program (REAP) funding, the team of students and faculty provided no-cost energy assessments for the processor. It recommended projects including air compressor controls, motor upgrades, waste stream concentrations, wind power and optimization of aeration from Industrial-Internet-of-Things (IIOT) installation. The assessment took place during the summer 2024 cycle and will hopefully lead to a successful USDA REAP application from the processor.

Application Processes

The USDA REAP has funding opportunities for stakeholders interested in energy efficiency and renewable energy projects. The program is designated for agricultural producers and small businesses. For more information, visit the USDA Rural Development website or email M.P. Hayes at mhayes@agcenter.lsu.edu with questions.

Optimizing Pond Aeration

The team observed that the wastewater treatment pond is manually sampled throughout the day to ensure parameters are maintained and pond health is consistent. The facility sends off samples for compliance and does not receive the results for five days, at which time the pond may require increased maintenance. The main energy-consuming equipment in this part of the facility is the water cannons to increase pond dissolved oxygen (DO). The current practice is to use an aerator to prevent any issues with the pond while waiting for the results. The team suggests integrating a series of IIOT water quality sensors into the existing centralized control system to modify the operations.

Energy Savings
174,000 kWh/year

Total Cost Savings
$21,228/year

Implementation Cost
$141,000

Payback Period
6.64 years

Waste Concentration Methods

Energy Savings*
-77,760 kWh/year

Total Cost Savings
$590,512/year

Implementation Cost
$783,539

Payback Period
1.33 years

While at the site, the team discussed with the host opportunities to treat water that comes from the vessels that hold the fish. Due to the water volume used at the facility, the protein and nutrients in the wastewater still require treatment and incur a cost for handling. The plant expressed interest in learning about other water reduction and waste reduction opportunities. The team observed the opportunity for the company to use a dissolved air flotation (DAF) system to recycle water and concentrate excess protein, fat and nutrients. *This system will save the company money on fuel cost from transporting the wastewater but add energy usage from the installation of new equipment.

Motor Upgrades

The team observed that some of the motors at the facility are not only old but oversized for operation. The identified motors are more than 20 years old and rated 25 horsepower to aerate the pond. The facility has utilized newer and more efficient 15-HP motors in some areas of the pond for the same purpose. We recommend downsizing six 25-HP motors to 15-HP premium efficient motors to move air around the ponds. The motors are used 24 hours a day and for most of the year, therefore having a significant effect on energy usage. Additionally, the newer motors will be more energy efficient and pair with the recommended IIOT systems for the wastewater treatment ponds.

Energy Savings
276,576 kWh/year

Total Cost Savings
$33,742/year

Implementation Cost
$15,900

Payback Period
0.47 years

Other Recommendations

The team had additional recommendations for upgrading air compressor systems and utilizing offshore wind turbines as renewable energy. For the air compressors, there is no existence of a central monitoring unit on-site, but there is potential for system enhancement through the implementation of an advanced centralized or master controller (optimizer) savings of $8,504 per year with a $12,500 implementation cost. Additionally, due to the proximity to the coast, the facility could potentially invest in offshore wind. Though the implementation cost would be high, the energy that is generated could offset the facility's footprint and provide an environmentally sustainable energy solution. The outlined recommendations are a summary and not a comprehensive economic analysis of projects.

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