LOUISIANA PLANT NURSERY

LSU AGCENTER WATER AND ENERGY CONSERVATION PROGRAM

Audit Highlights

- The team's report identified six recommendations that estimated annual savings at $56,906.
- The total implementation cost of projects is estimated at $764,417 with an average payback period of 5.97 years.
- The recommended projects incorporate efficient motor replacement for pumping irrigation water.

Facility Highlights

- This site is part of the LSU AgCenter's network of rural farming.
- The facility has sustainable practices for water reclamation utilizing natural landscapes to capture irrigation and rainwater to irrigate plants.
- The team was able to learn about irrigation scheduling and the overlap between water and energy usage at a large plant nursery operation.

A student team visits a plant nursery and sees irrigation systems. Photo by M.P. Hayes

Summary

The LSU AgCenter Water and Energy Conservation Program in partnership with Louisiana Sea Grant and LSU College of Engineering worked with a large plant nursery 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 sustainability assessments for the nursery. The team recommended projects including LED light upgrades, occupancy sensors, daylight harnessing, pump replacements and assorted sizes of solar installations. The assessment took place during the spring 2024 cycle with a target application to the USDA REAP of winter 2024.

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.

Floating Solar Array

During the assessment, the team was informed that the facility is interested in installing solar panels to generate electricity on-site. The facility has a large area with almost no shade from the surroundings. Installing solar panels and using electricity generated therein would cut its electricity bills, in addition to providing environmental benefits. The team identified a unique opportunity for space optimization by using floating solar in the irrigation pond. This recommendation would not only provide renewable energy but also conserve water by reducing evaporation during the summer.

Energy Savings
425,315 kWh/year

Total Cost Savings
$46,359/year

Implementation Cost
$705,600

Payback Period
15.2 years

Small-Scale Solar for Pond Aeration

Energy Savings
40,844 kWh/year

Total Cost Savings
$4,896/year

Implementation Cost
$16,000

Payback Period
3.27 years

The host informed the team that the wells used pumps for water level management throughout the year. The energy management of these pumps can be quantified by the multiple submeters at the well site. These meters are located in proximity for the small pumps to be plugged or hardwired into the energy grid. The team recommends looking for small-scale solar power to generate electricity for well systems. An off-the-grid solar unit from a hardware store can generate enough power to run the isolated systems. Since these systems are not required to be on at specific times and can be used whenever it is convenient, the off-the-grid solar provides independent electrical options to use.

Motor Upgrades

The LSU team observed that some motors at the facility were large horsepower, standard efficiency, outdated motors. However, there are still opportunities for further improvement by replacing certain motors with more efficient and premium options. The team recommends replacing older, standard efficiency motors for each of the major pumping irrigation ponds with newer energy-efficient models. The specifications for the 60-horsepower motors were calculated with online efficiency calculators. Despite the longer payback window, the final implementation cost can be adjusted based on successful application for the USDA REAP.

Energy Savings
24,336 kWh/year

Total Cost Savings
$2,653/year

Implementation Cost
$40,000

Payback Period
15.1 years

Other Recommendations

The team had additional recommendations for lighting projects including LED upgrades, occupancy sensors and improving daylight harvesting. The team observed that there would be potential for cost savings once all fluorescent and metal halide lighting fixtures are replaced with energy-efficient LEDs. The total wattage of current lights was estimated at 11,939 W for the various areas around the facility. The current lighting fixtures are used during usual shift hours but could also benefit from lighting controls. By upgrading controls and lights, the facility has the potential to save $2,998 (or 27,506 kWh) annually. The outlined recommendations are a summary and not a comprehensive economic analysis of projects.

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P3987-B (online) 7/25