Fisheries Wastewater Recapture for Industrial Use

Client: McKinstry and U of I

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Background:

The university has intensive fisheries research in the CNR building. Conditions for the research must be precise, with variables such as water quality, flow rates, and temperature strictly controlled. As such, water cannot be recirculated within the fish tanks without compromising the research and is instead sent directly to drain. Considering the very high water consumption, about one million gallons per month, alternative means of conserving water are desired.

The energy plant on campus produces steam for heating on campus, which is distributed via a network of underground tunnels. Some of the steam is lost in the process, requiring the plant to add make-up water. A large amount of make-up water is also needed for cooling tower operations, which is lost to evaporation. This makes the energy plant an ideal candidate to utilize non-potable wastewater on campus that would otherwise be sent to drain.

This project redirects the fisheries wastewater to the energy plant. Doing so will reduce the university's overall water consumption without impacting the research. Since the fishery requires colder water than the Energy Plant an economizing heat exchanger is needed to reduce the energy consumption of both systems. Finally, the water use fluctuates at the plant, so a control valve and means of automatically controlling flow rates is needed.

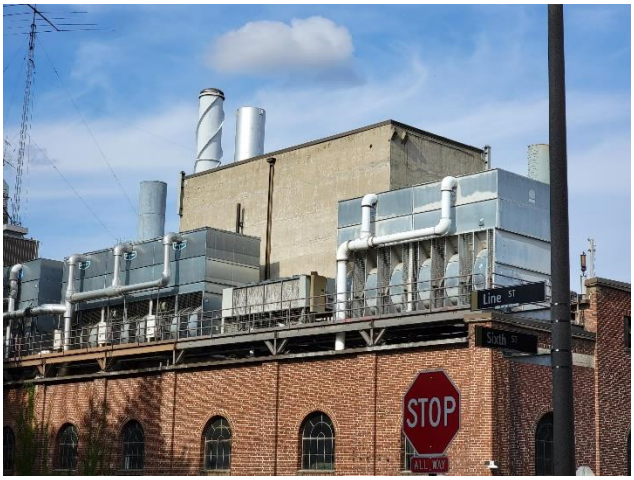

Figure 1. Cooling towers at Energy Plant.

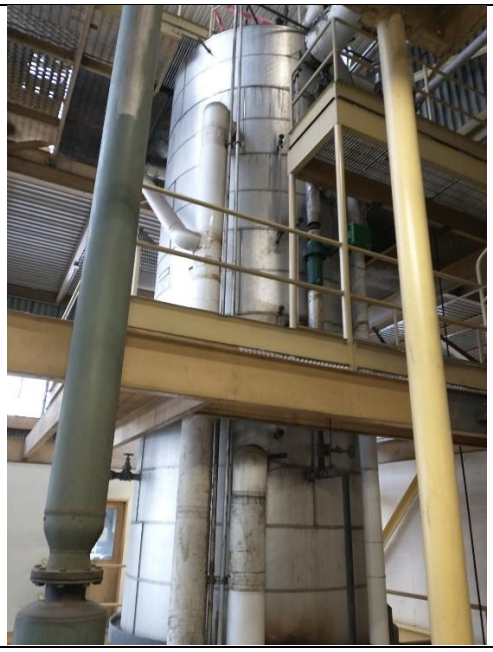

Figure 2. Hot Lime Softening system at Energy Plant requires make-up water.

Objective:

Mechanical design of a system to redirect water and recapture energy from fisheries wastewater for use in industrial applications at the Energy Plant.

Deliverables:

The following outcomes are desired:

1. System design to redirect flows including:
    a. Pumping requirements
    b. Economic pipe diameter
    c. Heat exchanger selection and sizing
    d. Flow rate and bypass control
2. An engineering economic analysis of the proposed design
3. Assessment of the impact or benefits to campus sustainability

Potential Engineering Disciplines:

Mechanical engineering

Budget:

The budget for this project is approximately $1,000. (Paid by the University)