

2013 Case Study

The Biosecurity Research Institute

Intern: Noura Saadi
Major: Civil and Environmental
Engineering
School: Kansas State University



Manhattan, Kansas



Company background

The Biosecurity Research Institute (BRI) is a comprehensive BSL3 (biosafety level 3) and BSL3-Ag (biosafety level 3 agricultural) facility with the necessary equipment to safely study pathogens that threaten animal and plant-based agricultural systems. The \$54 million facility also develops intervention strategies to minimize impact on the nation's food supply and economy. Located on the Kansas State University campus, BRI has acquired countless grants for education and research exploration at the school since its opening in 2008. This facility is unique among biocontainment research accommodations in several important ways. Researchers have the ability to evaluate actual food-processing conditions and determine if there are safer methods, and they are able to observe the plant or animal all the way to the product. This "farm-to-fork" method makes this institute one of the few labs in the world with such capabilities.

Project background

Prior to participation in the program, the BRI was a fully functional research facility that consumed large amounts of energy, gas, and water resources. While retaining its functionality, the institute expressed an interest in creating a more environmentally efficient building. Though there proved to be many challenges throughout the internship due to areas of containment, many areas were targeted for savings.

Incentives to change

Kansas State University recently committed to a self-improvement mission known as "K-State 2025." The overall goal of the project is to be recognized as a top 50 public research university by the year 2025. The 15-year plan consists of constructing new business and engineering buildings, and an expansion to Seaton Hall, allowing more advanced research

projects to be conducted at Kansas State University. It also comprises additions to both the Kramer and Derby complexes, including a new dining center and two new dorms, encouraging more students to enroll. The student union will also see an expansion, making the building size more functional for the current enrollment, while also allowing for an increase in admissions. Finally, the East and West Stadiums will be completely remodeled to better suit the thriving Wildcat population.

In order to support these expansions, the university first needed to examine its current HVAC state. Presently, K-State has one chiller plant containing two 1,250-ton absorbers. With the new additions and hopes of future expansion, the chiller plant would not be able to support the campus. It was proposed to build a new chiller plant as an addition to the "K-State 2025" plan. Funding for this plant will come from various opportunities for savings throughout campus, including those identified at the BRI. This new plant will have a 4,000-ton capacity, with a potential of 8,000 tons. It will be located just west of the recycling center on campus and will create a closed-loop system for the entire campus including the current chiller plant. The plant will have four cooling towers, with 30-in. piping that will be buried at a depth of 20 ft.

Projects reviewed for E2/P2 potential

Through the Engineering Extension and Pollution Prevention (E2/P2) program, interns were assigned to various sites with the intent to research waste-reducing solutions which will in turn help companies reduce operating costs, regulatory compliance burdens, and their environmental footprints. When the intern began her research at the Biosecurity Research Institute, she was given multiple projects to investigate and determine which would be the most beneficial both environmentally and economically, while also encouraged to explore other opportunities for savings. With help from countless employees, the

intern was able to effectively identify five research projects, including the following:

- Air-handling units scheduling and setbacks
- Irrigation moisture and rain sensors
- Water-cooled condenser units chiller tower
- Indoor lighting fixture replacements and occupancy sensors
- Outdoor lighting replacements

Summary of 2013 E2/P2 intern recommendations for the Biosecurity Research Institute

Project description	Annual estimated environmental impact	Annual estimated cost savings	Status
Irrigation rain/moisture sensors	111,493 gal	\$295	Implemented
Air-handling units scheduling/ setbacks	177,970 kWh 205 MCF	\$7,796	In progress
Water-cooled condenser units chiller tower	4,073,000 gal	\$26,770	Evaluation in progress
Indoor lighting fixture replacements and occupancy sensors	408,983 kWh	\$4,209	Further research required
Outdoor lighting replacements	4,546 kWh	\$340	Not recommended
Total savings *	4,184,493 gal, 177,970 kWh, 205 MCF	\$34,861	
GHG reductions *	205 metric tons CO₂e		

* Does not include projects that are “not recommended” or where “further research is needed.”