2020 Case Study

CIRCUIT RIDER

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Company Background

A Kansas State University Pollution Prevention Institute or, PPI 2020 circuit rider intern assisted food processors, manufacturing companies, and a large group of laboratories reduce their use of energy, water and chemicals.

Project Background

Each company was contacted to schedule a site visit and assess prerequisites for projects. On-site visits were conducted to identify and research pollution prevention, or P2 opportunities. After the visit and research, a P2 report was provided to the company that contained P2 recommendations along with environmental, social and economic impacts.

Incentives to Change

Implementing P2 benefits the environment, the community and employee health. Companies assisted by the Circuit Rider intern were looking for methods to accomplish this. Reducing chemical waste and energy and water consumption are methods to reduce environmental impact and save money. The intern presented six companies with viable methods of reducing their footprint through P2 strategies.

Projects Reviewed for P2 Potential

Compressed-air Leak Audits
The intern examined compressed-air systems at five facilities to check for air leaks, which can result in increased electrical use for compressed-air systems. A UE Systems ultrasonic detector and corresponding app were used to identify leaks and calculate their energy loss. Combined annual energy and cost savings with air-leak repairs are estimated to be 755,585 kWh and a cost savings of $65,151.

LED Lights
Three facilities were evaluated for upgrades to lighting from fluorescent to LED. LED lights are more efficient, last longer, lack mercury, and provide more illuminance than fluorescent bulbs. By installing LEDs, the combined annual savings is 206,785 kWh and $26,541, with an average return on investment of 1.29 years.

Solvent Reclamation
The intern examined a steel manufacturer's paint-solvent use and recommended a solvent reclamation system for recycle and reuse of solvent. Such a unit could recycle up to 90% of solvent a year, reducing hazardous waste disposal by 248 gallons, reducing the cost of virgin chemical purchases and saving the company $5,949. The return on investment for purchasing the unit would be 1.5 years.

Chemical Inventory
The intern assisted a company managing chemical inventories and hazardous waste disposal for numerous laboratories that were not reporting complete or correct inventories. Additionally the laboratories routinely disposed virgin chemicals as hazardous waste. Educational materials to train lab managers to report and improve chemical inventory records were developed. An online system to improve chemical inventory tracking was evaluated. Improved inventory control and communication with the lab managers could reduce hazardous waste disposal of virgin chemicals by an estimated 18,436 pounds per year and $15,522 in hazardous waste disposal fees.

Water-Leak Repairs
While visiting a food processing facility, the intern observed numerous water leaks. He measured the volume of two leaks and calculated the annual estimated loss of water if the leaks were to go unrepaired. Repairing the two leaks could save 20,826 gallons of water and $31 with greater savings potential if all leaks were repaired.

Air Vibrators
A food processing facility utilized air vibrators, operating via a constant flow of compressed air, to dislodge material stuck to the sides of bins and pipes.

The ball air vibrators in use were an older model and discharged large amounts of air. Newer

vibrators would use less energy, are quieter, and do not require frequent repairs. Replacing the ball vibrators with newer pneumatic air vibrators could save the company an annual estimated 336,888 kWh and $11,791.

Welding Gas Leaks

Welding gas-line leaks were identified using the UE ultrasonic detector. The welding gas was a mixture of CO_2 and argon. Although CO_2 is a GHG, neither it nor argon are regulated pollutants. Savings when leaks are repaired would be an estimated 3.83 $MTCO_2e$ and $5,163.

Solar Panels

Solar panel installation was evaluated at a food processing plant. The intern used an online solar panel cost estimator, which showed the kWh and cost savings of installing solar panels. Installation costs vary by installation contractor. Because of this, the intern recommended further research into local dealers which could reduce installation costs. Preliminary calculations for solar energy could save the company 1,170,880 kWh and $171,913 per year.

Sanitation Chemicals

The food processing facility used several methods of sanitation to prevent microbial contamination of their food-grade production. These included alcohol, a dry foot powder, and Ultra-Quat/water foam solution. The intern found the company could reduce Ultra-Quat use by replacing the foam method with additional alcohol boot sprayers. Reducing Ultra-Quat would result in reduced water usage, but air emissions could increase due to alcohol use in boot sprayers. The intern estimated a savings of $6,846 by reducing 29,133 gallons of water but further research was recommended.

Summary of 2020 P2 intern recommendations

Project	Annual estimated environmental impact	Estimated cost savings ($/year)	Status
Compressed-air leak	759 $MTCO_2e$, 731,643 kWh	$65,151	Recommended
LED Lights	217 $MTCO_2e$, 206,785 kWh	$26,541	Recommended
Solvent Reclamation	248 gallons n-butyl acetate, a VOC	$5,949	Recommended
Chemical Inventory	18,436 lbs. of virgin lab cleanout chemical/ hazardous waste, 0.4 $MTCO_2e$	$15,523	Recommended
Water Leak Repairs	20,826 gallons of Water, 0.14 $MTCO_2e$	$31	Recommended
Air Vibrators	336,888 kWh, 355 $MTCO_2e$	$11,791	Recommended
Welding Gas Leak	3.83 $MTCO_2e$	$5,163	Recommended
Solar Panels	1,170,880 kWh, 1,232 $MTCO_2e$	$171,913	Further research needed
Sanitation Methods	831 gallons of Ultra-Quat, 29,133 gallons of water, 0.19 $MTCO_2e$	$6,846	Further research needed
Total[1]	1,275,316 kWh, 20,826 gallons of water, 18,436 lbs. of virgin lab cleanout chemical/hazardous waste, 248 gallons n-butyl acetate	$130,149	
GHG reductions[1,2]	1,335 metric tons CO_2e		

[1]Does not include projects "not recommended" or where "more research needed."

[2]EPA P2 GHG Calculator with Cost, 7 April 2016