2017 Case Study

Tyson Foods, Inc.

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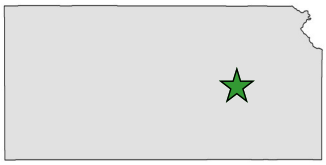

Company background
Tyson Foods Inc. is a multinational, meat-based food production company headquartered in Springdale, Arkansas. As of fiscal year 2016, Tyson employed 114,000 people across 107 facilities. While principally known for chicken products, they also prepare beef, pork, and turkey products. The Emporia, Kansas, processing plant, originally purposed as both a harvesting and processing facility, focuses on beef products, outputting foods ranging from ground beef chubs to USDA-certified steaks.

Project background
As per the Emporia plant's expectations of the internship program, the intern undertook projects focused primarily on wastewater reduction opportunities. Three of the five projects presented are tied to the plant's water system and two of those also had natural gas components However, steam heating and hot water bleed-off are also natural gas projects due to their relationship to the plant's natural gas-fueled boilers. The other two projects focused on waste electricity.

These projects were identified through observations of the plant in operation as well as through conversations with on-site personnel about waste issues they had noticed. Following identification of a potential project, the intern would bring it to the attention of management, discuss potential solutions with maintenance, and begin collecting data to approximate the project's waste-reduction potential.

Incentives to change
As a core value, Tyson Foods considers itself a "steward of the animals, land, and environment." To maintain the integrity of such a declaration, Tyson reports its efforts to reduce its environmental impact through sustainability initiatives. Tyson's corporate office recently hired a sustainability officer, and using a 2015 baseline, has set a corporate-wide goal to reduce water use by 12 percent by 2020. In addition to the water-reduction goal, the Kansas plant has set additional goals to reduce electrical and natural gas use by 3 percent, both by 2020.

Projects reviewed for P2 potential

<u>Solenoid valves to control continuous water supply</u>
The first project considered water usage of 10 vacuum packaging machines. When in operation, each unit has a constant supply of cooling water. However, eight of the units are capable of running for eight hours without water. The intern discussed several options with the maintenance staff to reduce the machines' water usage, and it was decided to incorporate solenoid valves into the plumbing of the eight waterless-capable units. The estimated annual savings is $2,728 and 1.69 million gallons of water. The electrical equipment is estimated to consume 91 kWh of electricity per year.

The men's locker room is equipped with four urinal troughs. These are a constant-drip design that produces 3,017,771 gallons of wastewater per year, costing the company $4,888. Installing normally closed solenoid valves with a time-delay relay, set to actuate for two minutes every six hours, reduces yearly production of wastewater to 25,148 gallons. While this solution requires 4.11 kWh of electricity per year, it produces a net annual savings of $4,848 and 2.99 million gallons of water.

<u>Replace boilers and repair steam leaks</u>
The second project centered on two direct-steam-injection heaters currently used to produce the plant's hot water. They are not efficient since they regularly overdraw steam from the boilers. A cancelled plan from 2015 to replace these two heaters was reconsidered by the intern. By recalculating potential savings from the original quote's estimates, the intern estimated an annual $10,841 could be saved due to 12,777 MMBTU reduced natural gas usage. Replacing the two heaters also allows for several leaks in the heating system to be fixed. These leaks cost the company $263 per year; 89,500 gallons of water and 139 MMTBU natural gas to heat it. In total, this project's estimated annual savings is 89,542 gallons of water; 12,827 MMBTU natural gas; and $11,104.

Tankless water heaters to eliminate bleed-off

The third project's aim was to eliminate the need for the plant's two hot water bleed-off points. Several electric tankless water heaters were considered; however, none of the heaters the intern reviewed were designed to supply the needed temperature rise for the required flow rate, without the installation of multiple heaters at each location. Electric heaters with a tank were considered, but they suffered from the same issue. Nonetheless, implementing electric water heaters to eliminate bleed-off points would save the company 560 thousand gallons of water and 4,812 MMBTU of natural gas, in turn consuming 716,358 kWh of electricity per year. This change will increase annual energy spending by $46,064, and thus the project is not recommended.

Upgrade lighting with LEDs

The employee parking lot is currently lit with 32 high-pressure sodium fixtures. These light fixtures are to be replaced with LED fixtures. Based on quotes received by a maintenance supervisor, it is estimated replacing these fixtures will save $10,944 per year by conserving 82,561 kWh of electricity. Additionally, the Tyson property is constantly lit by three high-pressure sodium fixtures and two metal-halide fixtures. Since these five fixtures are only supposed to be on during periods of darkness, it is assumed the photocells controlling them are malfunctioning. Replacing these photocells so that they operate normally is estimated to save the company $1,635 per year by conserving 22,934 kWh of electricity.

The facility's electric panel rooms are illuminated with fluorescent lights and metal halides each day of the week for 24 hours per day. By replacing current lights with LEDs and by installing occupancy sensors within the panel rooms, the Emporia plant can expect to save $12,050 per year by conserving 165,221 kWh of electricity. The non-panel rooms included in this project are derelict rooms clustered in the eastern half of the plant where harvesting used to take place. Like the panel rooms, these rooms are also constantly lit with fluorescent lights and metal halides. Following the same scheme of light replacement and sensor installation can save the company approximately $6,094 by conserving 85,502 kWh of electricity per year. The combined savings is $18,144 by conserving 250,724 kWh of electricity per year.

Compressed-air-leak survey

Seventy air leaks were discovered with a UE Ultraprobe 9000 during a cursory examination of the processing rooms, abandoned harvesting rooms, basement, and rooftop refrigeration system. Once fixed, these leaks have the potential to save the company $27,863 per year by conserving 395,818 kWh of electricity. A biannual air-leak audit is recommended.

Summary of 2017 P2 intern recommendations for Tyson Foods, Inc.

Project description	Annual estimated environmental impact	Annual estimated cost savings	Status
Solenoid valves to control continuous water supply	4.68 million gallons (95) kWh	$7,576	In progress
Replace boilers and repair steam leaks	89.5 thousand gallons 12,827 MMBTU	$11,104	Recommended
Tankless water heaters to eliminate bleed-off	560 thousand gallons 4,812 MMBTU (716,358) kWh	$(46,064)	Not recommended
Upgrade lighting with LEDs	356,219 kWh	$30,722	Recommended
Compressed-air-leak survey	395,818 kWh	$27,863	Recommended
Total savings[1]	**4.77 million gallons 12,827 MMBTU 751,942 kWh**	**$77,265**	
GHG reductions[1]	**1,438 metric tons[2] CO_2e**		

[1] Excludes projects "not recommended"

[2] EPA P2 GHG Calculator with Cost, May 2014