2017 Case Study

Smithfield Foods

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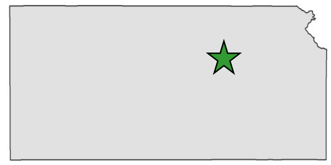

Company background
Smithfield Foods is a $14 billion global food company, and the world's largest pork processor and hog producer. Based in Smithfield, Virginia, the company produces a variety of packaged meats categories in a number of popular brands. Smithfield employs 52,000 people in North America and Europe, and exports products to more than 40 countries around the globe.

The Junction City, Kansas, Smithfield plant produces smoked sausages marketed under the Eckrich brand. It is located at 1920 Lacy Drive in Junction City. According to the Smithfield website, this plant employs 471 workers, making it one of the largest private employers in Junction City. Production averages approximately 150 million pounds of packaged meats in a given year, or about 2.8 million pounds per week.

Project background
The intern investigated projects in the areas of compressed-air efficiency, office lighting efficiency, parking lot lighting efficiency, biofuel generation, plastic cleaning and recycling, and truck-loading efficiency of recyclable materials.

Three plastics projects involved measures to reduce the amount of plastic going to the landfill. Currently, the Smithfield plant landfills about 2,796 tons of solid waste per year and about half of it is plastics.

Incentives to change
The primary driver for change at this plant is corporate policy. All plants are to reduce water use, energy use, and solid waste by 10 percent by the year 2020. All plants are also required to implement an ISO 14001 environmental management program and the Smithfield Junction City plant has done so.

In seeking to attain its goals, the Junction City plant has set 2017 goals for its operations in terms of water (3 percent reduction), energy (3 percent reduction), and solid waste (5 percent reduction). Performance in these areas is measured per 100 pounds of finished product.

Projects reviewed for P2 potential

<u>Compressed-air-leak audit</u>
The first project involved establishing an ultrasonic-based plant reliability program. The program would use ultrasonic technology for detecting and quantifying air, steam, natural gas, and ammonia leaks; monitoring motor bearing and valve conditions; and detecting electrical failure. This type of equipment was field-tested during the internship, using an ultrasonic probe on loan from the P2 program. Over the course of two days of testing, 48 leaks were found, representing 191.8 cubic feet per minute of air loss. Repair needs identified in these two rounds of leak detection represent a potential electrical savings of 329,000 kWh/year, a cost savings of $27,700. It is assumed at least the same level of savings could be accomplished with an in-house probe. Estimated electricity savings would yield a simple payback of 0.7 years.

<u>Replace existing lights with LEDs</u>
The next two projects involved replacing fluorescent tubes in non-production areas with light-emitting diodes (LEDs) and replacing mercury-vapor exterior lights with LEDs as well. The Smithfield plant has already partially implemented both projects. These retrofits would yield a combined 291,000 kWh and $24,700 savings per year.

<u>Waste-to-biofuel generation</u>
Another project investigated the feasibility of generating biogas from the plant's wastewater and solid waste. A conceptual design was developed for an anaerobic digester that could produce an estimated 50,000 therms of biogas. An estimated annual savings of $81,600 would result from reduced natural gas usage and reduced solid-waste-disposal costs, yielding a simple payback of 8.0 years. If wastewater treatment charges were reduced by 10 percent, the payback would improve to 4.8 years. The Smithfield plant is suited to this internationally established technology, because its wastewater is high in organic matter and already at a temperature that facilitates microorganisms involved in producing

biogas. The high natural gas demand at the plant could avert the need to store the methane or convert it to electricity. It is recommended this project be further investigated in cooperation with Kansas State University.

Recycle LDPE plastic
The largest volume of plastic, approximately 421 tons, is sheets of low-density polyethylene (LDPE) film used as liners for meat delivered to the plant and meat that is staged for rework. Because this plastic has come in contact with raw meat, it is considered unsanitary and is not able to be recycled locally. As part of the project, a proposal was obtained from a Nebraska-based recycler who is willing to accept the plastic at the same cost per ton as is currently being paid to landfill it but who would not charge a fee for each compactor pull.

To separate and compact the plastic for storage and transportation, a rotary compactor is recommended. A rotary compactor addresses odor and vermin problems associated with the meat-laden plastic by tightly compacting and sealing it. In the sealed state, the LDPE should be able to sit unrefrigerated until the recycler can haul a full truck. This also helps to source-separate the LDPE, reducing risk of cross-contaminating other plastic streams. After the reduced solid-waste-pull fees, this investment will yield a simple payback of 1.9 years.

Compost cellulose casings
A second tics, approximately 873 tons per year, is generated when sausage casings are removed from those sausages not produced with traditional natural casings. These cellulose-based casings are removed from the packing line area using a vacuum system and are currently compacted with other waste for landfill disposal. Prior to the internship, Smithfield had already obtained a proposal to compost these cellulose-based plastics at an organics site in Salina, Kansas. During his review of the overall plastic waste stream, the intern validated the composting approach for cellulose casings as a viable option.

Energy from waste packaging trim
A third stream of plastics, approximately 24 tons per year, is generated during the packaging of sausage in plastic. Excess plastic, trimmed from the packaging, is removed from the packing-line area using a vacuum system and is dumped into an open bin for landfill disposal. As part of the project, a proposal was obtained from an Oklahoma-based company to recover the energy from this plastic. Sending the whole plastic waste stream to this company is not viable because energy content of the other plastic would not justify costs incurred.

Improve efficiency for loading recyclables
To improve efficiency and safety of the plant's recycling program, a portable loading ramp is recommended. Currently, recycled materials are lifted into the back of the trailer with a forklift and then maneuvered inside the trailer with a pallet jack. A portable forklift ramp would allow recycled materials to be stacked inside the trailer mechanically. Approximately 36 hours of labor and 678 pallets would be saved per year due to this investment, yielding a simple payback of 4 years.

Summary of 2017 P2 intern recommendations for Smithfield Foods, Junction City, KS

Project description	Annual estimated environmental impact	Annual estimated cost savings	Status
Compressed-air-leak audit	329,000 kWh	$27,700	Partially implemented
Replace existing lights with LEDs	291,000 kWh	$24,700	Partially implemented
Waste-to-biofuel generation	50,00 therms	$81,600	Recommended
Recycle LDPE plastic	421 tons diverted from landfill	$11,520	Recommended
Compost cellulose casings	873 tons diverted from landfill	-	Partially implemented
Energy from waste packaging trim	24 tons diverted from landfill	-	Recommended
Improve recyclables-loading efficiency	-	$3,310	Recommended
Total savings	**620,000 kWh 50,000 therms 1,318 tons**	**$148,830**	
GHG reductions[1]	**1,756 metric tons CO_2e**		

[1] EPA P2 GHG Calculator with Cost, May 2014 & EPA WARM Tool- Version 14