Project Overview

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Company Background

Nebraska Nitrogen is an anhydrous ammonia fertilizer manufacturing plant based in Geneva, Nebraska that employees 60 people. The operation serves farmers of the Western Cornbelt, providing the necessary fertilizer to allow farmers to sustain soil fertility and crop production. The entire facility produces approximately 100 tons of ammonia fertilizer per day and has a storage capacity of up to 20,000 tons.

Project Description

The most limiting aspect of Nebraska Nitrogen's production is their steam usage. The plant is steam-limited, which becomes even worse in the winter. Many of the processes required in producing anhydrous ammonia either use steam as a heat source, as a water source for reactor feed streams, or a combination of the two. Specific areas of the plant investigated that featured significant steam impact were the waste heat boiler, the three auxiliary package boilers, the boiler feed water tank, the water-gas shift reactor, and the ammonia stripper.

Pollution Prevention Benefits

Pollution prevention is one of the utmost concerns of Nebraska Nitrogen. One large area that produces greenhouse gases is the combustion of natural gas for steam generation in the plant. As the plant is steam limited, the steam generation rate will remain roughly the same, but the emissions per ton of ammonia produced will decrease. The one exception to this was the insulation of the permeate tank, which would reduce the load required by the boilers. In total, the reduced emissions amounted to 850 metric tons of CO_2 annually.

Results

The projects undertaken while at Nebraska Nitrogen were incredibly successful. They resulted in significant cost savings, potential production rate increases, and reduced greenhouse gas emissions. The savings are quantified in Table 1. Additional indirect or intangible benefits include eliminated exposure to dangerously hot surfaces, improved boiler efficiency and instrumentation lifespan and reduced GHG emissions.

Table 1: Pollution Prevention Benefits and Results of the Project

Annual Energy Savings (MMBTU/year)	Annual Cost Savings ($/year)	Implementation Cost ($)	Simple Payback Period	GHG Reductions ($MTCO_2e$/year)
16,940	$411,400	$94,300	0.23 years	1,890