

GREEN PLAINS SUPERIOR, LLC

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COMPANY BACKGROUND



SUPERIOR

Green Plains Superior, LLC is an ethanol production facility based in Superior, Iowa. The company is a subsidiary of Green Plains Renewable Energy Inc., and currently employs 43 individuals. The employees are split between two daily shifts to maintain constant operations for ethanol production in the facility. The plant consumes more than 18 million bushels of corn in order to produce over 50 million gallons of ethanol annually. Along with ethanol, the company produces and sells dried distillers grains, distillers wet grains, and a syrup, all of which are byproducts of the ethanol production process and sources for animal feed.

PROJECT BACKGROUND

An audit of the compressed air system was performed in order to identify areas of the system in which efficiency could be increased, resulting in energy, environmental, and cost savings.

An insulation audit was also performed to identify opportunities to reduce the amount of heat loss found primarily in the steam, return condensate and ring dryer systems. Reducing heat loss leads to direct savings in natural gas consumption, with associated cost savings and the diversion of pollutants and greenhouse gasses.

INCENTIVES TO CHANGE

Responsible for almost 10 percent of the electrical usage at the plant, the compressed air system is a large potential source of energy savings. Any increase in the efficiency of the compressed air system would lead directly to a reduction in energy consumption and cost.

Aside from the cost of corn, natural gas is the largest cost of ethanol production at Green Plains Superior. Any reduction in natural gas consumption by means of insulation would result in direct environmental and cost savings.

RESULTS

Compressed Air System: The compressed air analysis revealed potential savings obtainable through several strategies including repairing air leaks, decreasing supplemental compressor operation, reducing compressor discharge pressure, decreasing dryer regenerative air purge rate, maximizing compressor cycle time, and installing compressor cold air intake systems. Overall, the

environmental impact of the recommended actions can save up to 769,000 kWh of annual energy consumption. The cost savings due to reduced energy consumption could exceed \$29,000 on an annual basis. In some cases the benefit of reduced maintenance and wear, along with extended compressor life, would provide additional savings.



Deaerator Tank Insulation: The insulation audit revealed the greatest source of heat loss to be the deaerator tank. Insulating the tank would have the greatest possible return of all intern recommendations. Annual savings could exceed \$38,000, with a potential return on investment of less than six months. The audit also found more than 460 feet of bare steam and condensate lines accounting for upwards of



15,000 therms of annual heat loss. Bare valve and flanges are estimated to account for an additional yearly heat loss of nearly 3,660 therms. With the appropriate insulation, up to 90 percent of the heat loss could be prevented, saving the company \$11,000 each year.

Ring Dryer Insulation: The ring dryer is responsible for almost one-third of the natural gas consumption at Green Plains Superior. Noted areas of the ring dryer include large air duct flanges, access hatches, and areas where insulation has been damaged or removed. In total, an estimated bare surface area of 366 square feet is recommended for the addition of insulation. Savings would exceed \$10,000 annually.

CONVENTIONAL AIR POLLUTANTS AND GREEN HOUSE GASES DIVERTED IN STANDARD TONS

Total for all sectors					
CO ₂	SO ₂	CH ₄	N ₂ O	CFC	PM-10
407.67	2.05	109.76	0.42	5.03	0.06

PROJECT	ANNUAL COST SAVINGS	ENVIRONMENTAL RESULTS	STATUS
REPAIR COMPRESSED AIR LEAKS	\$8,150	247,900 KWH	RECOMMENDED
INCREASE CYCLE TIME/AIR SYSTEM RECONFIGURATION	\$6,315	191,940 KWH	RECOMMENDED
REDUCE GA 45+ COMPRESSOR OPERATION	\$6,440	195,800 KWH	RECOMMENDED
UPGRADE TO DEW-POINT DEPENDENT PURGE CONTROL	\$4,434	134,778 KWH	RECOMMENDED
COMPRESSOR PRESSURE REDUCTION	\$3,800	115,500 KWH	RECOMMENDED
COMPRESSOR COLD AIR INTAKES	\$2,600	79,000 KWH	RECOMMENDED
STEAM AND RETURN CONDENSATE PIPE INSULATION	\$8,250	15,000 THERMS	RECOMMENDED
DEAERATOR TANK INSULATION	\$38,000	69,000 THERMS	RECOMMENDED
VALVE AND FLANGE INSULATION	\$2,010	3,660 THERMS	RECOMMENDED
RING DRYER INSULATION	\$15,400	17,520 THERMS	RECOMMENDED