

# GRUNDY COUNTY MEMORIAL HOSPITAL

GRUNDY  
CENTER



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## COMPANY BACKGROUND

Grundy County Memorial Hospital (GCMH), Grundy Center, successfully combines the values of personal care and friendliness with a high standard for health care often found only in much larger communities. Founded 61 years ago, the hospital has grown to serve four counties and to employ 213 people. The hospital has a regional reputation for its orthopedic services, including total knee and total hip replacement surgery, and the variety of outpatient services it makes available to the residents of the rural communities it serves. The hospital has been recognized with the Summit Award™ for Patient Satisfaction for its Emergency and Outpatient departments, and has been named a Top Twenty Most Recommended critical access hospital by the National Rural Health Association for 2012 and 2013.

## PROJECT BACKGROUND

Steam is a widely used utility at GCMH. Two fire-tube boilers serve the facility needs, one as standby and the other (which runs 85 percent of the year) producing the steam that is used for several processes in the building. In addition, an electric boiler is not currently used because it is unable to handle the necessary demand when the main boiler is down for maintenance.

## INCENTIVES TO CHANGE

The current boiler system was installed in 1969. Several additions to the original structure have increased the demand on the aging boiler system. The purpose of this project is to optimize the operating efficiency of the boiler and steam systems to reduce associated costs and emissions. Funding options and financial incentives were researched to help make the system improvements more cost effective.

## RESULTS

**Reduce Boiler Pressure:** The main boiler is run at a pressure of 70 psi to power two sterilizers in the surgical area. All other processes require a pressure of 20 psi or less. If the electric boiler were used to supply steam to the two sterilizers, which run about twenty hours per week, pressure on the gas-fired boiler could be reduced to 25 psi to provide the other steam needs for the facility.

**Duct Warm Air to Boiler Intake:** The boilers are located in a separate building so the high temperature does not heat up the rest of the facility. Installing ductwork to recover the heat from the ceiling of the boiler building and return it to the boiler intake would increase the intake air temperature. Combustion efficiency will increase one percent for every 40° F increase in air intake temperature.

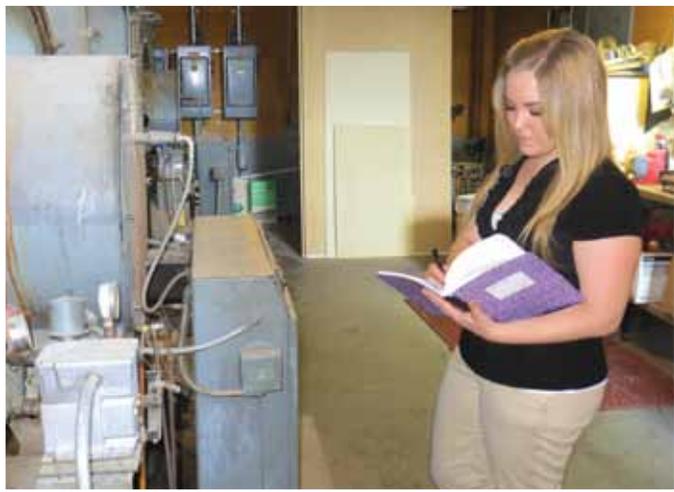
**Air-Fuel Ratio:** A proper air-fuel ratio is necessary for optimum combustion efficiency. If there is a lack of or excess of air to the system the fuel is unable to burn at its full potential. Currently this boiler has been producing soot, which indicates that the air-to-fuel ratio is off. Correcting the air-fuel ratio will increase the combustion efficiency and reduce gas usage.

**Steam Traps:** Approximately 60 small steam traps are located on room heaters, and 40 larger steam traps are part of the distribution system located throughout the facility. Steam traps that are in need of repair or replacement can fail in the closed, open, or partially open position. A trap failing partially open or open is difficult to detect because the process will still work but will lose efficiency with each failed trap. A maintenance schedule will help to detect failed traps and improve system efficiency.



**Steam and Condensate Leaks:** The condensate returned to the boiler system is tested quarterly and on average has a 60 percent return rate, which means there are system losses. This indicates there are steam leaks and steam traps not functioning properly, which increase the load carried by the boiler. Fixing steam and condensate leaks will decrease the amount of steam the boiler must produce and the amount of make-up water the boiler must use, resulting in reduced natural gas usage.

**Insulate Pipes:** There are a small number of pipes around the facility without insulation. It appears that when maintenance was done on these pipe sections, insulation was removed and not replaced. Replacing lost insulation reduces the amount of heat loss throughout the steam system.



**CONVENTIONAL AIR POLLUTANTS AND GREENHOUSE GASES DIVERTED IN METRIC TONS**

TOTAL FOR ALL SECTORS							
CO <sub>2</sub>	SO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	CFC	NO <sub>x</sub>	VOC	PM <sub>10</sub>
45.78	0.12	82.01	4.77	0.60	0.14	0.29	0.01

PROJECT	ANNUAL COST SAVINGS	ENVIRONMENTAL RESULTS	STATUS
REDUCE BOILER PRESSURE	\$18,028	47,125 THERMS	RECOMMENDED
DUCT WARM AIR TO BOILER INTAKE	\$1,545	4,038 THERMS	RECOMMENDED
AIR-FUEL RATIO	\$4,600	12,025 THERMS	IMPLEMENTED
STEAM TRAPS-SMALL	\$8,186	5,666 THERMS	RECOMMENDED
STEAM TRAPS-LARGE	\$18,742	12,970 THERMS	RECOMMENDED
STEAM AND CONDENSATE LEAKS	\$3,857	5,262 THERMS 52,815 GALLONS	RECOMMENDED
INSULATE PIPES	\$86	225 THERMS	RECOMMENDED

