M2G Energy Analysis Report

(Using IRS billing data)

Internal Revenue Service

4800 Buford Highway
Chamblee, Georgia

Analysis Period:
December 2008 – January 2011
Location:
Chamblee, Georgia
Report Date:
September 12, 2011

Greffen Systems, Inc. Confidential and Proprietary - Do Not Duplicate

Strategic Partner:

I·E·S·G Integrity Energy Solutions Group
www.iesgcorp.com
1777 Marine Pkwy, Brooklyn NY 11234
info@iesgcorp.com
(800) 757-2406

Summary

The M2G boiler optimization control unit was installed at the IRS building located at 4800 Buford Highway in Chamblee, Georgia. The building is 328,000 sq. ft. in size and makes use of two Weil-McLain boilers, each with a capacity of 6 MBtu/hr (the second Weil-McLain is only used for emergencies and an M2G was not installed on the second boiler). The M2G was installed on the Weil-McLain boiler on December 2, 2009. Using the actual billing data for the years prior to the M2G's installation and the actual billing data for the year after the M2G's install, Greffen's engineers performed a year-over-year analysis of the building's natural gas consumption to determine the actual energy savings generated by the M2G. The natural gas consumption was normalized using heating degree days (HDD) to account for weather variation in the comparison. By using a year-over-year analysis it was concluded that there was an 18.7% reduction in natural gas usage after the M2G's installation. Two years' gas consumption, the number of heating degree days, and normalized gas consumption can be seen in the table below. It was also determined that the return on investment (ROI) was only 6 months for the M2G unit. This ROI was extremely good in spite of a 38% drop in gas prices for the IRS during the M2G's first year.

IRS Building – Chamblee, Georgia				
	CCF	HDD	CCF/HDD	Energy Savings
Pre-M2G	76,166	1,452	52.5	18.7%
M2G	88,626	2,077	42.7	

Findings from the data collected to-date include the following:

- Building comfort levels are unaffected by the M2G device.
- An average natural gas savings of 18.7% was observed during the study period.
- The IRS recognized a return on investment (ROI) of 6 months using the actual billing data.
- The M2G has delivered significant energy and carbon savings and has also integrated into the IRS's existing building operations proving that the M2G is a commercially viable energy efficiency technology for the IRS.

Strategic Partner:

I·E·S·G Integrity Energy Solutions Group

www.iesgcorp.com 1777 Marine Pkwy, Brooklyn NY 11234 info@iesgcorp.com (800) 757-2406

Introduction

Greffen Technology

The M2G is an advanced intelligent boiler control that optimizes the gas usage of a boiler. An M2G unit monitors and records the temperature of the water flowing in and out of the boiler every 10 seconds. The M2G also monitors additional boiler operating data, including heat transfer rates during firing and interval periods when the burner is off.

When a demand on the boiler is made, the M2G microprocessor checks the latest data it has stored and decides whether to allow the control signal to fire the boiler or open a relay which blocks the boiler from firing. Energy savings are only one of the criteria used in the M2G decision making process: (1) building comfort level and (2) protection of the boiler from thermal shock are other key criteria that are constraints used by the M2G. Also, the M2G preserves the existing system's control over the boiler and system. The M2G's built-in intelligence adjusts to changing conditions and operational settings without any requirement for operator adjustment or intervention. From an operator viewpoint all existing controls and procedures remain fully functional.

The result is energy savings while ensuring maximum capacity during heavy load periods; this is accomplished with no impact on building comfort levels. Viewed from a perspective of waste heat, the M2G minimizes the waste heat going up the boiler flue while preserving the transfer of beneficial heat into the building.

Greffen Systems, Inc. Confidential and Proprietary - Do Not Duplicate

Strategic Partner:

I·E·S·G Integrity Energy Solutions Group

www.iesgcorp.com 1777 Marine Pkwy, Brooklyn NY 11234 info@iesgcorp.com (800) 757-2406

Data Collection, Analysis and Findings

Energy Consumption

To determine the energy savings generated by the M2G a year-over-year analysis was performed. A baseline year was established to determine the building's gas consumption without the M2G. The baseline year ranged from December 2008 to November 2009. The consumption during the first year after the M2G's installation was then compared to the baseline. The analyzed year with the M2G ranged from February 2010 to January 2011. Annual consumption was normalized using heating degree days (HDD) to eliminate weather variation effects. The final calculations show that the M2G reduced the gas consumption at the IRS building by 18.7%. The values used to calculate the savings are presented in the summary.

Using the consumption per heating degree day (HDD) and the actual expenditure on natural gas during the baseline year, it was also determined that the M2G saved $15,286.76 during the first year. The annual savings were determined by calculating the gas (CCF) that is saved per HDD with the M2G. The savings per HDD was then applied to the baseline year to determine the return on investment (ROI). The annual savings generated a ROI of 6 months. Note; a drop in the price of natural gas occurred for the IRS in August 2010 from $1.28/therm to $0.79/therm. This decrease in the gas price resulted in a higher ROI.

Normalized Gas Spend (Pre-M2G)	Average Savings Per Year	Return on Investment (ROI)
$66,655.78	$15,286.76	6 months

Strategic Partner:

I·E·S·G Integrity Energy Solutions Group

www.iesgcorp.com 1777 Marine Pkwy, Brooklyn NY 11234 info@iesgcorp.com (800) 757-2406

Conclusions

The M2G was successful in delivering natural gas savings for the observed time period. This was accomplished by a reduction in the number of boiler firings, a reduction in waste heat going up the flue, and an increase in heat transfer to the building. The boiler met demand with less energy consumed and lower carbon emissions with no effect on the building comfort levels as confirmed with tenant reports (or lack thereof). Confirmed average annual energy savings are 18.7% with an ROI of 6 months. The M2Gs should also provide additional savings by lowering boiler maintenance costs due to the decrease in wear resulting from the reduction in boiler firings.

This analysis has demonstrated the M2G's delivery of significant energy and carbon savings for the Internal Revenue Service using the actual normalized year-over-year data. This savings was accomplished by the installation of a device that was easily integrated into the IRS's building operations. The M2G is therefore a commercially viable and proven energy efficiency technology for the IRS.

Greffen Systems, Inc. Confidential and Proprietary - Do Not Duplicate

Strategic Partner:

I·E·S·G Integrity Energy Solutions Group

www.iesgcorp.com 1777 Marine Pkwy, Brooklyn NY 11234 info@iesgcorp.com (800) 757-2406