

Medina City Schools



Energy Savings Program

COGEN SAVINGS
May 2014 – April 2015
INTERIM REPORT
May 20, 2015

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Section 1: Overview

The Brewer-Garrett Company ("Brewer-Garrett") is pleased to present preliminary results of this year's energy savings benefits of the Energy Savings Program at Medina City Schools ("Medina"). Construction completed in the fall of 2009, so we are currently tracking savings for Performance Year 6 (October 2014 through September 2015). At the time of this report, utility bills used to measure energy savings were available through February of 2015. This report also highlights the success of the combined heat and power ("CHP") unit installed at the High School in May 2014. Brewer-Garrett used additional data directly from the CHP unit to calculate savings for the first twelve months of CHP operation (May 2014 through April 2015).

Performance Year 6 interim results: As reported in November 2014, Energy Savings Program has exceeded the projected annual savings goals of \$315,769 each year since implementation. As of November 2014 after five (5) years of operation, cumulative actual savings totaled \$2,900,914, well exceeding the target savings projected for this point in the 15-year program term. For auditing purposes, the parties agreed in 2013 to divert some of these savings towards the installation of a CHP unit, leaving \$2,481,447 towards the performance guarantee. As of the writing of this report, available utility bills show that Medina has saved an additional \$249,372 through February 2015, from both the original energy savings program and the CHP unit. The CHP unit itself yielded \$34,207 in energy savings during this five-month period (October 2014 through February 2015).

CHP Performance Results: The CHP unit has performed well since its official start in May 2014, producing both electrical and thermal energy as expected. Over the past twelve months from May 2014 through April 2015, the CHP unit delivered 970,553 kWh net electricity, while consuming 9,908 mcf of natural gas. At the same time, the CHP unit contributed waste heat to the high school's heating system, offsetting 7,499 mcf of natural gas normally used in the boiler. Subtracting the cost of the annual service contract for engine oil changes and maintenance (\$17,761), the CHP unit has delivered net savings of \$47,762 since May 2014. According to Medina maintenance managers, the high school has been able to turn off its boilers in the spring and summer, relying primarily on the CHP unit for heat and hot water.



Brewer-Garrett, together with W.W.Williams (the maintenance service provider for the CHP engine), continues to optimize the performance of the CHP system. Medina maintenance staff members have been great partners in this process, making tweaks to the building control system to maximize the

benefits of CHP. We look forward to additional improvements, including the installation of additional temperature sensors this month to help optimize run time thereby maximize efficiency while managing maintenance costs.

Information within this report will be updated in November 2015, when Brewer-Garrett reports on the overall savings realized by the Energy Savings Program for Performance Year 6.

Section 2: Savings Guarantee Summary

The Performance Guarantee is governed by the Energy Performance Agreements executed by Medina City Schools and The Brewer-Garrett Company on August 31, 2007 and September 30, 2013 (the "Contract"). The Performance Guarantee, summarized in Table 2a, is based on Schedule C of the Contract dated 8/31/2007: Energy and Operational Savings Guarantee. The Total Guaranteed Savings over the term of this agreement (15 years) is \$4,736,535.

A second Energy Performance and Service Agreement dated 9/30/2013 provided for the installation of a Combined Heat and Power ("CHP") Project that was estimated to generate \$62,833 in additional energy savings and increase operational costs by \$17,760 annually for a net savings of \$45,073. This second agreement guaranteed that Medina would recover the cost of the CHP project including construction and financing costs estimated at \$537,122. Since Medina was able to fund the project without financing, thereby eliminating interest costs, the guaranteed amount was adjusted to \$419,467, equivalent to the installed cost for the CHP system.

For auditing and verification purposes the parties agreed that the original Total Guaranteed Savings amount of \$4,736,535 for the original contract should not be increased to reflect the additional CHP project guarantees; instead the Cumulative Actual Savings achieved during Performance Years 1 through 3 was reduced by \$419,467 as shown in Table 3a.

Table 2a: Performance Guarantee Summary

Total Guaranteed Savings (\$) per Contract 8/31/2007		\$4,736,535		See Table 3a.	
Total Guaranteed Savings (\$) per Contract 9/30/2013		\$419,467			
		Guaranteed Savings (\$)			
Performance Year		Water/Sewer/ Energy Savings (\$)	Stipulated Operational Savings (\$)	Total Guaranteed Savings (\$)	Cumulative Guaranteed Savings (\$)
1	2010	\$315,769	\$0	\$315,769	\$315,769
2	2011	\$315,769	\$0	\$315,769	\$631,538
3	2012	\$315,769	\$0	\$315,769	\$947,307
4	2013	\$315,769	\$0	\$315,769	\$1,263,076
5	2014	\$315,769	\$0	\$315,769	\$1,578,845
6	2015	\$315,769	\$0	\$315,769	\$1,894,614
7	2016	\$315,769	\$0	\$315,769	\$2,210,383
8	2017	\$315,769	\$0	\$315,769	\$2,526,152
9	2018	\$315,769	\$0	\$315,769	\$2,841,921
10	2019	\$315,769	\$0	\$315,769	\$3,157,690
11	2020	\$315,769	\$0	\$315,769	\$3,473,459
12	2021	\$315,769	\$0	\$315,769	\$3,789,228
13	2022	\$315,769	\$0	\$315,769	\$4,104,997
14	2023	\$315,769	\$0	\$315,769	\$4,420,766
15	2024	\$315,769	\$0	\$315,769	\$4,736,535
Total		\$4,736,535	\$0	\$4,736,535	

Note: The Combined Heat and Power (CHP) project (contract executed 9/30/2013) guaranteed \$537,112 to cover the cost of the project (adjusted to \$419,467 since the project was not financed.) This guarantee amount is not included in the table above, since the CHP project was funded via excess savings from years 1 through 3 of the program. See Table 3a.

Section 3: Performance History

Table 3a: Performance History for the Medina City Schools Energy Savings Program

Performance Year		Guaranteed Savings (\$)	Actual Savings (\$)	Cumulative Guaranteed Savings (\$)	Cumulative Actual Savings (\$)
---	Interim Period	-----	\$470,472	-----	\$470,472
1	10/09 - 9/10	\$315,769	\$438,675	\$315,769	\$909,147
2	10/10 - 9/11	\$315,769	\$478,648	\$631,538	\$1,387,795
3	10/11 - 9/12	\$315,769	\$444,287	\$947,307	\$1,832,082
Note: CHP Project contract was signed 9/30/2013 and guaranteed total savings of \$419,467; this Project was funded via the excess savings from years 1 through 3 of the guarantee. The annual Guaranteed Savings amount has not been increased to reflect the additional CHP Project guarantee; instead the Cumulative Actual Savings for Performance Year 3 has been reduced by \$419,467.					
3 rev	10/11 - 9/12	\$315,769	\$444,287	\$947,307	\$1,412,615
4	10/12 - 9/13	\$315,769	\$501,965	\$1,263,076	\$1,914,580
5	10/13 - 9/14	\$315,769	\$566,866	\$1,578,845	\$2,481,447
6a	10/14 - 2/15	\$131,570	\$249,372	partial year only	
6b	3/15 - 9/15	\$184,199			
7	10/15 - 9/16	\$315,769			
8	10/16 - 9/17	\$315,769			
9	10/17 - 9/18	\$315,769			
10	10/18 - 9/19	\$315,769			
11	10/19 - 9/20	\$315,769			
12	10/20 - 9/21	\$315,769			
13	10/21 - 9/22	\$315,769			
14	10/22 - 9/23	\$315,769			
15	10/23 - 9/24	\$315,769			
Total		\$4,736,535			

Energy Audit for Medina City Schools, Year 6 (Partial results only)

The undersigned agrees that The Brewer-Garrett Company delivered this audit report to Medina City Schools. If no written reply is made to The Brewer-Garrett Company concerning the validity of this audit in 30 days, it will be considered received by Medina City Schools. *This acknowledgement does not constitute an acceptance of the Performance Year 6 audit results which will be delivered formerly in November 2015.*

Received by: _____

Date: _____

Medina City Schools

Delivered by: _____

Date: _____

The Brewer-Garrett Company

Section 4: Summary of Savings

Table 4a

Medina City Schools ~ Performance Year 6 (Partial)			
~ October 2014 - February 2015			
Summary of Savings			
Electric			
KWH Used In Base Year		11,180,440	KWH
Baseline for	Partial Performance Year 6	4,723,163	KWH
Actual Usage for	Partial Performance Year 6	3,701,135	KWH
Total KWH Saved		1,022,028	KWH
Total Dollars Saved		\$147,252	
Natural Gas			
MCF Used In Base Year		42,373	MCF
Baseline for	Partial Performance Year 6	30,169	MCF
Actual Usage for	Partial Performance Year 6	22,899	MCF
Total MCF Saved		7,270	MCF
Total Dollars Saved		\$87,219	
Water and Sewer			
Water Used In Base Year		3,676	CCF
Water Baseline for	Partial Performance Year 6	3,676	CCF
Water Actual Usage for	Partial Performance Year 6	592	CCF
Total Water CCF Saved		3,084	CCF
Total Water Dollars Saved		\$2,301	
Total Sewer Dollars Saved		\$26,030	
Lighting M&V Savings at Bus Garage			
Partial Performance Year 6		\$1,370	
Stipulated Operational Savings (Costs)			
CHP Maintenance Costs	Partial Performance Year 6	(\$7,400)	
CHP Maintenance Costs	Adjustment for PY 5*	(\$7,400)	
*One time adj for Performance Year 5 - May '14-Sep '14			
Total Actual Savings	Partial Performance Year 6	\$249,372	
Total Guaranteed Savings	Partial Performance Year 6	\$131,570	

Section 5: Energy Savings – Performance Year 6 (partial year-5 months)

For Performance Year 6 (October 2014 through September 2015), Brewer-Garrett guarantees \$315,769 in annual savings as shown in Table 2a. For the five months analyzed to date (October 2014 through February 2015), the program is guaranteed to save Medina \$131,570 (equal to $\$315,769 / 12 * 5$) as shown in Table 3a.

Based on utility bills for electric, natural gas, water and sewer, Medina actually saved \$264,172 as shown in Figure 5a. However, Medina has incurred additional maintenance costs for oil changes and other CHP engine service items provided by W.W.Williams. These costs were included in the project's savings projections as a stipulated annual amount of \$17,761. Including these costs through February 2015 reduces the net savings to \$249,372 so far in Performance Year 6.

Brewer-Garrett will provide a detailed analysis for each school building as part of the next Year-End Savings Report, expected in November 2015. **For this interim report, the combined net savings amount to date of \$249,372 is well above the projected savings of \$131,570 for the five (5) months of Performance Year 6 (October 2014 through February 2015).**

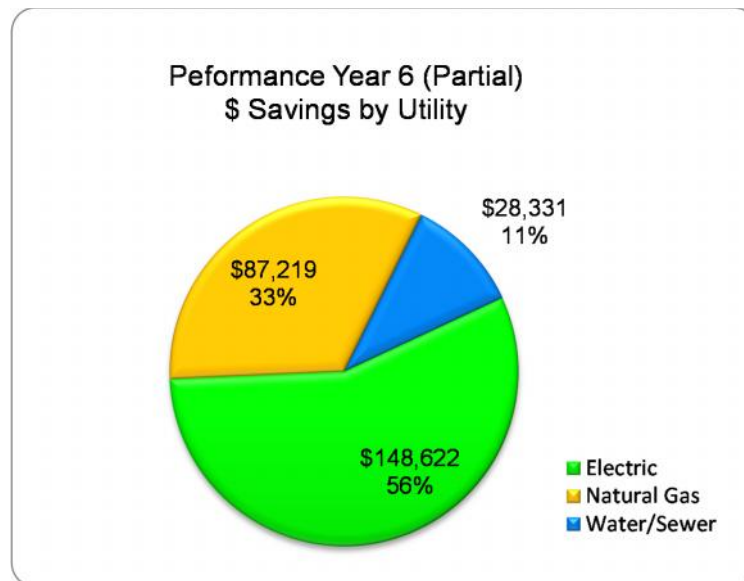


Figure 5a

Section 6: CHP Net Savings (12 months)

While earlier sections of this report outline the benefits of the entire Medina Energy Savings Program during the first few months of Performance Year 6, Brewer-Garrett wants to highlight the performance of the combined heat and power (CHP) unit installed at the high school. That unit feeds electricity and thermal energy to both the high school and adjoining recreation center. The CHP unit itself records electricity production and other important parameters, so Brewer-Garrett was able to assemble a full twelve (12) months of data, spanning May 2014 through April 2015, even though utility bills are not available for all months.

The CHP unit finished installation and commissioning by May 2014, at which time Medina City Schools signed the formal interconnection agreement with Ohio Edison. During the past year, the unit operated for 7,283 hours plus another 1,415 hours during commissioning for a total of 8,698 hours since installation. Across all operating hours, the unit generated 1,092,374 kW gross electricity as read on the engine's display screen, for an average of 125.5 kW gross output. Deducting for parasitic users on the machine (1.5%) such as the lube oil pump, water pumps and cooling fan, the unit delivered an average of 123.5 kW net to Medina.

Restricting the saving evaluation to the annual period of May 2014 through April 2015, the CHP unit delivered 970,553 kWh net electricity (after adjustments for operating hours), while consuming 9,908 mcf of natural gas. At the same time, the CHP unit contributed waste heat to the high school's heating system, offsetting 7,499 mcf of natural gas normally used in the boiler. Subtracting the cost of the annual service contract for engine oil changes and maintenance (\$17,761), the CHP unit has delivered net savings of \$47,762 during this period.



Figure 6a. CHP Unit (front and back views with heat recovery piping)

W.W.Williams performed regular maintenance on the CHP system every 1,250 operating hours. Service occurred on the dates shown in Table 6b. W.W.Williams performed another service at 8,750 hours interval a few days ago in early May 2015.

Date	Service Interval
June 6, 2014	1,250 hours
July 7, 2014	2,500 hours
September 3, 2014	3,750 hours
October 29, 2014	5,000 hours
January 6, 2014	6,250 hours
March 11, 2015	7,500 hours

Table 6b. CHP Unit Maintenance History

The unit did experience some downtime during the year in addition to regularly scheduled maintenance visits. On several occasions, the unit tripped offline because of power voltage sags from the electric utility. In order to protect its generator components, the unit automatically shuts down during such events. Onsite Medina staff can easily restart the unit with the touch of a button. The Brewer-Garrett team has worked with the engine manufacturer to adjust these trip settings to reduce the frequency of these nuisance trips.

In order to calculate net savings, Brewer-Garrett collected data directly from the CHP unit showing operating temperatures, output and performance. This information was compared to specifications to ensure that performance remained consistent. Brewer-Garrett made adjustments to its savings calculations for lost operating hours not attributable to forced outages or maintenance. This included a 24 day period in December 2014, when the unit was idled for administrative issues.

In order to translate energy saved into dollars, Brewer-Garrett used actual electric and natural gas rates charged by the utility during the past twelve months. For the high school utility accounts, natural gas averaged \$6.41/mcf while electricity cost \$0.0831/kWh.

Section 7: Conclusion

This report concludes that both the CHP unit and the larger Energy Savings Program at Medina City Schools have so far exceeded guarantee savings targets. The CHP unit has integrated seamlessly into the high school heating system and consistently delivers both electrical and thermal energy to the system.

Brewer-Garrett is pleased to be Medina's energy partner. We believe in bringing value to the partnership in areas outside of merely reporting energy savings. Later this month, we will install additional temperature sensors on the CHP unit to better track waste heat output. After a few months of monitoring, we will calculate how the high school may optimize run time and improve CHP efficiency and financial benefit. For example, on mild summer nights, the need for hot water in the building drops. It may be more economical to shut down the CHP unit for a few hours than to run it overnight. Brewer-Garrett will work with facility staff to make these decisions to drive additional value.

Natural gas prices remain steady and have even declined over the period, while electricity continues to be more expensive. Therefore, Brewer-Garrett expects the CHP unit to deliver increasing value to Medina in the years to come.