

# Annual Savings Report

## State of Ohio Standard Forms and Documents

Project Name Belmont-Harrison Career Centers Date 12/18/15  
 Project Number 1293

Project Summary	
School District Name	Belmont-Harrison Career Centers
State Project Number (SN)	1293
School Building Name(s)	Belmont Career and Technical Center Harrison Career and Technical Center
Total Project Cost (\$)	\$726,606
Length of Contract Term (years)	15
Projected Avg. Annual Savings (\$)	\$64,969
Construction Started/Completed	Start Date: 2/18/2013      Completion Date: 10/22/2013
Reporting Year (1, 2 or 3)	1
ESCO Name	Constellation NewEnergy, Inc.
ESCO Address	100 Constellation Way, Suite 1000C Baltimore, MD 21202
ESCO Phone Number	(412) 489-9467
ESCO Contact Person	David Rasmussen
ESCO E-mail Address	David.Rasmussen@constellation.com

At a minimum, the following items must be included in the annual report in order to support the summary table above. Additional information may be included and the items below are in no particular order within your report. Please check that the following are included in the report:

- Baseline utility tables (gas, electric, water/sewage, etc.) including rates
- Actual monthly utility data for the current year
- List of adjustments from baseline to current year and the supporting documentation
- Adjusted utility tables for the current reporting year
- Conclusion as to whether the project has met its savings projection
- Conclusion as to whether the project has met its guarantee (for projects approved after September 2013)
- In case of shortfall, what measures are proposed to remedy the shortfall (if applicable)

Prepared by:  
David Rasmussen, Supervisor Performance Assurance

Name, Title  
 ESCO Name

12/18/15  
 Date

Certified by:  
Mark A. Lucare

Name, Treasurer  
 School District

1/6/16  
 Date

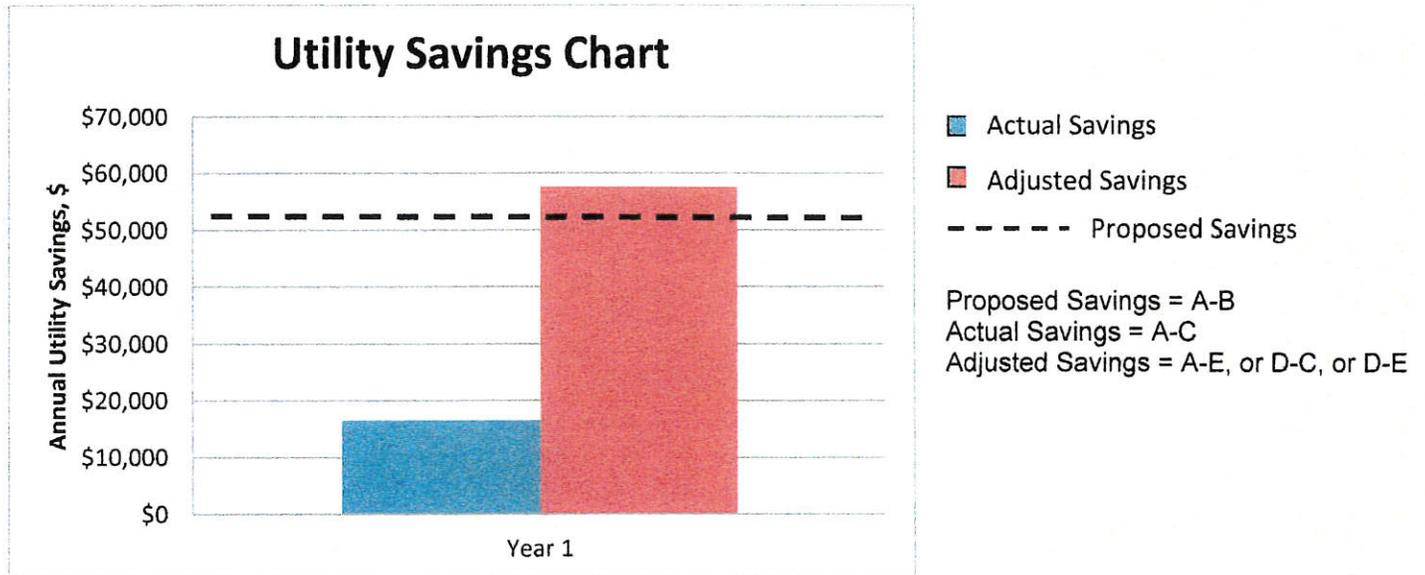
# Annual Savings Report

Utility Table

Electricity	Baseline	Proposed	Actual	Adjusted Baseline year	Adjusted Current year
Annual Usage, kWh	1,239,909	803,448	1,137,316	N/A	758,494
Annual Cost, \$	\$107,574	\$69,579	\$98,496	\$N/A	\$65,645
CDD	546		833	N/A	N/A
Fuel (if applicable)	Baseline	Proposed	Actual	Adjusted Baseline year	Adjusted Current year
Annual Usage, _____ Units	4,360	3,638	4,315	N/A	3,554
Annual Cost, \$	\$57,967	\$48,368	\$57,370	\$N/A	\$47,254
HDD	5533		6100	N/A	N/A
Water/Sewage (if applicable)					
Annual Usage _____ Units	936	482	279	N/A	470
Annual Cost, \$	\$9,793	\$5,047	\$2,918	\$N/A	\$4,920
<b>Total Annual Utility Cost, \$</b>	<b>\$175,335(A)</b>	<b>\$122,994(B)</b>	<b>\$158,784(C)</b>	<b>\$N/A(D)</b>	<b>\$117,819(E)</b>

Note: Adjustments can be to baseline year or current (measured) year, or both if baselines are adjusted to a historical average. Adjustments include weather, occupancy, utility rate, over-rides, additions, etc. Please justify these adjustments in the body of the report.

**Utility Savings Chart (Example. Delete and replace with actual project data)**



**PERFORMANCE PERIOD ONE**

July 1, 2014 - June 30, 2015

**Belmont-Harrison Career Centers**

**ANNUAL MEASUREMENT AND VERIFICATION REPORT**

**QUICK VIEW**

- 🏠 Excellent report health
- 🏠 Verified Savings exceed Guaranteed dollar amount for measurement year 1

**KEY ACTION ITEMS**

- 🏠 No action items, project is performing as proposed.

**KEY DATES**

- 🏠 July 1, 2015 - Start of Performance Year 2
- 🏠 June 30, 2016 - End of Performance Year 2
- 🏠 September 30, 2016 - Year 2 M&V Report Due

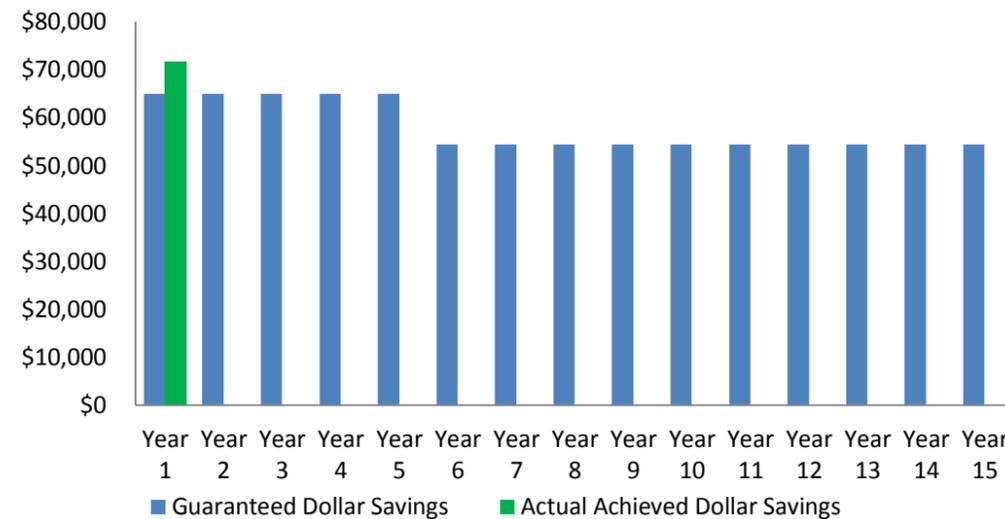
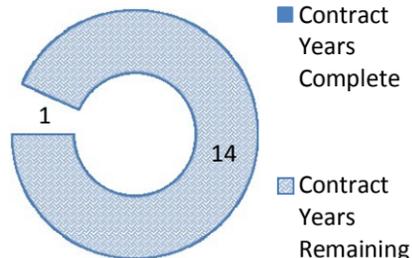
**PERFORMANCE PERIOD COSTING**

Year	Debt Service	Perf Per Expenses	Total Annual Cost
Year 1	\$61,467	\$3,500	\$64,967
Year 2	\$61,345	\$3,623	\$64,968
Year 3	\$61,218	\$3,749	\$64,967
Year 4	\$64,967	N/A	\$64,967
Year 5	\$64,967	N/A	\$64,967
Year 6	\$54,412	N/A	\$54,412
Year 7	\$54,412	N/A	\$54,412
Year 8	\$54,412	N/A	\$54,412
Year 9	\$54,412	N/A	\$54,412
Year 10	\$54,412	N/A	\$54,412
Year 11	\$54,412	N/A	\$54,412
Year 12	\$54,412	N/A	\$54,412
Year 13	\$54,412	N/A	\$54,412
Year 14	\$54,412	N/A	\$54,412
Year 15	\$54,412	N/A	\$54,412
<b>TOTAL</b>	<b>\$858,084</b>	<b>\$10,872</b>	<b>\$868,956</b>

Grayed blocks are future years

Performance Assurance  
 24 Summit Park Drive  
 Suite 103  
 Pittsburgh, PA 15275  
 (412) 489-9467  
 www.constellation.com

**Energy Performance Contract Status**



October 19, 2015

Rich Schoene  
 Superintendent  
 110 Fox Shannon Place  
 St. Clairsville, OH 43950

**Re:** Annual Measurement and Verification Report Year 1

Dear Mr. Schoene:

Constellation NewEnergy, Inc. is pleased to submit three copies of the Year 1 Annual Measurement and Verification Report for the guaranteed energy services project performed at the Belmont-Harrison Career Centers.

The verified energy-related cost savings is \$71,721 which is greater than the year one guaranteed cost savings of \$64,969. I will be following up with you upon receipt of this annual report to schedule an on site review of the report.

If you have any questions, please do not hesitate to contact me by telephone at (814) 418-0186 or by e-mail at David.Rasmussen@constellation.com.

Sincerely,

David Rasmussen, CEM, CMVP  
 Supervisor, Performance Assurance



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## UTILITY AND O&M RATE DATA

The following table lists the current utility rates that are utilized in savings calculations to determine the annual savings achieved for measurement year one. These utility rates were derived based upon the base and escalation rates outlined in Schedule D of the GESA.

Utility/Commodity	Base Rates	Contract Year 2014	Escalation Rate	Number of Years Escalated
Belmont: Electric ( kWh)	\$0.08827	\$0.08827	0.0%	N/A
Harrison: Electric ( kWh)	\$0.08362	\$0.08362	0.0%	N/A
Belmont: Natural Gas (MCF)	\$13.29552	\$13.29552	0.0%	N/A
Belmont: Water & Sewer (kgal)	\$10.46271	\$10.46271	0.0%	N/A
Harrison: Water & Sewer (kgal)	\$5.84000	\$5.84000	0.0%	N/A

## VERIFIED SAVINGS TO DATE

Performance Period	Electric Usage Savings (kWh/yr)	Natural Gas Savings (MCF)	Water Savings (kGal)	O&M Savings (\$)	Total Dollar Savings (\$)	Guaranteed Dollar Savings (\$)
Current Year	480,815	807	465	\$14,203	\$71,721	\$64,969
<b>Total</b>	<b>480,815</b>	<b>807</b>	<b>465</b>	<b>\$14,203</b>	<b>\$71,721</b>	<b>\$64,969</b>

## ENVIRONMENTAL IMPACT

By utilizing the electric and natural gas energy savings values contained in the enclosed M&V report, Constellation is able to calculate the positive annual environmental impact of the energy conservation measures implemented .

Annual Electricity Saved	Annual Fuel Saved		Annual Tons of CO <sub>2</sub> Avoided
480,815 kWh	807 MCF	=	412



Avoiding 772 metric tons of CO<sub>2</sub> is equivalent to the following:

869	Barrels of oil consumed	
42,057	Gallons of Gasoline	
34	A Homes energy use for a year	
79	Passenger Vehicles	

[<http://www.epa.gov/cleanenergy/energy-resources/calculator.html>]

## RECOMMENDATIONS

Based upon the observations while performing the annual measurement and verification requirements for the Belmont-Harrison Career Centers, Constellation would like to provide recommendations on a few aspects of the systems utilized, to help maximize the overall efficiency of the project.

Energy Conservation Measure	Indicator	Recommendation
ECM 1.0 - Belmont: Lighting Upgrade/ Occupancy Sensors		As needed, continue to replace bulbs/ballasts with similar types as installed within this project in order to continue to achieve the measured savings. No additional recommendations at this time.
ECM 2.0 - Belmont: Water Conservation		As needed, continue to replace water fixtures with similar types as installed within this project in order to continue to achieve the measured savings. No additional recommendations at this time.
ECM 3.0 - Belmont: Boiler Replacement		Continue to maintain the boiler in order to achieve the measured savings. No additional recommendations at this time.
ECM 4.0 - Belmont: ED Pack Replacement		Continue to maintain the ED Pack to achieve the proposed savings. No additional recommendations at this time.
ECM 5.0 - Belmont: Air Compressor Retro-Commission		Continue to maintain the air compressor in order to achieve the proposed savings. No additional recommendations at this time.



**Constellation.**<sup>®</sup>

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# **Belmont-Harrison Career Centers**

Annual Measurement and Verification Report  
Year One

*Submitted:* October 19, 2015

*Submitted to:* Belmont-Harrison Career Centers  
110 Fox Shannon Place  
St. Clairsville, OH 43950

*Prepared by:* Constellation NewEnergy, Inc.  
24 Summit Park Drive  
Suite 103  
Pittsburgh, PA 15275

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## **Introduction**

Constellation NewEnergy, Inc. (Constellation), is pleased to present this annual Measurement & Verification Report to the Belmont-Harrison Career Center.

Under the requirements of the guaranteed energy service agreement, Constellation has provided and installed the Energy Conservation Measures (ECMs) as proposed through the IGA report and the Guaranteed Energy Savings Agreement.

Since the projected energy savings for each ECM is dependent upon its design and performance, any variation to those parameters need to be documented. Any changes to the original design may adversely affect the proposed energy savings.

The intent of this report is to identify, verify, and document the critical parameters for energy savings and establish their compliance with the approved designs set forth in the IGA Report for all of the ECMs involved.

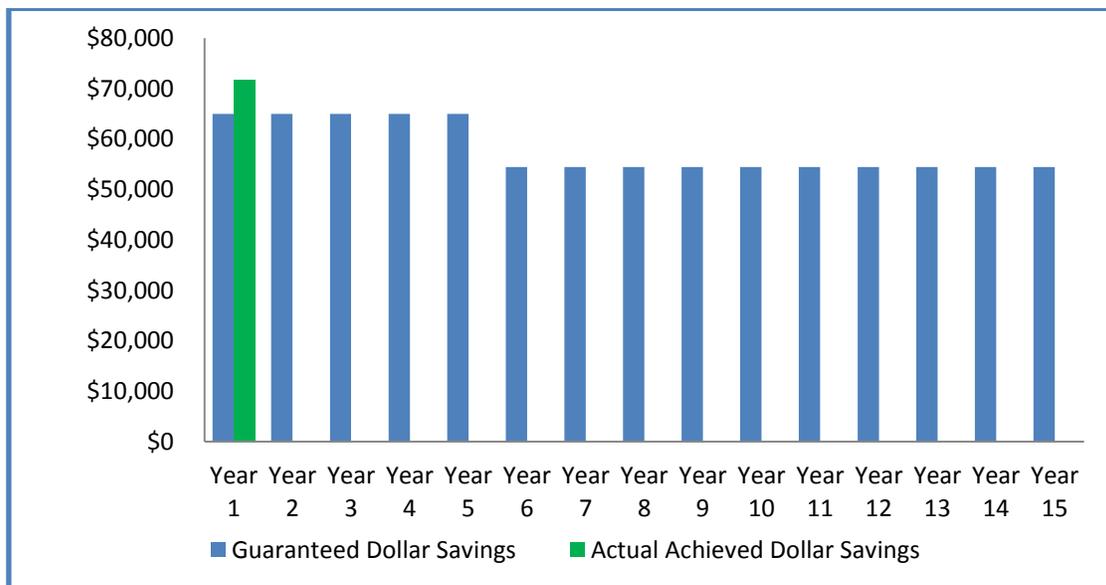
This report is structured such that the core topics and adjoining savings of the project are summarized in sections titled Guarantee Comparison, Savings Summary, and Measurement and Verification Findings. More detailed information about the annual measurement and verification results follow in the Supplemental Information section of the report.

## Guarantee Comparison

The purpose of this section is to visualize the comparison between the actual achieved savings amount annually versus the guaranteed annual values, as specified in Schedule D, Exhibit 1 of the Guaranteed Energy Services Agreement (GESA).

**Performance Year One Annual Guaranteed vs. Achieved Savings**

Current Year	Projected	Guaranteed	Actual	Actual / Guaranteed
Year One	\$64,969	\$64,969	\$71,721	110%



## Savings Summary

Below are the savings summarized for Year One of the Performance Period that represents the total energy unit and dollar savings generated for each ECM.

### Performance Year One Annual Achieved Savings

Energy Conservation Measure	Electric Energy (kWh)	Fuel Savings (MCF)	Water Savings (kGal)	Utility Cost Savings (\$)
ECM 1.0 – Belmont: Lighting Upgrade/Occupancy Sensors	324,924	0	0	\$28,681
ECM 2.0 – Belmont: Water Conservation	0	9	264	\$2,876
ECM 3.0 – Belmont: Boiler Replacement	0	757	0	\$10,071
ECM 4.0 – Belmont: ED Pack Replacement	21,663	0	0	\$1,912
ECM 5.0 – Belmont: Air Compressor Retro-Commission	22,711	0	0	\$2,005
ECM 6.0 – Belmont: Fridge/Freezer Air Cooled Condenser Conversion	717	0	202	\$2,173
ECM 7.0 – Belmont: DHW System Replacement	0	40	0	\$534
ECM 8.0 – Harrison: Lighting Upgrade/Occupancy Sensors	93,663	0	0	\$7,832
ECM 9.0 – Harrison: Air Compressor Retro-Commission	17,137	0	0	\$1,433
<b>Total</b>	<b>480,815</b>	<b>806</b>	<b>466</b>	<b>\$57,518</b>
			O&M Savings	\$14,203
			<b>Project Total</b>	<b>\$71,721</b>

## Measurement and Verification Findings

The following information provides the measurement and verification findings for the current measurement year, along with any Constellation-specific recommendations to continue to capture the greatest savings for each ECM implemented at Belmont-Harrison Career Centers.

### ECM 1.0: Belmont: Lighting Upgrade/Occupancy Sensors

#### Annual Measurement and Verification Plan

Savings for this ECM are based upon IPMVP Volume I, EVO 10000-1:2012, Option “A” (Retrofit Isolation: Key Parameter Measurement) where the retrofitted fixture circuits are isolated, wattages are measured, and the **operating hours are estimated.**

Savings from this ECM are directly related to the lighting retrofit and therefore the measurement boundary is drawn around the retrofitted fixtures and their corresponding circuits. A statistically determined sample size of the representative fixture wattages was **measured during the baseline and the post installation periods.** Upon completion of the measurements in the baseline and post installation phases, the measurements are utilized to **recalculate the actual energy savings.** These energy savings are verified annually thereafter **visually** to verify that the fixtures remain in place and that they are being replaced with the same wattage consuming bulb/ballast combinations as needed.

Refer to the **Post Installation Measurement and Verification report dated 10/6/2014** for equations and supporting data utilized to calculate the achieved savings for the measurement year, as detailed in the Savings Summary section of this report.

#### Annual Findings

On October 12, 2015, a representative from Constellation inspected the lighting upgrades to ensure proper operation. Upon inspection it was determined that the interior lighting and light sensors remained installed and were operating as intended. When inspecting

different interior spaces it was observed that there was above adequate lighting levels in those spaces.

Additionally, the maintenance staff provided input in regards to replacement of burnouts, verifying that replacement bulb/ballasts are the same or similar to what was installed to maintain savings.

## **ECM 2.0: Belmont: Water Conservation**

### **Annual Measurement and Verification Plan**

The proposed M&V approach is based on IPMVP Volume I, EVO 10000-1:2012, Option “A” (Retrofit Isolation: Key Parameter Measurement) where the retrofitted water fixtures are isolated, flow rate is measured, and the usage/demographics are estimated. Savings from this ECM are directly related to the water conservation ECM, and therefore the measurement boundary is drawn around the water fixtures. A statistically determined sample size of the representative fixtures were measured during the baseline and the post installation periods. Upon completion of the measurements in the baseline and post installation phases, the measurements are utilized to recalculate the actual energy savings. These measures are visually inspected annually to verify that the Constellation-installed fixtures remain in place or are replaced with the same or better flowrate fixtures as needed.

Refer to the Post Installation Measurement and Verification report dated 10/6/2014 for equations and supporting data utilized to calculate the achieved savings for the measurement year, as detailed in the Savings Summary section of this report.

### **Annual Findings**

On October 12, 2015, a representative from Constellation inspected the installed water fixtures to confirm that they remain in place. The maintenance staff verified that there were no current issues with the water fixtures this past performance period.

## **ECM 3.0: Belmont: Boiler Replacement**

### **Annual Measurement and Verification Plan**

The proposed M&V approach is based on IPMVP Volume I, EVO 10000-1:2012, Option “A” (Retrofit Isolation: Key Parameter Measurement) where the retrofitted boiler(s) are isolated, combustion efficiency is measured, and the heating load is estimated. Savings from this ECM are directly related to the boiler retrofit and therefore the measurement boundary is drawn around the retrofitted boiler.

The baseline combustion efficiency of the existing boiler(s) was measured during normal operating conditions. After completion of the retrofit, the combustion efficiency of the installed boiler(s) was measured during the post installation period under similar operating conditions that were in effect during the baseline measurement.

The baseline fuel consumption was estimated based on the building heating load. This value was mutually agreed upon by the Belmont-Harrison Career Centers and Constellation and will be utilized to calculate the savings after post installation.

Refer to the Post Installation Measurement and Verification report dated 10/6/2014 for equations and supporting data utilized to calculate the achieved savings for the measurement year, as detailed in the Savings Summary section of this report.

### **Annual Findings**

On October 12, 2015, a representative from Constellation inspected the installed boilers to confirm that they remain in place. The maintenance staff verified that there were no operational issues with the boiler(s) this past heating season; however, a pump in the hot water loop was replaced on one of the boilers which will not affect the energy savings associated with the Boiler Replacement ECM.

## **ECM 4.0: Belmont: ED Pack Replacement**

### **Annual Measurement and Verification Plan**

There is no measurement and verification plan associated with this ECM as detailed in the contract. Savings are calculated based on engineering calculations and assumptions. The energy savings model was updated with as built nameplate information where appropriate to determine the annual energy savings. The energy savings model yielded 21,633 kWh in annual energy savings. These savings will be mutually agreed upon throughout the duration of the performance period and shall remain constant as long as the installed equipment is properly maintained and/or operated.

Refer to the Post Installation Measurement and Verification report dated 10/6/2014 for equations and supporting data utilized to calculate the achieved savings for the measurement year, as detailed in the Savings Summary section of this report.

### **Annual Findings**

N/A

## **ECM 5.0: Belmont: Air Compressor Retro-Commission**

### **Annual Measurement and Verification Plan**

There is no measurement and verification plan associated with this ECM as detailed in the contract. Savings are calculated based on engineering calculations and assumptions. The energy savings model was updated with as built nameplate information where appropriate to determine the annual energy savings. The energy savings model yielded 22,711 kWh in annual electric savings. These savings will be mutually agreed upon throughout the duration of the performance period and shall remain constant as long as the installed equipment is properly maintained and/or operated.

Refer to the Post Installation Measurement and Verification report dated 10/6/2014 for equations and supporting data utilized to calculate the achieved savings for the measurement year, as detailed in the Savings Summary section of this report.

## **Annual Findings**

N/A

### **ECM 6.0: Belmont: Fridge/Freezer Air Cooled Condenser Conversion**

#### **Annual Measurement and Verification Plan**

There is no measurement and verification plan associated with this ECM as detailed in the contract. Savings are calculated based on engineering calculations and assumptions. The energy savings model was updated with as built nameplate information where appropriate to determine the annual energy savings. The updated energy savings model yielded 717 kWh in annual electric savings and 202 kGal in annual water savings. These savings will be mutually agreed upon throughout the duration of the performance period and shall remain constant as long as the installed equipment is properly maintained and/or operated.

Refer to the Post Installation Measurement and Verification report dated 10/6/2014 for equations and supporting data utilized to calculate the achieved savings for the measurement year, as detailed in the Savings Summary section of this report.

## **Annual Findings**

N/A

### **ECM 7.0: Belmont: DHW System Replacement**

#### **Annual Measurement and Verification Plan**

There is no measurement and verification plan associated with this ECM as detailed in the contract. Savings are calculated based on engineering calculations and assumptions. The energy savings model was updated with as built nameplate information where appropriate to determine the annual energy savings. The updated energy savings model yielded 40 MCF in annual natural gas savings. These savings will be mutually agreed upon throughout the duration of the performance period and shall remain constant as long as the installed equipment is properly maintained and/or operated.

Refer to the Post Installation Measurement and Verification report dated 10/6/2014 for equations and supporting data utilized to calculate the achieved savings for the measurement year, as detailed in the Savings Summary section of this report.

### **Annual Findings**

N/A

## **ECM 8.0: Harrison: Lighting Upgrade/Occupancy Sensors**

### **Annual Measurement and Verification Plan**

There is no measurement and verification plan associated with this ECM as detailed in the contract. Savings are calculated based on engineering calculations and assumptions. The energy savings model was updated with as built nameplate information where appropriate to determine the annual energy savings. The updated energy savings model yielded - 24,405 kWh in additional annual electric consumption and 717 MCF in annual natural gas savings. These savings will be mutually agreed upon throughout the duration of the performance period and shall remain constant as long as the installed equipment is properly maintained and/or operated.

Refer to the Post Installation Measurement and Verification report dated 10/6/2014 for equations and supporting data utilized to calculate the achieved savings for the measurement year, as detailed in the Savings Summary section of this report.

### **Annual Findings**

On August 5, 2015, a representative from Constellation inspected the installed air curtains to verify that they remain in place. At the time of the inspection, the air curtains were turned off as it was cooling season.

## **ECM 9.0: Harrison: Air Compressor Retro-Commission**

### **Annual Measurement and Verification Plan**

There is no measurement and verification plan associated with this ECM as detailed in the contract. Savings are calculated based on engineering calculations and assumptions. The

energy savings model was updated with as built nameplate information where appropriate to determine the annual energy savings. The updated energy savings model yielded 17,137 kWh in annual electric savings. These savings will be mutually agreed upon throughout the duration of the performance period and shall remain constant as long as the installed equipment is properly maintained and/or operated.

Refer to the Post Installation Measurement and Verification report dated 10/6/2014 for equations and supporting data utilized to calculate the achieved savings for the measurement year, as detailed in the Savings Summary section of this report.

### **Annual Findings**

On October 12, 2015, a representative from Constellation met with the maintenance staff to verify proper operation. The maintenance staff provided input in regards to replacement of burnouts, verifying that replacement bulb/ballasts are the same or similar to what was installed to maintain savings.

### **Conclusion**

The cover letter of this report designates the total captured savings for measurement year one for the Belmont-Harrison Career Centers, which exceed the guaranteed savings amount by \$6,752. The Belmont-Harrison Career Centers continue to adequately address maintenance items regarding installed equipment through this project and as long as they continue this effort, they will realize the guaranteed savings annually.

Refer to the Post Installation Measurement and Verification report dated 10/6/2014 for all supporting data and calculations submitted to the Belmont-Harrison Career Centers. This information may be found in the Appendices Section of the report and provides the supporting documentation, cut sheets, energy savings models, in addition to any other relevant supporting information for the project.