SIEMENS

ENERGY PERFORMANCE CONTRACT

PERFORMANCE ASSURANCE REPORT

FOR THE

Town of Gill

Performance Year 1: July 1, 2012 – June 30, 2013

Siemens Industry, Inc.
Canton, MA

SIEMENS

PERFORMANCE SOLUTIONS AGREEMENT OVERVIEW

Client ..... **Town of Gill**

Effective Contract Date ..... **June 6, 2011**

Customer Contact ..... **Ray Purington, Town of Gill Administrative Assistant**

Siemens Contact ..... **Colleen Fissette, Performance Assurance Engineer**

Performance Guarantee Period ..... **July 1, 2012 to June 30, 2032**

Contract Term ..... **20 Years**

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1. Executive Summary

Performance Year 1: July 1, 2012 – June 30, 2013

Siemens Industry (Siemens) is pleased to provide the Town of Gill with this Year-1 energy savings guarantee report. This report details the energy performance of the implemented project by comparing realized energy and cost savings for this annual period to the contract guaranteed savings. Your Energy Performance Contract with Siemens guaranteed **$11,620** in annual cost savings. Total Year-1 cost savings for this annual period amounted to **$14,711** and consisted of **$14,002** in Measured and Verified Savings and **$708** in Stipulated Energy Savings. Total Year-1 savings are **$3,091** in excess of the guaranteed savings for this performance period.

Table 1. Summary of annual guaranteed and verified savings for the Town of Gill

Annual Period	Measured and Verified Savings	Option D Stipulated Savings	Total Realized Annual Savings	Annual Guaranteed Savings	Savings Excess/ Shortfall
1	**$14,002**	**$708**	**$14,711**	**$11,620**	**$3,091**
2				$11,969	
3				$12,328	
4				$12,698	
5				$13,079	
6				$13,471	
7				$13,875	
8				$14,292	
9				$14,720	
10				$15,162	
11				$15,617	
12				$16,085	
13				$16,568	
14				$17,065	
15				$17,577	
16				$18,104	
17				$18,647	
18				$19,207	
19				$19,783	
20				$20,376	
TOTALS	**$14,002**	**$708**	**$14,711**	**$312,243**	**$3,091**

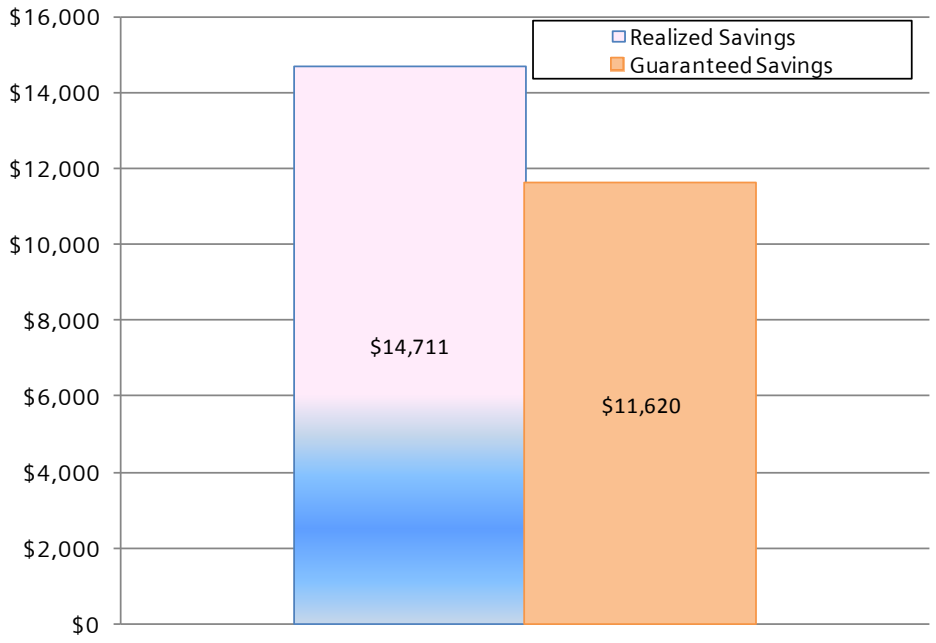

Figure 1. Year-1 Savings Comparison

Table 2. Year-to-Date Energy Savings (Units)

Energy Savings	Electric Energy Saved (kWh/yr)	#2 Fuel Oil Saved (gal/yr)
Guaranteed	24,605	3,168
Realized	**36,653**	**3,595**

Table 3. Guaranteed Energy Savings by FIM (Units)

Facility Improvement Measure	Electric Energy Saved (kWh/yr)	# 2 Fuel Oil Saved (gal/yr)
Lighting & Controls	24,605	(221)
Boiler Replacement		1,944
EMS		1,139
Domestic Hot Water Upgrade (DHW)		33
Building Envelope Improvement		274
TOTALS	**24,605**	**3,168**

Table 4. Realized Energy Savings by FIM (Units)

Facility Improvement Measure	Energy Saved (kWh/yr)	#2 Fuel Oil Saved (gal/yr)
Lighting & Controls	36,653	(329)
Boiler Replacement		2,351
EMS		1,265
Domestic Hot Water Upgrade (DHW)		33
Building Envelope Improvement		274
TOTALS	**36,653**	**3,595**

2. Performance Assurance Overview

This section of the report provides an overview of the methodology and parameters used to measure and verify savings for this report and are based on the signed contract between the Town of Gill and Siemens Industry, Inc.

2.1 Measurement and Verification Methods

Realized savings were calculated using the methodology described in Attachment F of the energy performance contract. There are four guarantee options to measure and verify savings: Option A - Measured Capacity, Option B - Measured Consumption, Option C - Main Meter Comparison, and Option D - Stipulated.

Option A - Measured Capacity. This approach is intended for Facility Improvement Measures where a one-time measurement for specific equipment or systems instantaneous baseline energy use, and a one-time measurement for specific equipment or systems instantaneous post-implementation (Post) energy use can be measured. Baseline and Post energy consumption is calculated by multiplying the measured end use instantaneous capacity (i.e. – kW, Gal/hr, BTU/hr) by stipulated hours of operation for each mode of operation (i.e. – hours, week, month). The calculations for energy consumption will be defined in the Measurement and Verification article of Attachment F. The work sequence required for data collection, evaluation, and reporting will be defined in the Measurement and Verification article of Attachment A.

Option B - Measured Consumption. This approach is intended for Facility Improvement Measures where continuous periodic measurements for specific equipment or systems baseline energy use, and continuous periodic measurements for that equipment or systems post-implementation (Post) energy use can be measured. The calculations for energy consumption will be defined in the Measurement and Verification article of Attachment F. Periodic inspections and consumption measurements of the equipment or systems will be necessary to verify the on-going efficient operation of the equipment and saving attainment. The predetermined schedule for data collection, evaluation, and reporting will be defined in the Performance Assurance Technical Support Program article of Attachment A.

Option C - Main Meter Comparison. This approach is intended for measurements of the whole-facility or specific meter baseline energy use, and measurements of whole-facility or specific meter post-implementation (Post) energy use can be measured. The methodology to establish baseline and Post parameter identification, modeling approach and baseline or model adjustments will be defined in the Measurement and Verification article of Attachment F. Periodic inspections of baseline energy usage, operating practices, and facility and equipment, and meter measurements of the will be necessary to verify the on-going efficient operation of the equipment, systems, practices and facility, and saving attainment. The predetermined schedule for data collection, evaluation, and reporting will be defined in the Performance Assurance Technical Support Program article of Attachment A.

Option D - Stipulated. This approach is intended for Facility Improvement Measures where the end use capacity or operational efficiency; demand, energy consumption or power level; or manufacturer's measurements, industry standard efficiencies or operating hours are known in advance, and used in a calculation or analysis method that will stipulate the outcome. Both CLIENT and SIEMENS agree to the stipulated inputs and outcome(s) of the analysis methodology. Based on the established analytical methodology the savings stipulated will be achieved upon completion of the Facility Improvement Measures Work and that no further measurements or calculations will need to be performed. The methodology and calculations to establish savings value will be defined in the Measurement and Verification article of Attachment A.

2.2 Guaranteed Savings

Guaranteed cost savings are shown below in Table 5.

Table 5. Realized and Guaranteed Annual Cost Savings.

Facility Improvement Measure	M&V Option	Guaranteed Savings
Lighting & Controls	A	$3,796
Boiler Replacement	B	$4,487
EMS	B	$2,629
Domestic Hot Water Upgrade (DHW)	D	$75
Building Envelope Improvement	D	$633
Totals		**$11,620**

2.3 Utility Rate Structures and Escalation Rates

Utility rates used to calculate dollar savings for this report are based on the baseline year unit rates shown in Table 6. As per contract, an escalation rate of 3% will be applied to the baseline rate for each utility.

Table 6. Summary of Contract Utility Rates for Performance Year-1

	# 2 Fuel Oil ($/gal)	Electric Consumption ($/kWh)
Gill Elementary School	$2.31	$0.1750

2.4 Baseline Utility Data

Table 7 outlines the utility consumption that occurred during the Baseline period.

Table 7. Baseline Consumption

Location	Electricity (kWH)	Fuel Oil (Gal)
Gill Elementary School	89,062	11,201

2.5 Baseline Operating Data

The operating parameters during the Baseline period are used to determine the guaranteed savings, which are based on the efficiency improvements resulting from implementation of the facility improvement measures (Table 8).

Table 8. Baseline Operating Parameters

Units	Occupied	Unoccupied	Occupied Hrs/Wk	Unoccupied Hrs/Wk
Gill Elementary School	71	68	55	113

2.6 Contracted Baseline Operating Data

The guaranteed savings from the facility improvement measures provided under this contract are based on implementation of the following schedules and set points shown in Table 9.

Table 9. Post-Implementation Parameters

Units	Occupied	Unoccupied	Occupied Hrs/Wk	Unoccupied Hrs/Wk
Gill Elementary School	70	60	55	113

3. Performance Assurance Results

3.1. Summary of Guaranteed and Verified Savings

Total realized annual energy savings for this performance year were **$14,711** and were comprised of **$5,655** of Option A, **$8,347** in Option B, **$708** in Option D savings respectively. Total realized annual savings are in excess of the annual guaranteed energy savings of **$11,620** by **$3,091.** The following sections detail the Option A, B, and D savings.

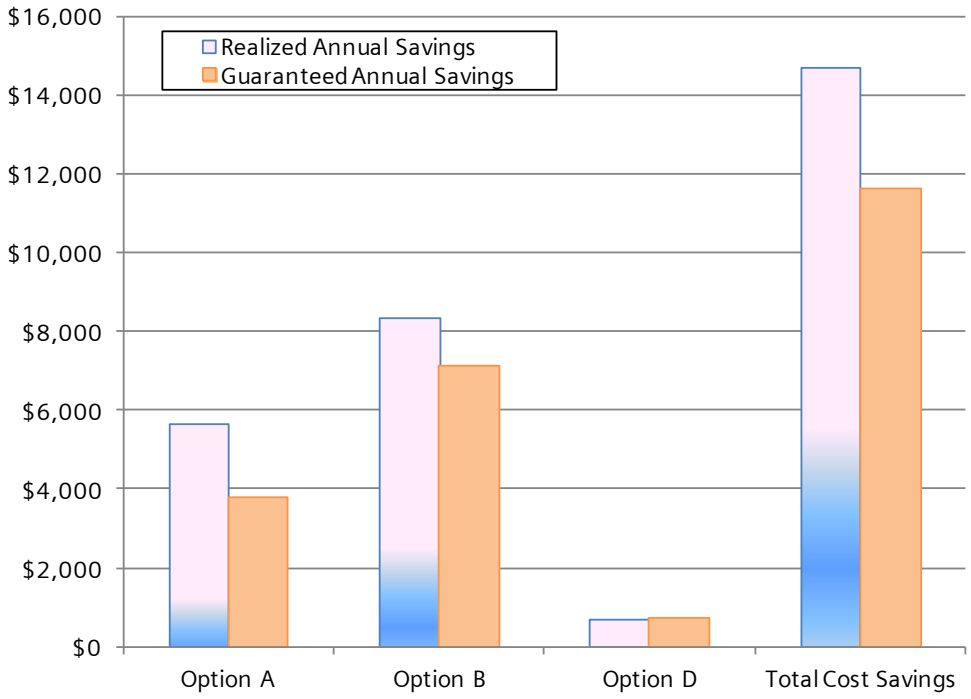

Figure 2. Realized and Guaranteed Annual Cost Savings for Year-1

3.2. Option A Savings

3.2.1. Performance Year Savings

Option A savings are verified based on one-time measurements taken after substantial completion of each facility improvement measure and the estimated savings are included as ongoing realized savings in each subsequent performance year. The table below summarizes Option A savings realized during the current performance year and shows that total Option A savings amount to **$5,655** which is **$1,859** above the guaranteed Option A savings (**$3,796**).

Table 10. Summary of Option A Savings for Performance Year-1

Facility Improvement Measure	Electric Energy Savings (kWh/yr)	#2 Fuel Oil Savings (Gal)	Verified $ Saved per year	Guaranteed $ per year	Excess/ Shortfall $
Lighting Upgrade	36,653	(329)	**$5,655**	$3,796	$1,859

3.2.2. Results by Measure

3.2.2.1. Lighting & Controls Retrofit

Energy savings resulting from the lighting retrofit were verified based upon a one-time measurement of the lighting power capacity under existing conditions, a one-time measurement of the lighting power capacity upon completion of the lighting retrofit project and agreed-upon annual operating hours. Table 11 details the savings results from the lighting and controls retrofit. A representative sample of each lighting-fixture type was used to determine pre-retrofit and post-retrofit kW (Table 12).

Table 11. Annual Savings Associated with the Lighting Upgrade

Lighting Upgrade	
Guaranteed Electric Savings (kWh)	24,605
Realized Electric Savings (kWh)	36,653
Cost per kWh	$0.1750
Total Electric Cost Savings	**$6,414**
Guaranteed Fuel Oil Savings (Gal)	(221)
Realized Fuel Savings (Gal)	(329)
Cost per Gal	$2.31
Total Fuel Oil Cost Savings	**($759)**
Total Guaranteed Savings	**$3,796**
Total Realized Savings	**$5,655**
Excess/Shortfall in Savings	**$1,859**

Table 12. Measured lighting fixtures by type.

Map Location/ Room Name	ECO #	Qty Metered	Expected Before Watts	Measured Before Watts	Expected After Watts	Measured After Watts
Map 21 Main Hallway	C-T8-QLSS-UNV	14	88	88	62	66
Map 21 Main Hallway	C-T8-QLSS-UNV		88	87	62	65
Map 10 Room 10	A-T8-QLSS-UNV	18	60	60	42	40
Map 10 Room 10	A-T8-QLSS-UNV		60	60	42	40
Map 6 Room 6	EDFW/N-T8-QXPS-UNV	8	109	109	55	46
Map 6 Room 6	EDFW/N-T8-QXPS-UNV		109	109	55	46
Map 5	EDFW/N-T8-QXPS-UNV	8	109	108	55	45
Map 5	EDFW/N-T8-QXPS-UNV		109	108	55	45
Map 3 Room 3	EDFW/N-T8-QXPS-UNV	8	109	107	55	40
Map 9 Room 9	A-T8-QLSS-UNV	18	60	59	42	40
Map 9 Room 9	A-T8-QLSS-UNV		60	60	42	40
Map 16 Kitchen	B-T8-QLSS-UNV	4	112	112	84	85
Map 16 Kitchen	B-T8-QLSS-UNV		112	111	84	85
Map 25 Auditorium	VDF-QXPS-UNV	8	455	455	166	160
Map 25 Auditorium	VDF-QXPS-UNV		455	453	166	164

3.3. Option B Savings

3.3.1. Performance Year Savings

Realized Option B savings amounted to **$8,347** which is **$1,231** in excess of Year-1 guaranteed Option B savings of **$7,116**. These realized savings are calculated each year based on measurements and methods outlined in Attachment F of the performance contract.

Table 13. Summary of Option B Savings for Performance Year-1

Facility Improvement Measure	#2 Fuel Oil (gal/yr)	Verified $ Saved per year	Guaranteed $ per year	Excess/ Shortfall $
Boiler Replacement	2,351	**$5,426**	$4,487	$939
EMS (Setback)	1,265	**$2,921**	$2,629	$292
Total Option B Savings	**3,616**	**$8,347**	**$7,116**	**$1,231**

3.3.2.1 Boiler Replacement

Siemens replaced the existing steam boiler at Gill Elementary with a new oil fired sectional steam boiler. Energy savings were achieved through increased combustion efficiency. Savings were verified through the results of a combustion efficiency test performed at high and low fire. The average efficiency of **88.1%** was higher than the predicted efficiency of **83%**. The results from the boiler combustion efficiency test are provided in the appendix of this document.

Table 14. Savings Associated with the Boiler Replacement

Boiler Replacement	
Guaranteed Efficiency	83.0%
Measured Efficiency	**88.1%**
Guaranteed Fuel Oil Savings (Gal)	1,944
Realized Fuel Savings (Gal)	2,351
Cost per Gal	$2.31
Total Fuel Oil Cost Savings	$5,426
Total Guaranteed Savings	**$4,487**
Total Realized Savings	**$5,426**
Excess/Shortfall in Savings	**$939**

3.3.2.2 Energy Management System (EMS)

Siemens furnished and installed a Siemens APOGEE Building Automation System at the Gill Elementary School. The following control strategies were implemented.

Night Setback:
Conditioned spaces in Gill Elementary School are automatically "setback" during unoccupied periods by the EMS. The setbacks reduce electrical energy consumption by reducing or eliminating operation of the applicable supply and return fans and setting "up" space temperatures to reduce the cooling load when areas are unoccupied. Thermal heating savings were also achieved during the setback periods, when space temperatures are automatically lowered during the heating season to reduce the heat transfer losses through the building envelope. Savings for night setback were determined through trending space temperature set points and schedules, the results are shown in Table 16. Temperature set points were found to be as contracted, 60°F during unoccupied hours and 70°F during occupied hours, with only minor deviations.

Table 15. Savings Associated with the EMS.

Energy Management System	
Guaranteed Fuel Oil Savings (Gal)	1,139
Realized Fuel Savings (Gal)	1,265
Cost per Gal	$2.31
Total Fuel Oil Cost Savings	$2,921
Total Guaranteed Savings	**$2,629**
Total Realized Savings	**$2,921**
Excess/Shortfall in Savings	**$292**

Table 16. Results of Night Setback trend reports, December 2012

Unit	Occupied Temperature	Occupied Set point	Unoccupied Temperature	Unoccupied Set point
FCU 4	70	70	68	60
RAD 1	69	69	66	60
RAD 2	69	70	66	60
RAD 3	67	70	64	60
RAD 7	68	70	67	60
RAD 10	68	70	66	60
RAD 18	70	70	67	60
UV 5	69	70	65	60
UV 6	70	70	65	60
UV 9	71	70	69	70
UV 11	71	71	67	60
UV 12	70	70	66	60
UV 13	70	70	65	60
UV 14	70	70	67	60
UV 15	69	69	65	60
UV 16	69	70	64	60
Average	**69**	**70**	**66**	**61**

3.4. Option D Stipulated Savings

Realized Option D savings amounted to **$708** and are based on the predicted savings calculated in the detailed energy audit as agreed upon in the performance contract.

3.4.1. Performance Year Savings

Table 17. Summary of Option D Stipulated Savings.

Facility Improvement Measure	Fuel Oil (gallons/yr)	Verified $ Saved per year	Guaranteed $ per year	Excess/ Shortfall $
Domestic Hot Water Upgrade	33	**$75**	$75	$0
Building Envelope Improvements	274	**$633**	$633	$0
Total Option D Savings	**307**	**$708**	**$708**	**$0**

3.4.2.1 Building Envelope

To control air leakage Siemens' sealed gaps, cracks, and holes using appropriate materials and systems in sixteen exterior door sweeps and unit ventilator wall gaps.

3.4.2.2. Domestic Hot Water Upgrade

Siemens installed a new domestic hot water heater with an efficiency of 83%.

4. Construction Savings

Construction savings is calculated by prorating the Year-1 realized savings by the number of days between when Substantial completion and Final completion were signed. Total construction savings amount to **$7,990**. The construction savings are presented here for informational purposes only and do not contribute to the realized savings to meet the guarantee.

Table 18. Construction Savings by FIM

FIM Name	FIM Substantial Completion	Start of Performance Period 1	Days	Annual energy savings	Construction Period Savings ($)
Lighting & Controls	12/1/2011	6/26/2012	208	$5,655	**$3,223**
Boiler Replacement	1/1/2012	6/26/2012	177	$5,426	**$2,631**
EMS	11/15/2011	6/26/2012	224	$2,921	**$1,792**
Domestic Hot Water Upgrade (DHW)	1/1/2012	6/26/2012	177	$75	**$36**
Building Envelope Improvement	1/1/2012	6/26/2012	177	$633	**$307**
TOTAL					**$7,990**

5. Emissions Reduction

The following table converts the energy savings (electric, fuel oil, propane, etc.) into pounds of carbon dioxide that would have been released into the atmosphere if this project was not performed. These values are then converted into everyday examples to illustrate how this performance contract has decreased the carbon footprint of the Town of Gill. For example, from the table below, the realized energy savings avoided the equivalent of the **carbon dioxide emission of 10.2 cars in Year 1**.

Annual Reduction

CO2e Reductions

Electricity	42,635.1
Natural Gas	0.0
#1, #2, #4 Fuel Oil	80,470.4
#5, #6 Fuel Oil	0.0
Total	123,105.6

in pounds

Other Pollutants

NOx	95.8
SO2	103.7

in pounds

Equivalencies

Project Term Reduction

CO2e Reductions

Electricity	852,702.7
Natural Gas	0.0
#1, #2, #4 Fuel Oil	1,609,409.5
#5, #6 Fuel Oil	0.0
Total	2,462,112.3

in pounds

Other Pollutants

NOx	1,917.1
SO2	2,074.3

in pounds

Equivalencies

6. Appendices

6.1 Combustion Efficiency Results

COMBUSTION TEST:		
	LOW FIRE	HIGH FIRE
CO2:	11.4	12.11
Smoke:	13 ppm	2 ppm
Stack:	282.9	365.5
Dr.(Brch):	-.04	
Dr.(OF):	+0	
Effy:	88.8%	87.4%