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SOMERSET COUNTY ENERGY AUDIT

Prepared for

Montgomery Township Board of Education

Mr. Thomas M. Venanzi, School Business Administrator



Montgomery High School
1016 Route 601, Skillman, NJ 08558



Orchard Hill Elementary School
244 Orchard Road Skillman, NJ 08558



Upper Middle School
375 Burnt Hill Road, Skillman, NJ 08558

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Prepared By

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EXECUTIVE SUMMARY

The Somerset County NJ Planning Board funded an audit program for Montgomery Township Board of Education's High School, Orchard Hill Elementary School and Upper Middle School. These schools serve three thousand seven hundred students in grades kindergarten through second and seventh through twelfth, include six hundred seventy thousand square feet of occupied space and incur 1.7 million dollars in annual energy costs.

The audit revealed several opportunities for energy conservation worthy of detailed investigation described as follows:

The tables below lists the potential savings, investment required, and anticipated available incentives.

Montgomery Township Board of Education
 Montgomery High School
 1016 Route 601
 Skillman, NJ 08558
 Square Footage: 400,000 FT²
 Cost per kWh: \$0.15
 Cost per therm: \$1.19
 Cost per therm (Alternate Fuel):
 EUI: 105,241
 Expected EUI: 94,581

Applicant ID	Building ID	Sequence ID	Description	Incentives					Estimated Capital Cost		Net Cost	Estimated Annual Savings (2009 \$)					Economics				Annual Avoided Carbon Emissions (tons)			
				Lump Rebate (\$)	Rebate Source	Lump (\$)	Annual (\$)	Source	Contract Value	Source		Electric (kWh)	Demand (kW)	Natural Gas (therms)	Alternate Fuel (therms)	Energy (\$)	Maint. (\$)	Total (\$)	Risk/Probability	Simple Payback (years)		Annual Return on Investment (%)	NPV (\$)	EUI (Btu/SF)
16	26	ECM-1	HVAC System and Building Controls Retro Commissioning	-	-	-	-	-	342,000	Means, Published Material Pricing, Contractors	342,000	546,157	-	23,406	-	110,277	Maintenance savings would only be generated by labor savings	110,277	30/70	3.1	35	1,150,000	94,581	561.2

EXECUTIVE SUMMARY (Continued)

Montgomery Township Board of Education
 Orchard Hill Elementary School
 244 Orchard Road
 Skillman, NJ 08558
 Square Footage: 130,000 FT²
 Cost per kWh: \$0.16
 Cost per therm: \$1.54
 Cost per therm (Alternate Fuel):
 EUI: 106,520
 Expected EUI: 85,823

Applicant ID	Building ID	Sequence ID	Description	Incentives			Estimated Capital Cost		Estimated Annual Savings (2009 \$)							Economics			EUI (Btu/SF)	Annual Avoided Carbon Emissions (tons)				
				Lump Rebate (\$)	Rebate Source	Lump (\$)	Annual (\$)	Source	Contract Value	Source	Net Cost	Electric (kWh)	Demand (kW)	Natural Gas (therms)	Alternate Fuel (therms)	Energy (\$)	Maint. (\$)	Total (\$)			Risk/Probability	Simple Payback (years)	Annual Return on Investment (%)	NPV (\$)
16	27	ECM-1	Upgrade of Classroom Unit Ventilator Controls and CO2 Demand Based Ventilation	34,300	NJ Pay for Performance Program	-	-	-	231,000	Means, Published Material Pricing, Contractors	196,700	58,100	-	21,400	-	42,600	Maintenance savings would only be generated by labor savings	42,600	30/70	4.6	28	381,000	88,538	170.9
16	27	ECM-2	Lighting Retrofit Program	17,600	NJ Smart Start	-	-	-	87,000	Means, Published Material Pricing, Contractors	69,400	103,440	-	-	-	16,367	Maintenance savings would only be generated by labor savings	16,367	20/80	4.2	25	152,300	103,805	80.2

Montgomery Township Board of Education
 Upper Middle School
 375 Burnt Hill Road
 Skillman, NJ 08558
 Square Footage: 142,350 FT²
 Cost per kWh: \$0.16
 Cost per therm: \$1.67
 Cost per therm (Alternate Fuel):
 EUI: 90,426
 Expected EUI: 74,611

Applicant ID	Building ID	Sequence ID	Description	Incentives			Estimated Capital Cost		Estimated Annual Savings (2009 \$)							Economics			EUI (Btu/SF)	Annual Avoided Carbon Emissions (tons)				
				Lump Rebate (\$)	Rebate Source	Lump (\$)	Annual (\$)	Source	Contract Value	Source	Net Cost	Electric (kWh)	Demand (kW)	Natural Gas (therms)	Alternate Fuel (therms)	Energy (\$)	Maint. (\$)	Total (\$)			Risk/Probability	Simple Payback (years)	Annual Return on Investment (%)	NPV (\$)
16	28	ECM-1	Upgrade of Classroom Unit Ventilator Controls and CO2 Demand Based Ventilation	25,200	NJ Pay for Performance Program	-	-	-	266,000	Means, Published Material Pricing, Contractors	240,800	-	-	19,981	-	32,900	Maintenance savings would only be generated by labor savings	32,900	30/70	7.3	16	206,000	76,393	117.5
16	28	ECM-2	Window Replacement Program	-	-	-	-	-	289,051	Means, Published Material Pricing, Contractors	289,051	-	-	6,718	-	11,119	Maintenance savings would only be generated by labor savings	11,119	20/80	26.3	-4	None	90,426	39.5
16	28	ECM-3	Lighting Retrofit Program	10,700	NJ Pay for Performance Program	-	-	-	63,000	Means, Published Material Pricing, Contractors	52,300	74,310	-	-	-	12,200	Maintenance savings would only be generated by labor savings	12,200	20/80	4.3	25	113,000	88,644	57.6

EXECUTIVE SUMMARY (Continued)

Capital Improvement and Operation and Maintenance Measures

In addition to the ECMs shown, the following capital improvement measures, their associated costs (including installation), yearly energy savings and simple paybacks were determined.

CAPITAL IMPROVEMENT MEASURE	COST	YEARLY ENERGY SAVINGS	SIMPLE PAYBACK (YEARS)
Replace Windows (per Square Foot)	\$40	\$1.5	26.0
Replace Skylights (per Square Foot)	\$30	\$1.9	16.0
Install Daylighting and Occupancy Sensors (per Sensors)	\$290	\$80	3.6
Incorporate Operation of Exhaust Fan with Lighting Occupancy Controls (Per Fan)	\$200	\$20	10.0
Install Hallway Light Switches for 1/2 Lighting in Afternoon (Per Corridor)	\$500	\$125	4.0
Install Digital Time Clock for Exterior Lighting (per Time Clock)	\$175	\$0	-
Install Vending Miser Device for Vending Machine (per Device)	\$200	\$150	1.3

Some operation and maintenance measures were identified. Facility maintenance personnel should routinely check these items and repair as necessary.

O&M MEASURE	COST
Install Weather Stripping (per 3'-0"x 7'-0" Door)	\$60-\$100
Replace Sealant (per Linear Foot)	\$3.65
Install Architectural Insulation (per Square Foot)	\$2-\$3

Energy Utilization Index

Energy Utilization Index (EUI) is the annual energy use per unit area expressed as BTU/SF of floor area. It provides an indication of overall energy efficiency. The Energy Efficiency Administration (<http://www.eia.doe.gov>) suggests that Education Facilities in the United States average 83,100 BTU/SF. Our analysis of Montgomery utility use shows the following EUIs for 2009

Montgomery Township Board of Education	
School	EUI, BTU/SF
High School	105,200
Orchard Hill Elementary School	106,500
Upper Middle School	90,400

Building Best Practices

A list of Building Best Operating Practices has been provided by Somerset County and is included in the Appendix

Direct Install

A new program titled Direct Install was introduced in February as part of the New Jersey SmartStart program. It requires participants to have a peak demand of 200 kW or less over the preceding 12 months. It is funded by the Societal Benefits Charge. Additional information can be found at

<http://www.njcleanenergy.com/commercial-industrial/programs/direct-install>

The following sections detail the project methodology, facilities, cost savings, implementation scope, capital programs and program returns for each ECM.