



Indiana Area School District Horace Mann Elementary School Building Energy Profile



July 29, 2011
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Building Energy Profile

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Building Name: Horace Mann Elementary School

Building Location: 205 South Fifth Street
Indiana, Pennsylvania 15701

Building Representative: Dale Kirsch/Business Manager
Greg Trout/Supervisor of Buildings and Grounds

Profile Generation Date: July 29, 2011

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Building Energy Profile

Summary

This report is an overview of the building and operations at the Indiana Area School District/Horace Mann Elementary School. Key energy and performance benchmarks are captured from utility billing information provided by the site contacts and from observations made during the building assessment.

This facility incurs approximately \$ 60,641.00 in annual utility costs. The site energy use index is approximately **100** kBtu/sf-year. According to the *Commercial Building Energy Consumption Survey*, US Energy Information Administration (Source: Data adapted from DOE-EIA.), the average EUI for K-12 schools with approximately 47,000 square footage with walk-in coolers/refrigeration is **110**. This facility's energy performance rating is **60**.

Acknowledgement

AllFacilities Energy Group gratefully acknowledges the support and assistance Dale Kirsch/Business Manager Indiana Area School District and Greg Trout/Supervisor of Buildings and Grounds.

Abbreviations

The following abbreviations may be found on these pages:

kGal	1,000 gallons (of water). Unit of measurement used by your water company
DHW	Domestic Hot Water – Water heated and used for domestic related purposes, such as washing hands, etc. (water from the hot water heater).
EUI	Energy Use Index – total energy (electricity and fossil fuels) consumed per square foot. This value is used to compare and benchmark facilities.
HVAC	Heating, Ventilation, Air Conditioning – Equipment used to heat, cool and provide air flow to the building.
kBtu	One thousand Btus (British thermal units). Standard unit of measurement of energy (can be used for both electric and fossil fuels) often used in benchmarking comparisons.
kWh	One thousand Watt hours (of electricity consumed). Unit of measurement used by the electric company.
kcf	One thousand cubic feet of natural gas (on utility bills, mcf is often used by the natural gas companies to mean 1,000cf)



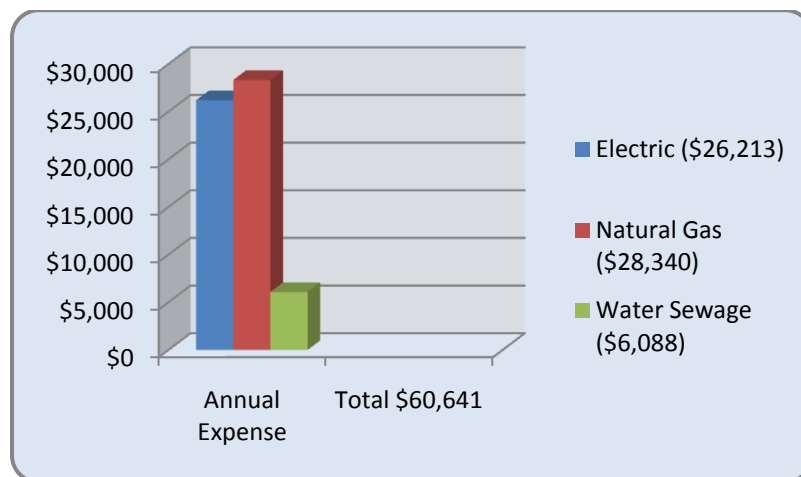
Building Energy Profile



Utility Data

Energy Cost Breakdown by Utility

NATURAL GAS (Dominion-Peoples/Amerada) <i>Account# not provided</i> <i>Meter# not provided</i>	\$ 28,340.00 (7/10 to 6/11)
ELECTRICITY (Penelec) Rate# general secondary medium <i>Account# 10 00 01 6234 2 8</i> <i>Meter# not provided</i>	\$ 26,213.00 (7/10 to 6/11)
WATER (Pa. American Water) SEWAGE (Indiana Borough) <i>Account# not provided</i> <i>Meter# not provided</i>	\$ 6,088.00 (7/10 to 6/11)
Total Utility Cost	\$ 60,641.00 (7/10 to 6/11)
Total Square Footage	47,338 SF
Average Utility Cost Per Square Foot*	\$1.28





Building Energy Profile

*According to the *American School and University Annual Maintenance Survey 2008*, the average cost per square foot for all utilities, for all types of schools (including heavy energy users such as high schools with swimming pools) and including all utility costs in the US (of which Pittsburgh is in the bottom 25%) should be at **\$1.90**

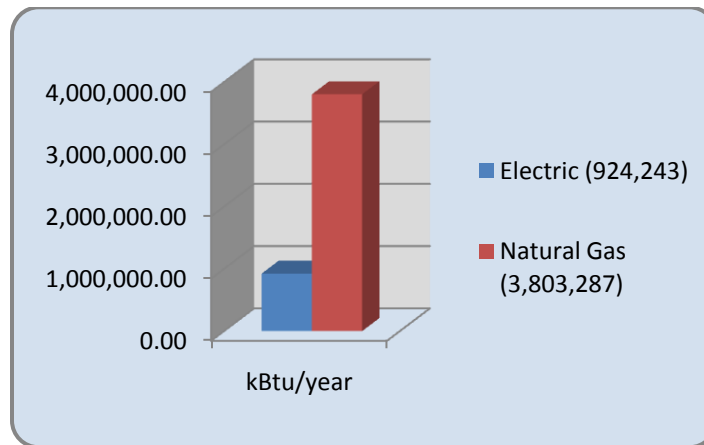
Based on 12 months of utility data provided, this facility is currently at **\$1.28** per square foot for all utilities.

Annual Utility Use

Annual Electricity use in kWh	270,880 kWh/year
Annual Electricity use in kBtu	924,242.56 kBtu/year
<i>Account# 10 00 01 6234 2 8</i>	
<i>Meter# not provided</i>	
Maximum Demand (in kW)	121.4 kW during/April 2011
Annual Natural Gas use in kcf*	3,696.1 kcf/year
Annual Natural Gas use in kBtu	3,803,286.9 kBtu/year
<i>Account# not provided</i>	
<i>Meter# not provided</i>	
*Note: it has been confirmed with the supplier that consumption is expressed in MCF on the bill, which is normally <i>million cubic feet</i> , but is actually 1,000 cubic feet (kcf) in this instance.	
Annual Water use in kGals	419 kGal/year
<i>Account# not provided</i>	
<i>Meter# not provided</i>	
Energy Use Index (EUI) electric and gas (expressed as kBtu/sq.ft.-year)	**100



Building Energy Profile



** Energy auditors use a measure called Energy Use Index (EUI) to enable comparisons between different buildings and energy types. EUI is calculated by converting all energy used in a building to a common unit, BTUs, and then dividing it by the square footage of the heated/ cooled space in the building. The EUI is the most common means of expressing the total energy consumption for each building. The EUI is usually expressed in *BTUs/Square Foot-Year* and can be used to compare energy consumption relative to similar building types or to track consumption from year to year in the same building. Sometimes EUI is given as thousands of BTU/square foot-year.



Building Energy Profile

Target Energy Performance Results

The design **must** achieve a rating of 75 or higher to be eligible for "Designed to Earn the ENERGY STAR".

NOTE: Values are 20% Electricity - Grid Purchase and 80% Natural Gas. The Target & Average Building energy use for this facility are calculated based on fuel mix of input estimated energy use.

Target Energy Performance Results (estimated)			
Energy	Design	Target	Average Building
Energy Performance Rating (1-100)	60*	75	50
Energy Reduction (%)	9	22	0
Source Energy Use Intensity (kBtu/Sq. Ft./yr)	149	129	165
Site Energy Use Intensity (kBtu/Sq. Ft./yr)	**100	86	110
Total Annual Source Energy (kBtu)	7,069,013	6,092,297	7,790,703
Total Annual Site Energy (kBtu)	4,727,530	4,074,334	5,210,173
Total Annual Energy Cost (\$)	\$ 74,068	\$ 63,834	\$ 81,629
Pollution Emissions			
CO2-eq Emissions (metric tons/year)	333	287	367
CO2-eq Emissions Reduction (%)	9%	22%	0%

Facility Characteristics		Estimated Design Energy			
Space Type	Gross Floor Area (Sq. Ft.)	Energy Source	Units	Estimated Total Annual Energy Use	Energy Rate (\$/Unit)
K-12 School	47,338	Electricity - Grid Purchase	kBtu	924,243	\$ 0.027/kBtu
Total Gross Floor Area	47,338	Natural Gas	kBtu	3,803,287	\$ 0.013/kBtu

* The Average Building is equivalent to an EPA Energy Performance Rating of 50.

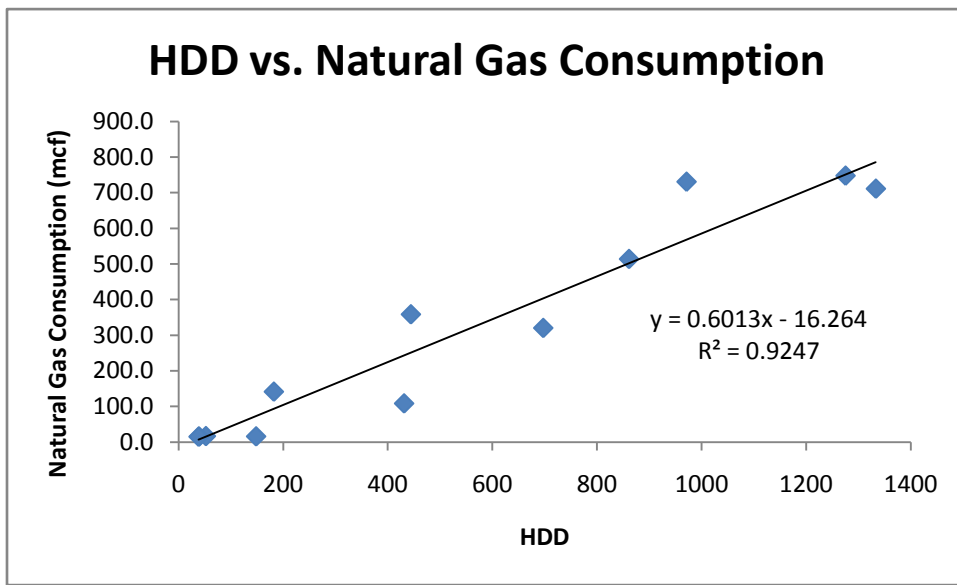
Source: Data adapted from DOE-EIA.



Building Energy Profile

Utility Costs per Unit

Electricity	\$.096 per kWh
Natural Gas	\$7.67 per kcf
Water/Sewage	\$14.53 per kGal



Linear regression analysis determines the relationship between the weather and building energy use. Generally, an R squared value of 0.80 or above indicates that there is a good relationship between weather and building energy use. The R squared value is 0.92 for this facility. The natural gas load is directly proportional to outdoor air temperature and the gas load of the building primarily serving the system for heating.

Maintenance & Operations Costs per Area

(Expressed in median dollars per square foot)

Total Energy/Utilities	\$ 1.28
Gas/Electricity/Other Fuels	\$ 1.15
Other Utilities	\$ 0.13



Building Energy Profile



Building Profile

Building Use: Elementary School/Grades K-6
Class: Public School
Anchor Tenant: Indiana Area School District
Setting: Indiana, Pennsylvania

Utilities

Electric: Penelec
Natural Gas: Dominion Peoples/Amerada
Water: Pennsylvania American Water
Sewage: Indiana Borough

Number of Full Time Staff: 37

Number of Students: 389 (October 2010)
245 (projected 2011/2012)

Year Constructed: 1908

Renovations/Additions: 1962 (plans provided)
James K. and Robert T. Scheeren Architects, Indiana, PA
1986 (structural plans provided)
Robert T. Scheeren Architects Indiana, PA

Days Occupied: Days: 178 student days, 185 teacher days, 260 days for office and custodial staff

Hours of Operation: Elementary students start at 8:55 a.m. and dismiss at 3:15 p.m.
Teachers begin at 7:30 a.m. and dismiss at 3:30 p.m. Office staff work 7:30 to 4:00 during the school year and 7:30 to 3:30 during the summer months

Energy Performance Rating for this facility: **60***

*To be eligible for the Energy Star, facilities must obtain a rating of at least 75



Building Energy Profile

Building Area

(Total square footage and descriptions/operating characteristics of each major space)

Gross floor area:	47,338
Building Type:	Brick/Masonry
Number of Stories:	3
Basement:	Yes
Roofing System:	Gable/Multi Peak/Fiberglass Shingle Flat/ Roofing membrane with stone media



Year Installed:	Approximately 15 years old
Roof Insulation:	Not identified in building plans
Windows:	Aluminum Frame/Solar Bronze Glass 5/8" (installed 1982)



Building Energy Profile

Building Envelope

As indicated on design drawings.

(Approximately 16,850 sq ft)

Ground Floor - There is a large multipurpose room with a stage. Adjacent to the multipurpose room is a kitchen with serving counter. The other facilities are an art room, copy room, faculty room, two kindergarten rooms, music room, and nurse's office. The building mechanical rooms are also on this level. There are two stairways and two large restrooms. In addition there are eight single occupant restrooms. There are three entry/exits.

(Approximately 16,850 sq .ft)

First Floor - The facilities located on this floor are; administration offices, conference room, six classrooms, library, and storage rooms. There are two stairways and two large restrooms. The main entrance to the building is on this level.

(Approximately 13,638 sq. ft.)

Second Floor - The facilities located on this floor are; a computer lab, six classrooms, gifted room, reading room, and storage rooms. There are two stairways and two large restrooms.





Building Energy Profile

Facilities & Equipment

Auditorium multipurpose room with stage (ground floor)



Classrooms (14) Twelve and two kindergarten



Computer Labs second floor

Elevator/Lifts none

Gymnasium multipurpose room ground floor



Building Energy Profile

Kitchen



Misc. Rooms

administration offices (first floor)
 copy room, faculty room and nurses office (ground floor)
 conference and library (first floor)

Restrooms

(7) 1 single occupant, 3 boys and 3 girls

Ground Floor

(1) boys/2 sinks, 3 toilets, and 3 urinals with sensors except sinks
 (1) girls/3 sinks and 4 toilets with sensors except sinks
 (1) single occupant

First Floor

(1) boys/2 sinks, 5 toilets, and 6 urinals with sensors except sinks
 (1) girls/4 sinks and 8 toilets with sensors except sinks

Second Floor

(1) boys/2 sinks, 2 toilets, and 2 urinals with sensors except sinks
 (1) girls/4 sinks and 7 toilets with sensors except sinks



Total fixtures;

18 sinks, 30 toilets, and 11 urinals



Building Energy Profile

Food Service

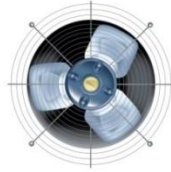
Kitchen

1 – Vulcan/oven/model# 6145A
45000Btu (oven) 15000Btu (top burner)



Primary cooking equipment fuel source: natural gas

Building Energy Profile



HVAC SYSTEMS

Heating:

Boilers (hot water)

Cooling:

The building has limited air conditioning, primarily just the offices and computer lab.

Air Distribution:

Roof Top Unit Ventilators



Systems

(limited information provided in building plans and documents)
Smith/Series 60 boiler with an Auburn burner/installed 1963

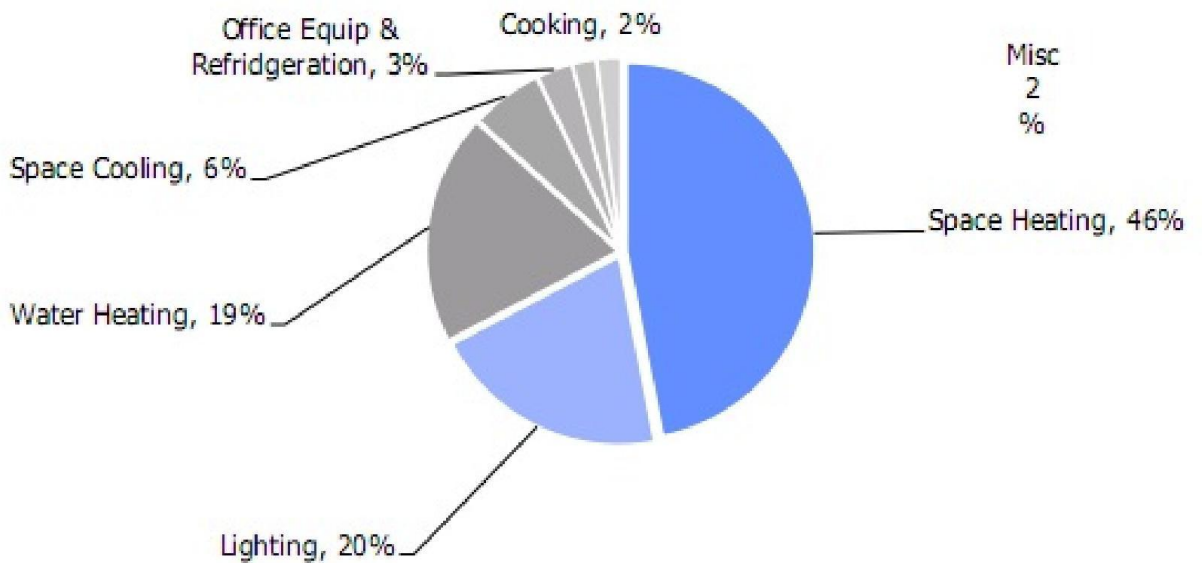
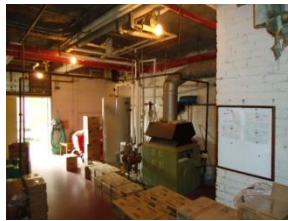


(1) Honeywell/air compressor/with dryer
(age or model number not identified)

(22) Room hot water units
(age, mfg., or model number not identified)

Building Energy Profile

HVAC Service	Not Identified
Temperature Controls	Pneumatic installed 1990
Domestic Hot Water	RAYPAK- natural gas water heater couple to storage tank



Breakdown of energy use in Schools

Source: US DOE, 2006

Building Energy Profile



LIGHTING

Indoor Lighting: (no lighting protection or automated system)

Ground Floor

Boiler Room	(10) ceiling mount/single/incandescent/150w
Display Cabinets	(6) 4' surface mount/fluorescent/2-lamp/34w T12



Classrooms	(24) 4' recessed/fluorescent/4-lamp/34w T12
Conference Room	(6) 4' ceiling mount/fluorescent/4-lamp/34w T12
Hallways	(22) 2'x 2' recessed/fluorescent/2-lamp/20w T12
Kitchen	(10) 4' ceiling mount/fluorescent/2-lamp/34w T12
	(6) 4' recessed/fluorescent/4-lamp/34w T12
	(4) skylights



Library	(12) 4' recessed/fluorescent/4-lamp/34w T12
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Building Energy Profile

Mechanical Rooms (10) ceiling mount/single/incandescent/100w



Multipurpose Room (13) spot/250w/quartz-halogen



Nurses Office (4) 4' ceiling mount/fluorescent/2-lamp/34w T12
 Restrooms (8) 4' ceiling mount/fluorescent/2-lamp/34w T12
 Stairways (6) 4' ceiling mount/fluorescent/2-lamp/34w T12
 Storage Rooms (4) 4' ceiling mount/fluorescent/2-lamp/34w T12

First Floor

Classrooms (8) (96) 4' recessed/fluorescent/4-lamp/34w T12
 Hallways (22) 4' ceiling mount/fluorescent/2-lamp/34w T12
 Restrooms (8) 4' ceiling mount/fluorescent/2-lamp/34w T12
 Stairways (4) 4' ceiling mount/fluorescent/2-lamp/34w T12
 Storage Rooms (3) 4' ceiling mount/fluorescent/2-lamp/34w T12

Second Floor

Classrooms (7) (84) 4' recessed/fluorescent/4-lamp/34w T12
 Hallways (22) 4' ceiling mount/fluorescent/2-lamp/34w T12
 Restrooms (8) 4' ceiling mount/fluorescent/2-lamp/34w T12
 Stairways (2) 4' ceiling mount/fluorescent/2-lamp/34w T12
 Storage Rooms (3) 4' ceiling mount/fluorescent/2-lamp/34w T12

Building Mounted Exterior Lighting:

(6) wall sconce/1 lamp/250w metal halide with day-night sensor
 (*electrical lighting plans were not provided with the building plans)

Building Energy Profile

Exit Signs:

Ground Floor (8) LED

First Floor (6) LED

Second Floor (4) LED

Electrical Equipment

I.T. Equipment 165 - PC units
(age, mfg, model not identified)

29 - printers
(age, mfg, model not identified)

Kitchen

Xerox copier models-CC20, W5665

1- McCall/cooler/model# WKMK23AF

1 - Market Forge/Steamer/ETP-10G
120v/1.5amp/84000btu/hr

2 - Market Forge/convection ovens/model# M-2700HEC



1 - Hobart/dishwasher/model# CL44E
208v/3ph/55amp





Building Energy Profile

(1) - Tyson Metal Products/hot well/model# F-3
230v/3ph/4kw

(1) - Cre-Cor/hot rack/model# H1381834
120v/2000 watt

(1) - Salvajor/disposer/model# 200
230v/3ph/1 ½ hp

(1) – Beverage Air/milk cooler/model# SMF49Y-1W-02
120v/134amp

(1) walk-in freezer 1 ½ hp/230v/3ph
(mfg. model# and age for equipment not provided in building plans)

(1) walk-in cooler ¾ hp/230v/3ph
(mfg. model# and age for equipment not provided in building plans)



(2) upright refrigerators
(mfg. model# and age for equipment not provided in building plans)

(1) mixer ½ hp 115v
(mfg. model# and age for equipment not provided in building plans)

(2) slicers ¼ hp 115v
(mfg. model# and age for equipment not provided in building plans)

(1) peeler ¼ hp 115v
(mfg. model# and age for equipment not provided in building plans)



Building Energy Profile

Miscellaneous Equipment

Fire Alarm	Sprinklers throughout supported through a wet pipe system
Vehicles	None Identified
Emergency Generator	Onan/model# 12.5JC-3CR 12.5KW gasoline/installed 1984

Maintenance

Support staff performs quarterly preventative maintenance scheduled per the academic calendar year.



Building Energy Profile

According to the U.S. Department of Energy, the average school spends 46% of its energy consumption on heating, air conditioning and air handling and 20% on lighting. Following is a short list of the most common Energy Conservation Measures (ECM) that are being implemented by schools:

Building Automation Systems: Since operating hours at a school vary by season, school calendar and outside activities, many schools have installed sophisticated building automation systems. However, independent audits reveal that many of these controls are not functioning correctly, have programmed settings that are out of date, or are maintained by staff or volunteers who need additional training in how to use them. Recommissioning and training for these systems can improve energy efficiency by as much as 15%. Upgrading to newer control technology may be recommended in spaces with variable use. For example, dormitory rooms, meeting rooms, bathrooms and classrooms can now employ wireless programmable thermostats that set back temperatures when rooms are unoccupied for set periods of time. The energy savings versus cost analysis revealed a 2.6-year payback. More complex buildings require building automation systems that can deliver even higher savings, but require more training to properly maintain them.

Lighting Replacement: Even buildings that are only two years old can be using outdated lighting technology. The most popular energy conservation measures in lighting include: replacing T-12 fluorescent fixtures with T-8 fixtures/electronic ballasts, replacing Exit sign lamps with LED bulbs, and replacing standard incandescent light bulbs with CFLs (compact fluorescent lamps). New developments in “high-bay” lighting now offer significant savings for applications in warehouses, gymnasiums, auditoriums, etc.

Light Occupancy Sensors: Occupancy sensors turn off lights when the space is not in use. Where standard wall switches control room lighting, a low-cost replacement of the switch with a combination switch/occupancy sensor can reduce energy in offices, storage rooms, bathrooms, athletic locker rooms, maintenance facilities, kitchens, coolers and freezers. More sophisticated lighting-control systems can manage multiple buildings and unique applications such as outdoor recreation areas, warehouses, storage and basement areas and even individual classrooms. Lighting controls have also successfully been used where daylight is available in rooms, common areas, and so on to turn down or turn off lighting during mid-day periods when outside light can be used instead. Called “daylighting,” installing more windows and overhead skylights partnered with lighting controls allows spaces to use less lighting during the 8:30 a.m. to 4:30 p.m. period.

Fans and Air-Handling Equipment: Proper maintenance and routine cleaning can make a big difference in the energy efficiency of fans and other air-handling devices. Additional analysis and possible retro commissioning of equipment such as dampers and fans will ensure that they are being used efficiently and only when needed. Finally, upgrading to variable frequency drives on motors that do not need to be in constant use provides additional significant energy savings.



Building Energy Profile

Energy Misers: Many new devices are available that cut power or lower power to devices such as computers, copiers, flat screen monitors and vending machines. The return on investment for these types of devices is usually between one and two years. Also, another simple idea is to put hot water tanks on timers to set back water temperatures when a building is not in use. Charging extra for hot water washers in dormitories and only running cold water lines to the majority of washers can reduce energy in laundry facilities.

Water Conservation: Water and sewer rates are now higher than ever before and are expected to continue to rise. New low-flow faucet aerators and fixtures with sensors can cut back water use dramatically and are showing paybacks in less than six months.

ENERGY STAR: Organizations that make a purchasing commitment to ENERGY STAR rated equipment and standards for building equipment have been able to drive more than \$0.40 per square foot off of their baseline energy costs.

A handwritten signature in black ink, appearing to read "Stephen M. Klim", is written over a horizontal line.

Stephen M. Klim
Energy Efficiency Analyst
AllFacilities Energy Group

July 29, 2011