



Indiana Area School District Ben Franklin Elementary School Building Energy Profile



July 29, 2011
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Building Energy Profile

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Building Name: Ben Franklin Elementary School

Building Location: 95 Ben Franklin Road
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 Indiana Area School District/Ben Franklin 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 \$88,225.00 in annual utility costs. The site energy use index is approximately ****128** 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 56,000 square footage, with walk-in coolers/refrigeration is **130**.

This facility's energy performance rating is **51***.

Acknowledgement

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



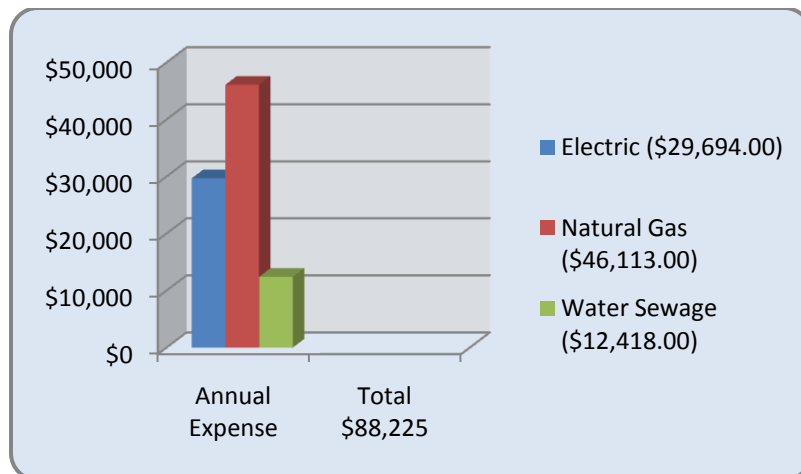
Building Energy Profile



Utility Data

Energy Cost Breakdown by Utility

NATURAL GAS (Dominion-Peoples/Amerda) <i>Account# not provided</i> <i>Meter# not provided</i>	\$ 46,113.00 (7/10 to 6/11)
ELECTRICITY PENELEC Rate Class- General Secondary Medium <i>Account# 10 00 01 9848 0 4</i> <i>Meter# not provided</i>	\$ 29,694.00 (7/10 to 6/11)
WATER (Pennsylvania American Water) SEWAGE (Indiana Borough and White Twp.) <i>Account# not provided</i> <i>Meter# not provided</i>	\$ 12,418.00 (7/10 to 6/11)
Total Utility Cost	\$ 88,225.00
Total Square Footage	55,690 SF
Average Utility Cost Per Square Foot*	\$ 1.58





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 **\$1.58** per square foot for all utilities.

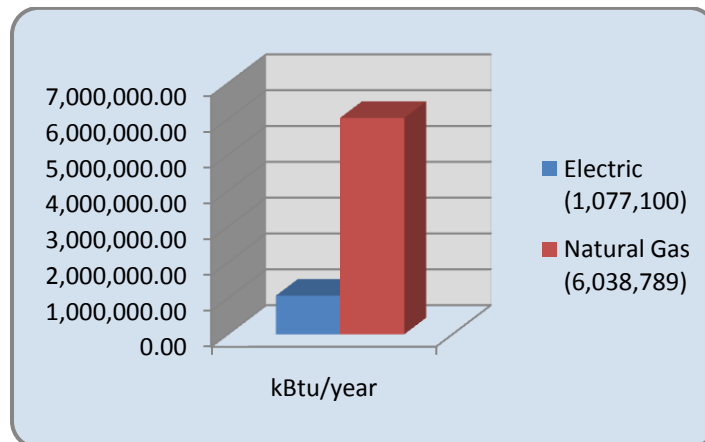
Annual Utility Use

Annual Electricity use in kWh	315,680 kWh/year
Annual Electricity use in kBtu	1,077,100 kBtu/year
PENELEC Rate Class- General Secondary Medium	
Account# 10 00 01 9848 0 4	
Meter# not provided	
Maximum Demand (in kW)	143.5 kW during 5/11
Annual Natural Gas use in kcf*	5,868.6 kcf/year
Annual Natural Gas use in kBtu	6,038,789 kBtu/year
Account# not provided	
Meter# not provided	
*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	893 kGal/year
Account# not provided	
Meter# not provided	
Energy Use Index (EUI) electric and gas (expressed as kBtu/sq.ft.-year)	**128



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 15% Electricity - Grid Purchase and 85% 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)	51*	75	50
Energy Reduction (%)	1	22	0
Source Energy Use Intensity (kBtu/Sq. Ft./yr)	178	141	181
Site Energy Use Intensity (kBtu/Sq. Ft./yr)	**128	101	130
Total Annual Source Energy (kBtu)	9,920,126	7,871,872	10,066,385
Total Annual Site Energy (kBtu)	7,115,889	5,646,638	7,220,803
Total Annual Energy Cost (\$)	\$ 107,250	\$ 85,106	\$ 108,831
Pollution Emissions			
CO2-eq Emissions (metric tons/year)	474	376	481
CO2-eq Emissions Reduction (%)	1%	22%	0%

Facility Information			
15701 United States			
Facility Characteristics		Estimated Design Energy	
Space Type	Gross Floor Area (Sq. Ft.)	Energy Source	Units
K-12 School	55,690	Electricity - Grid Purchase	kBtu
Total Gross Floor Area	55,690		
* The Average Building is equivalent to an EPA Energy Performance Rating of 50.		Estimated Total Annual Energy Use	Energy Rate (\$/Unit)
		Natural Gas	kBtu

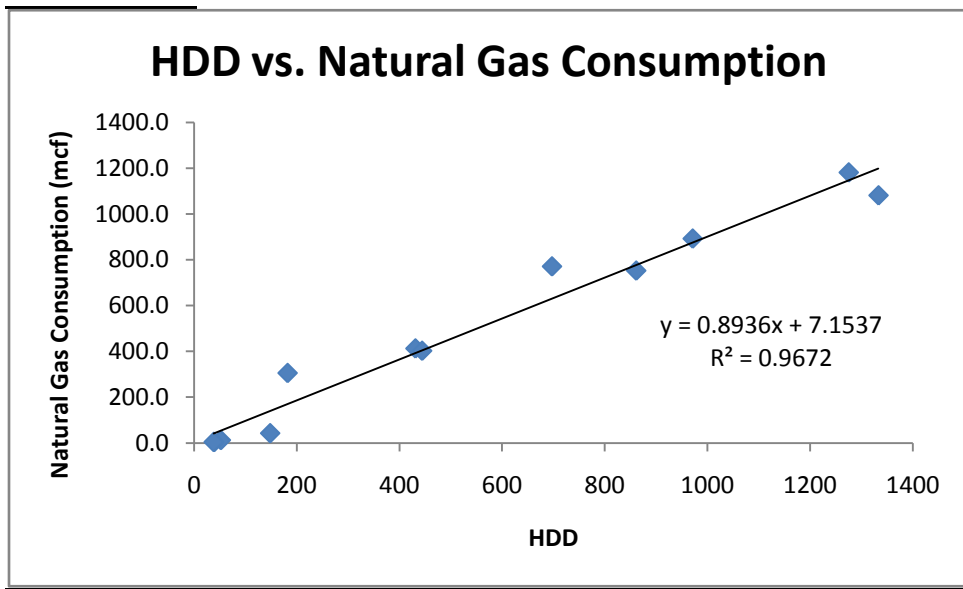
Source: Data adapted from DOE-EIA.



Building Energy Profile

Utility Costs per Unit

Electricity Cost per Unit	\$0.09 per kWh
Natural Gas Cost per Unit	\$ 7.86 per kcf
Water/Sewage Costs per Unit	\$ 13.91 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 0.97 for this facility. The natural gas load is directly proportional to outdoor air temperature and the gas load of the building primarily serves the HVAC system for heating.

Maintenance & Operations Costs per Area

(Expressed in median dollars per square foot)

Total Energy/Utilities	\$ 1.58
Gas/Electricity/Other Fuels	\$ 1.36
Other Utilities	\$ 0.22



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 and White Twp.

Number of Full Time Staff: 55

Number of Students: 436 (October 2010)
385 (projected 2011/2012)

Year Constructed: 1953

Renovations/Additions: Not Defined

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: **51***

*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:	55,690 sq.ft.
Building Type:	Brick/Masonry
Number of Stories:	1
Basement:	Yes (partial)
Roofing System:	Comprised of a Tectum/Gypsum type deck over steel bar joists. Roofing membrane with stone media. Cafeteria is comprised of steel roof deck over laminated wood beams.
Year Installed:	Approximately 12 years old (roof leaks in multipurpose room)



Roof Insulation:	Not identified in building plans
Windows:	Double pane with aluminum frame installed mid 1980's

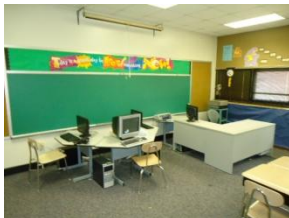


Building Energy Profile

Building Envelope

As indicated on design drawings.

Building plans are dated 1953. Mechanical and electrical drawings were not provided. Not able to determine the space designation or layout of interior from building drawings.



Facilities & Equipment

Auditorium	multipurpose room with stage
Cafeteria	1
Classrooms	24
Computer Labs	1
Elevator/Lifts	none
Gymnasium	multipurpose room
Kitchen	1





Building Energy Profile

Library	1
Misc. Rooms	(4) storage (1) art room
Nurse Office	1
Offices	5
Restrooms: (7)	(3) boys - 2 sinks, 2 toilets, and 3 urinals with activation sensors (3) girls - 3 sinks and 5 toilets with activation sensors (1) nurse office - single occupant – 1 sink and 1 toilet



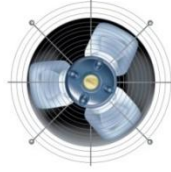
Total fixtures; 16 sinks, 22 toilets, and 9 urinals

Food Service

Kitchen warming kitchen with walk-in cooler

Primary cooking equipment fuel source; Electric

Building Energy Profile



HVAC SYSTEMS

Heating:

Cooling:

Air Distribution:

Boilers

Limited to offices and computer labs

Unit Ventilators

Systems:

(2) Smith Boilers (steam)/series# 450-15-s with power flame C3G-30 burners installed 1990



Window unit supporting administration offices
(age, mfg., and model not provided)

(1) 3 ton condensing unit computer lab
(age, mfg., and model not provided)



(1) Emglo air compressor (model # not provided)

HVAC Service

Not Identified

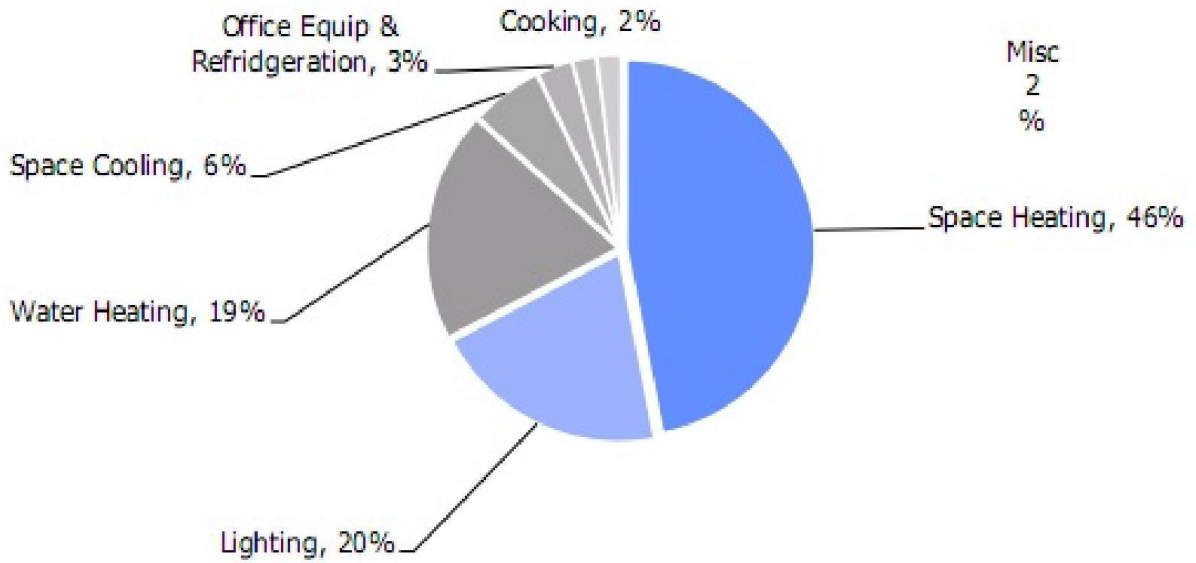
Temperature Controls

pneumatic/DDC (1993) Barber-Coleman

Domestic Hot Water

AO Smith gas heater (1999) coupled with original storage tank.

Building Energy Profile



Breakdown of energy use in Schools

Source: US DOE, 2006

Building Energy Profile



LIGHTING No lighting protection or automated control systems are in use.

Indoor Lighting:

Boiler Room (8) metal halide/1 lamp/300 watt
Classrooms (270) 4' recessed/fluorescent/4-lamp/34w T12



Hallways (44) 4' recessed/fluorescent/4-lamp/34w T12



Kitchen (20) 4' recessed/fluorescent/4-lamp/34w T12



Library (15) 4' recessed/fluorescent/4-lamp/34w T12
Lobby (12) 4' recessed/fluorescent/4-lamp/34w T12





Building Energy Profile

Mechanical Room	(6) 4' recessed/fluorescent/4-lamp/34w T12
Multipurpose Room	(8) metal halide/1 lamp/300 watt
(stage)	(12) spot/halogen/250 watt
Nurse Office	(6) 4' recessed/fluorescent/4-lamp/34w T12
Offices	(16) 4' recessed/fluorescent/4-lamp/34w T12
Restrooms	(36) 4' recessed/fluorescent/4-lamp/34w T12
Storage Rooms	(8) 4' recessed/fluorescent/4-lamp/34w T12

*electrical lighting plans were not provided with the building plans

Building Mounted Exterior Lighting:

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

Exit Signs:

(16) LED

Electrical Equipment

I.T. Equipment

(210) PC Units*
 *age, mfg. , model not identified in building plans

(39) printers*
 *age, mfg., model not identified in building plans

Xerox copier models-W5655, W5675, W5638

Kitchen

(1) Beverage Air/milk cooler/model# SMF49/115v, 8.2amp
 (1) Copeland/walk in cooler/model# WH1-0075-TAC
 308v, 3ph, 2.75amp





Building Energy Profile

(3) Traulsen/freezer/model# G22010/115v,12amp



(1) Cres-Cor/warmer/model# H1381834/120v, 2000watt

(2) Market Forge/convection oven/model#M2700HEC/120v, 5amp

(1) Champion/dishwasher/conveyor/model# 24/208v, 3ph, 67amp



Miscellaneous Equipment

Emergency Generator	Spectrum /model# 35GS60 60KW/diesel, installed 1999
Fire Alarm	Pull station
Vehicles	None Identified

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.

Energy Misers: Many new devices are available that cut power or lower power to devices such as



Building Energy Profile

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