



# Indiana Area School District Dwight D. Eisenhower Elementary School Building Energy Profile



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## Building Energy Profile

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Building Name: Eisenhower Elementary School

Building Location: 1460 School 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 Indiana Area School District/Eisenhower 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 \$59,850.00 in annual utility costs. The site energy use index is approximately **124** 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 36,000 square footage without walk-in coolers/refrigeration is **101**. This facility’s energy performance rating is **27**.

### 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:

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



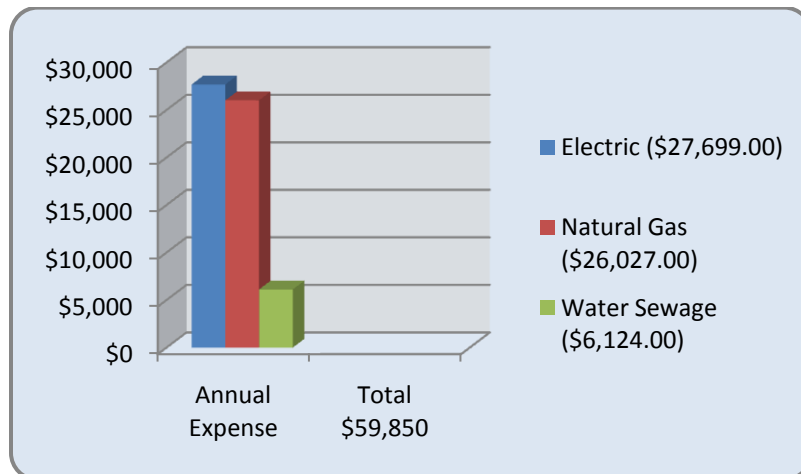
Building Energy Profile



**Utility Data**

**Energy Cost Breakdown by Utility**

<b>NATURAL GAS (Dominion-Peoples/Amerada)</b> <i>Account# not provided</i> <i>Meter# not provided</i>	<b>\$ 26,027.00 (7/10 to 6/11)</b>
<b>ELECTRICITY</b> Penelec Rate Class- General Secondary Medium <i>Account# 10 00 01 8148 4 5</i> <i>Meter# not provided</i>	<b>\$ 27,699.00 (7/10 to 6/11)</b>
<b>WATER (Pa. American Water)</b> <b>SEWAGE (Indiana Borough)</b> <i>Account# not provided</i> <i>Meter# not provided</i>	<b>\$ 6,124.00 (7/10 to 6/11)</b>
<b>Total Utility Cost</b>	<b>\$ 59,850.00</b>
<b>Total Square Footage</b>	<b>36, 103 SF</b>
<b>Average Utility Cost Per Square Foot</b>	<b>\$1.66*</b>





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**

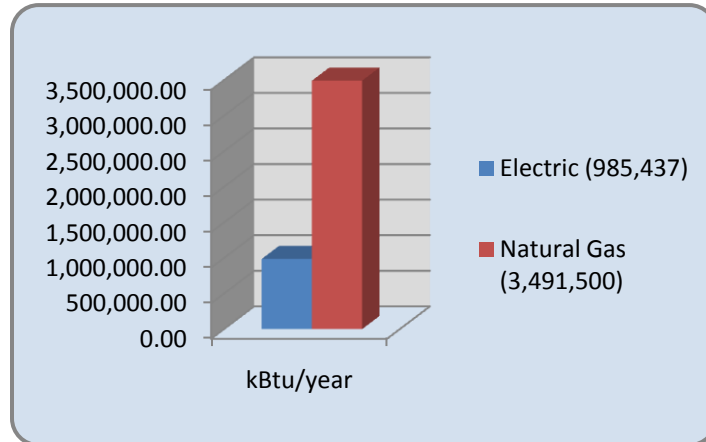
Based on 12 months of utility data provided, this facility is currently at **\$1.66** per square foot for all utilities.

**Annual Utility Use**

<b>Annual Electricity use in kWh</b>	<b>288,815 kWh/year</b>
<b>Annual Electricity use in kBtu</b>	<b>985,437 kBtu/year</b>
<i>Account# 10 00 01 8148 4 5</i>	
<i>Meter# not provided</i>	
<b>Maximum Demand (in kW)</b>	<b>132.7 kW during 2/11</b>
<b>Annual Natural Gas use in kcf*</b>	<b>3,393.1 kcf/year</b>
<b>Annual Natural Gas use in kBtu</b>	<b>3,491,500 kBtu/year</b>
<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.	
<b>Annual Water use in kGals</b>	<b>421 kGal/year</b>
<i>Account# not provided</i>	
<i>Meter# not provided</i>	
<b>Energy Use Index (EUI) electric and gas (expressed as kBtu/sq.ft.-year)</b>	<b>** 124</b>



### 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 22% Electricity - Grid Purchase and 78% 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
<a href="#">Energy Performance Rating (1-100)</a>	27*	75	50
<a href="#">Energy Reduction (%)</a>	N/A	22	0
<a href="#">Source Energy Use Intensity (kBtu/Sq. Ft./yr)</a>	192	123	157
<a href="#">Site Energy Use Intensity (kBtu/Sq. Ft./yr)</a>	<b>**124</b>	79	<b>101</b>
<a href="#">Total Annual Source Energy (kBtu)</a>	6,946,960	4,437,158	5,674,145
<a href="#">Total Annual Site Energy (kBtu)</a>	4,476,937	2,859,506	3,656,677
<a href="#">Total Annual Energy Cost (\$)</a>	\$ 72,982	\$ 46,615	\$ 59,610
Pollution Emissions			
<a href="#">CO2-eq Emissions (metric tons/year)</a>	325	208	266
<a href="#">CO2-eq Emissions Reduction (%)</a>	-22%	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	36,103	Estimated Total Annual Energy Use	Energy Rate (\$/Unit)
<b>Total Gross Floor Area</b>	<b>36,103</b>	Electricity - Grid Purchase	kBtu
		Natural Gas	kBtu
			985,437
			3,491,500
			\$ 0.028/kBtu
			\$ 0.013/kBtu

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

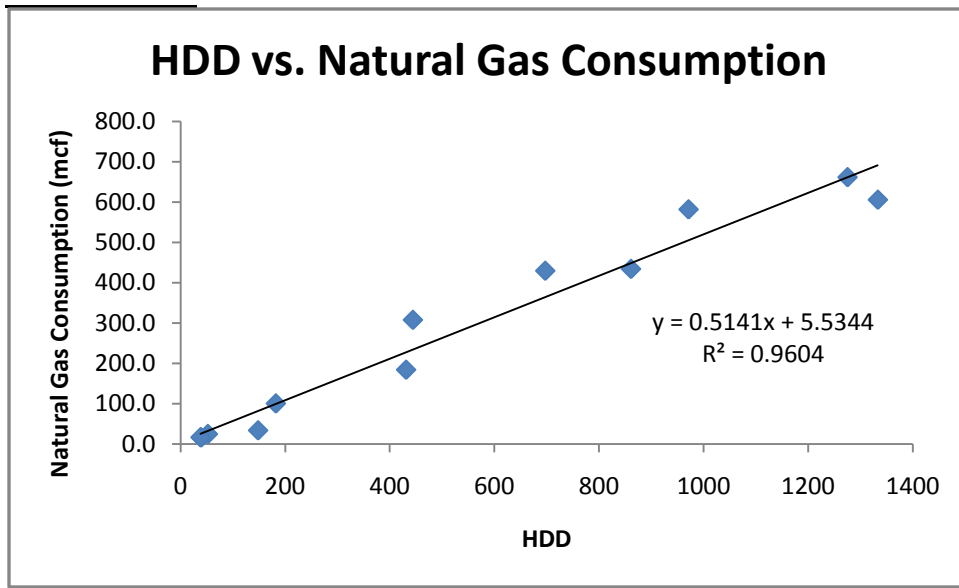
Source: Data adapted from DOE-EIA. See EPA



Building Energy Profile

**Utility Costs per Unit**

<b>Electricity Cost per Unit</b>	<b>\$ .095 per kWh</b>
<b>Natural Gas Cost per Unit</b>	<b>\$ 7.67 per kcf</b>
<b>Water/Sewage Costs per Unit</b>	<b>\$ 14.55 per kGal</b>



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 0.96 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 in the areas being conditioned.

**Maintenance & Operations Costs per Area**  
 (Expressed in median dollars per square foot)

Total Energy/Utilities	\$ 1.66
Gas/Electricity/Other Fuels	\$ 1.49
Other Utilities	\$ 0.17



## 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: 38

Number of Students: 304 (October 2010)  
275 (projected 2011/2012)

Year Constructed: 1955  
Hunter Caldwell and Campbell Architects  
Indiana, Pennsylvania

Renovations/Additions: Classroom additions (not updated in building plans provided)

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: **27\***

\*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:	36,103
Building Type:	Brick/Masonry
Number of Stories:	2
Basement:	Yes
Roofing System:	Flat/Roofing membrane with stone media. (roof is leaking and in poor condition)
Year Installed:	Approximately 17 years old



Roof Insulation:	Not identified in building plans
Windows:	Aluminum frame/single glaze construction



## Building Energy Profile

### **Building Envelope**

*As indicated on design drawings.*

#### **(Approximately 3,000 sq. ft.)**

Basement; boiler room and mechanical equipment room

#### **(Approximately 33,103 sq. ft.)**

First Floor; the main entrance for the building is on this level with 2 double doors leading to lobby. There are 12 classrooms, a multipurpose room with a stage, and kitchen with serving counter. The administrative offices with copy room, art room, computer room, library, music/band room, and nurse's office are on this level. The mechanical room and storage rooms are also on this level. There is one interior stairway in the new addition and 4 restrooms.



### **Facilities & Equipment**

Auditorium

multipurpose room/first floor



Classrooms (12)



Building Energy Profile

Computer Labs

first floor addition



Elevator/Lifts

none

Gymnasium

multipurpose room/first floor



Kitchen

first floor



Misc. Rooms

art room, copy room, computer room, library, music/band room, and nurse's office



## Building Energy Profile

### Restrooms (10)

#### First Floor (10)

- (1) boy's 2 sinks, 3 toilets, and 5 urinals
- (1) girl's 2 sinks and 6 toilets
- (1) boy's 2 sinks, 3 toilets, and 3 urinals
- (1) girl's 2 sinks and 5 toilets
- (5) single occupants/1 sink and 1toilet each



*Total fixtures;* 13 sinks, 14 toilets, and 8 urinals with activation sensors  
(\*fixtures were not identified in building plan documents)

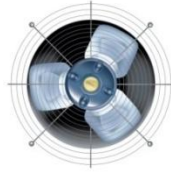
### **Food Service**

Kitchen                      warming kitchen with convection ovens and microwaves

Primary cooking equipment fuel source; electric



Building Energy Profile



**HVAC SYSTEMS**

**Heating:**

Steam System/Boilers

**Cooling:**

Roof Top HVAC Units (offices and computer labs)

**Air Distribution:**

Unit Ventilators

Systems

(2) Smith/Series# 3500 Boilers with C-3 -G burners  
Installed 1989



Condensate Pumps (age, mfg., and model not provided)  
Exhaust Fans (age, mfg., and model not provided)



Unit Ventilators installed 1994 (mfg. and model not provided)



1 – Trane/split system cooling/model# TTR025C100A1  
208-230V/1/60 24 NOMINAL COOLING CAPACITY (kitchen)



## Building Energy Profile

1- Trane/DX cooling/standard efficiency/TSC040A3ROAZD  
208-230v/3ph/23.9amp 4 TON (kitchen)

HVAC Service

Not identified

Temperature Controls

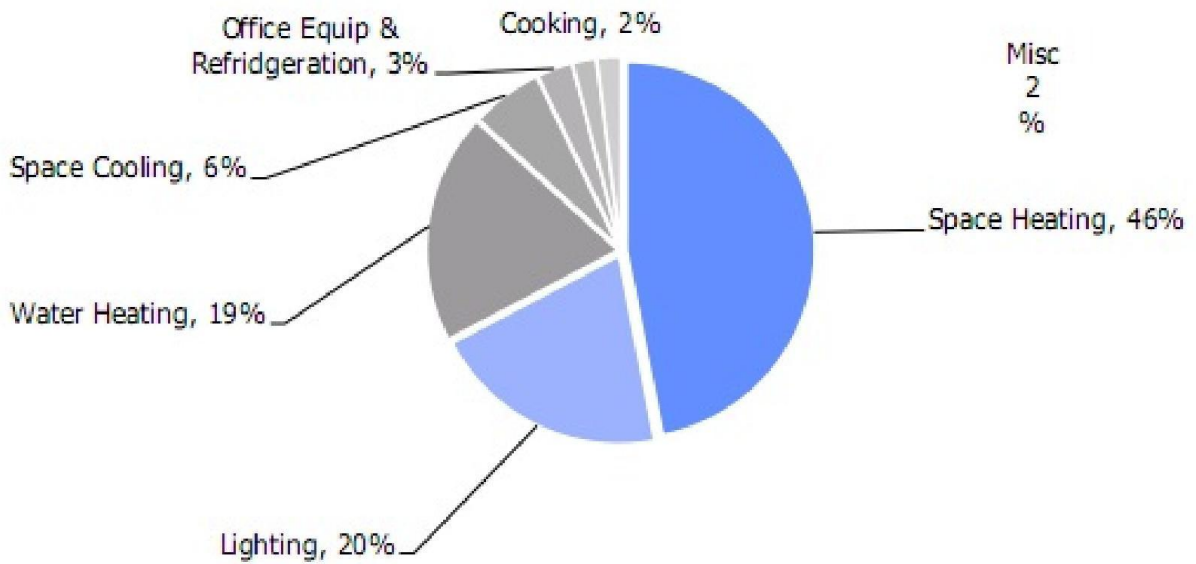
Pneumatic/DDC installed 1994 (mfg. and model not provided)

Domestic Hot Water

RAYPAK domestic water heater (1988) coupled to storage tank  
capacity and model number not identified in building documents



Building Energy Profile



**Breakdown of energy use in Schools**

Source: US DOE, 2006

Building Energy Profile



**LIGHTING**

**Indoor Lighting:**

Basement

Not Identified in Building Plans

First Floor

Classrooms

(172) 4' recessed/parabolic/4-lamp/34w T12



Entry Lobby  
Kitchen

(10) 4' recessed/4-lamp/34w T12  
(8) 4' recessed/4-lamp/34w T12



Kindergarten Rooms  
Hallway  
Multipurpose Room  
with stage

(16) 4' recessed/4-lamp/34w T12  
(22) 4' recessed/4-lamp/34w T12  
(8) metal halide/1 lamp/300 watt  
(6) spot/250w/halogen  
(22) spot/150w-R40 (stage)

Building Energy Profile



Nurse's Office	(7) 4' recessed/2-lamp/34w T12
Offices	(16) 4' recessed/2-lamp/34w T12
Restrooms	(16) 4' recessed/3-lamp/34w T12
	(2) 4' recessed/2-lamp/34w T12 (kindergarten restrooms)
	(1) 4' recessed/2-lamp/34w T12 (nurse's office)

Storage (7) 4' recessed/2-lamp/34w T12



**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:**

First Floor (10) LED

**Electrical Equipment**

I.T. Equipment 169 - PC units  
 (age, mfg, model not identified)

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

Xerox copier models-WCM20I, W5665





## 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