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Facility Energy Assessment Report

Smart Energy Design Assistance Center (SEDAC)

Putnam County Elementary School

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Facility Location:	326 N 5th St, Hennepin, IL 61327
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Table of Contents

Acknowledgements

The Smart Energy Design Assistance Center (SEDAC) would like to thank Putnam County School District for participating in the Public Sector Design Assistance Program and for providing access to information necessary to develop this report. Ryan Siegel, of SEDAC, was the engineer responsible for the analysis and is the primary author of this report. Additional assistance in report preparation by Robert Schlorff and Shawn Maurer are greatly appreciated. Other contributors to this report of SEDAC are also gratefully acknowledged.

Executive Summary

The Putnam County Elementary School is owned by Putnam County CUSD #535 and is located in Hennepin, Illinois. The facility is used as an elementary school and has approximately 38,000 sq. ft. of usable space. The building is used by 260 students and 30 staff members and is occupied from Mid-August through May.

This report identified 10 potential energy cost reduction measures for implementation. After a thorough evaluation of each measure, 8 of the measures are recommended based upon their feasibility for implementation and return on investment.

Recommended Package of Energy Efficiency Measures			
Simple payback (before incentives)	2.2 years	**Incentives Available**	$24,600
Annual Utility Cost Savings	$22,000	**Percent Annual Cost Savings Reduction**	30%
kWh Reduced/yr	49,100	**Percentage kWh Reduction**	33%
therms Reduced/yr	6,200	**Percentage therms Reduction**	28%

The recommendations in this report are designed to allow the facility to create an effective and financially prudent implementation plan to be used to help the building become more energy efficient. The report should be used as a tool to facilitate budgetary planning and obtaining funding/financing. Eligible public-sector incentives are described in this report as well as other opportunities for need-based grants and other funding sources. All information is current at the time of the assessment; for up-to-date information on funding or incentives, contact SEDAC any time at 800.214.7954. Alternatively, you may contact your utility. Implementing the recommendations in this report will reduce energy consumption, help improve occupant comfort and reduce vulnerability to fluctuations in future energy costs. This report can also help towards obtaining LEED® and ENERGY STAR building certification.

Each of the measures are discussed in detail in this report. Recommendations on HVAC, lighting, building envelope, and insulation improvements are included along with suggestions for additional cost reduction measures. Table E1 presents the facility's utility information, as obtained from Ameren Illinois documentation. Table E2 presents the results of the analysis performed on each measure.

Table E1: Utility Information for October 2021 through September 2022

Fuel	Utility	Rate Class	Annual Consumption		Annual Cost ($/yr)	Annual Cost (%)	Unit Cost*	
Electricity	Ameren IL	DS-2	147,836	kWh	$14,037	41%	$0.095	$/kWh
Natural Gas	Ameren IL	GDS-2	22,360	therm	$20,021	59%	$0.90	$/therm
Floor Area	38,080 sf	Totals	2,740,416	kBtu	$34,058	100%		
Site Energy Use Intensity			72	kBtu/sf/yr	Energy Cost Intensity		$0.89	$/sf/yr
Electricity Use Intensity			3.9	kWh/sf/yr	Natural Gas Use Intensity		0.59	therms/ sf/yr
***Note: Unit Costs are blended averages which include all taxes and demand charges.**								

Table E2: Energy Cost Reduction Measure Analysis

Measure #	Description	Potential Energy Savings				Estimated Project Cost	Potential Incentive	SPB w/o &w/ Incentive (yrs)[1]	IRR[2] (%)	NPV[3] ($)
		kW	kWh	therm	$					
1	Individual Urinal Flush Valves	0	0	0	$11,800[5]	$3,000	$0	0.3	>100%	$88,000
								0.3	>100%	$88,300
2	Interior LED Lighting Upgrades	17	26,700	(200)	$2,300	$18,500	$11,700	8.0	4%	($500)
								3.0	32%	$11,100
3	Heat Pump Clothes Dryer	0	500	1,700	$1,600	$1,300	$0	0.8	>100%	$11,100
								0.8	>100%	$11,100
4	Energy Efficient Transformer	0	21,900	0	$2,100	$10,000	$5,300	4.8	16%	$6,100
								2.3	43%	$11,300
5	Bathroom Exhaust Controls	0	0	1,300	$1,100	$500	$0	0.5	>100%	$8,200
								0.5	>100%	$8,200
6	Pipe Insulation	0	0	2,200	$2,000	$6,000	$4,400	3.1	30%	$9,200
								0.8	>100%	$13,600
7	Steam Trap Testing & Repair	0	0	200	$200	$1,800	$1,200	12	0%	($400)
								3.9	27%	$800
8	Programmable Thermostats	0	0	1,100	$1000	$7,200	$1,800	7.5	6%	$300
								5.6	12%	$2,100
9	Heat Pump Water Heaters	0	(2,900)	500	$200	$3000	$0	17	(9%)	($1,600)
								17	(9%)	($1,600)
10	Increase Roof Insulation	0	5,800	4,400	$4,500	$111,300	$0	25	(14%)	($76,400)
								25	(14%)	($76,400)
	All Measures	17	52,000	11,100	$26,700	$162,600	$24,300	6.1	10%	$43,800
								5.2	14%	$68,100
PKG	Recommended Measures (1-8)	17	49,100	6,200	$22,000	$48,300	$24,300	2.2	44%	$121,900
								1.1	93%	$146,200

Notes:
1) "SPB" Refers to Simple Payback, or the amount of time that the projected energy savings will exceed the first cost of the project.
2) IRR (%) refers to Internal Rate of Return.
3) NPV ($) refers to Net Present Value.
4) Total values have been rounded from calculated values.
5) Estimated Water Savings

1 Introduction

The Public-Sector Design Assistance Program is an energy efficiency program that provides millions of dollars in rebates to public facilities that make large-scale equipment improvements to their electric and natural gas systems. SEDAC supports the Public-Sector Design Assistance Program in advocating the efficient and effective use of energy by businesses and public buildings throughout Illinois. The objective of SEDAC is to encourage communities, building owners and operators, design professionals, and building contractors to incorporate energy efficiency practices and renewable energy systems. SEDAC is managed by the University of Illinois at Urbana-Champaign.

The Smart Energy Design Assistance Center (SEDAC) has performed an energy savings and cost analysis for various energy cost reduction measures applied to the Putnam County Elementary School, located in Hennepin, Illinois. The analysis is based on a site inspection conducted on November 1, 2022, engineering calculations, and typical industry assumptions. This report presents the results of the analysis along with the methods and assumptions used.

Engaging in energy-efficiency strategies to control costs is more critical than ever as organizations face the lingering recession and budget challenges. Organizations that take a systematic and strategic approach toward energy management will acquire a broad array of tangible and intangible benefits of interest to themselves and the public at large.

The elevation of energy management to critical importance is a result of many factors, including an increasingly complex and volatile energy marketplace, a growing awareness about the realities of climate change, recognition of the rising importance of intangibles in calculating market value, and an expanding awareness of the importance to restrict the carbon footprint of organizations. According to the U.S Green Building Council, most commercial buildings use 10 to 30 percent more energy than necessary and have ample opportunities to reduce their energy consumption levels.

Public entities known for aggressive and proactive environmental policies stand to reap many intangible benefits including improved community relations, an enhanced reputation as a socially responsible entity, and improved productivity/morale. Energy management practices also help to ensure the reliability of equipment, which reduces the risks and costs associated with equipment failures and downtime.

2 Building Description

2.1 General

The analysis of the building was based on engineering calculations, rule of thumb assumptions, and experience of the engineer. The sections which follow describe details of each building and important input parameters of the calculations.

2.2 Site Conditions and Building Details

The Putnam County Elementary School is owned by Putnam County CUSD #535 and is located in Hennepin, Illinois. The facility is used as an elementary school and has approximately 38,000 sq. ft. of usable space. The building is used by 260 students and 30 staff members and is occupied from Mid-August through May. Custodial staff is present Monday through Friday 6AM to 9PM. The building has been built in many phases over the decades. The original school building celebrates its centennial this year. The gymnasium was built in 1948 and attached in 1954. The school also had additions in 1960, 1963, and 1974.

2.3 Building Envelope

Roof:

The majority of the roof of the elementary school is low-slope tar and gravel. The gymnasium has a barrel-vaulted modified bitumen roof. The gymnasium roof was replaced about 15 years ago. The remaining roofs are over 25 years old and are nearing end of life, as low slope roofs typically last around 20 years. Given the age of the roofs, it is anticipated that there is R-10 insulation in the roof.

Exterior Walls:

The original school is structural masonry with multi-wythe brick and concrete. The additions are predominantly brick masonry with 6" concrete masonry block. Again, due to the age of construction, it is anticipated that there is little insulation present.

Windows and Doors:

The doors are single-pane in aluminum extrusions. The majority of windows are double-pane with insulated glass and were installed in the last decade. The windows are estimated to have a U-factor of 0.25 and the doors are 1.0. The original building windows were replaced in the past with glass block along with smaller single pane operable windows. These have a U-factor around 1.0.

2.4 HVAC Systems

Heating:

Building heating is provided by a pair of Sellers steam boilers with an input capacity of 1.7 million Btu per hour each. The stated output is 1.3 million Btu per hour, providing a nameplate efficiency of 80%. Because they are 14 years old, it is estimated that they have an efficiency of only 75%. Part of the steam goes through a shell and tube heat exchanger to transfer energy from the steam system to a hot water system for the original building. The steam traps are tested when maintenance personnel are making a repair in an area, but not on a planned routine basis. Recently, several traps were replaced.

Cooling:
Cooling is provided by several different residential style split systems; each classroom has its own unit. Each of these is 2.5 ton and controlled by an individual thermostat. The larger spaces are served by rooftop units of between 4 and 7.5 tons each and are controlled by individual thermostats.

Ventilation:
Ventilation is provided through the rooftop units and through leaks in the building envelope.

Control System:
The building uses individual room thermostats which allows for much better control but does not allow for remote alarms and monitoring. However, this simple and granular control leads to energy savings by only having to turn on systems where work is being done, allowing portions of the building to remain off through the summer.

Kitchen:
The elementary school cooks the meals for students in the on-site kitchen. This includes a high temperature commercial dishwasher with associated electric booster heater along with a commercial garbage disposer. The cooking line includes an antique 10-burner range with double ovens and a single stack convection oven. The 10’ exhaust hood has a local fan switch and was off during the site visit as there was no cooking occurring. The kitchen also has a reach-in milk cooler.

2.5 Lighting and Internal Loads

Indoor Lighting:
The indoor lighting is mostly T-8 florescent fixtures which were upgraded some years back from the original T-12 florescent technology. The majority of the lighting is controlled by manual switches. Occupant sensors have been installed in bathrooms and other spaces with unpredictable occupancy.

Outdoor Lighting:
The limited exterior lighting has been upgraded to LED.

Internal Loads:
The school has relatively little in the way of additional loads, including some IT switches, a few refrigerated beverage machines, and a handful of computers in the offices.

2.6 Domestic Hot Water

Domestic hot water is predominantly provided by a pair of 50-gallon natural gas-fired tank type water heaters with 38 kBtu per hour burners. There is also a 40-gallon electric resistance tank type water heater in a closet for a set of single bathrooms in the special education area. The domestic hot water piping is mostly uninsulated.

3 Energy Consumption Analysis

3.1 Electric and Natural Gas Utility Data Analysis

The building's energy consumption was obtained from utility bills provided by Putnam County CUSD 353. Utility bills were analyzed for a twelve-month timeframe from October 2021 through September 2022. Both electricity and natural gas are delivered by Ameren Illinois.

The facility paid a total of $14,037 for electricity in this time frame and $20,021 for natural gas. The total utility cost for the facility from October 2021 through September 2022 was $34,058.

Table 1: Utility Information for October 2021 through September 2022

Fuel	Utility	Rate Class	Annual Consumption		Annual Cost ($/yr)	Annual Cost (%)	Unit Cost*	
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Electricity Use Intensity			3.9	kWh/sf/yr	Natural Gas Use Intensity		0.59	therms/sf/yr

*Note: Unit Costs are blended averages which include all taxes and demand charges.

Figure 1 represents the comparison of electricity consumption (kWh) and annual cooling degree days (CDD). A degree day compares the outdoor temperature to a standard indoor temperature of 65 degrees Fahrenheit. The more extreme the outdoor temperature, the higher the degree day number. Therefore, degree-day measurements can be related to the amount of energy needed for space heating and cooling as compared to the outdoor temperature. The elementary school has a low base load of around 8,000 kWh per month. This is due in part to the HVAC systems being unitary systems serving individual rooms or small clusters of rooms. These systems also only operate when there is a call for heating or cooling, which minimizes operating hours. Since this building does not host summer school and the systems allow only rooms that are occupied to be conditioned, a noticeable drop in electrical usage can be seen during the summer months.

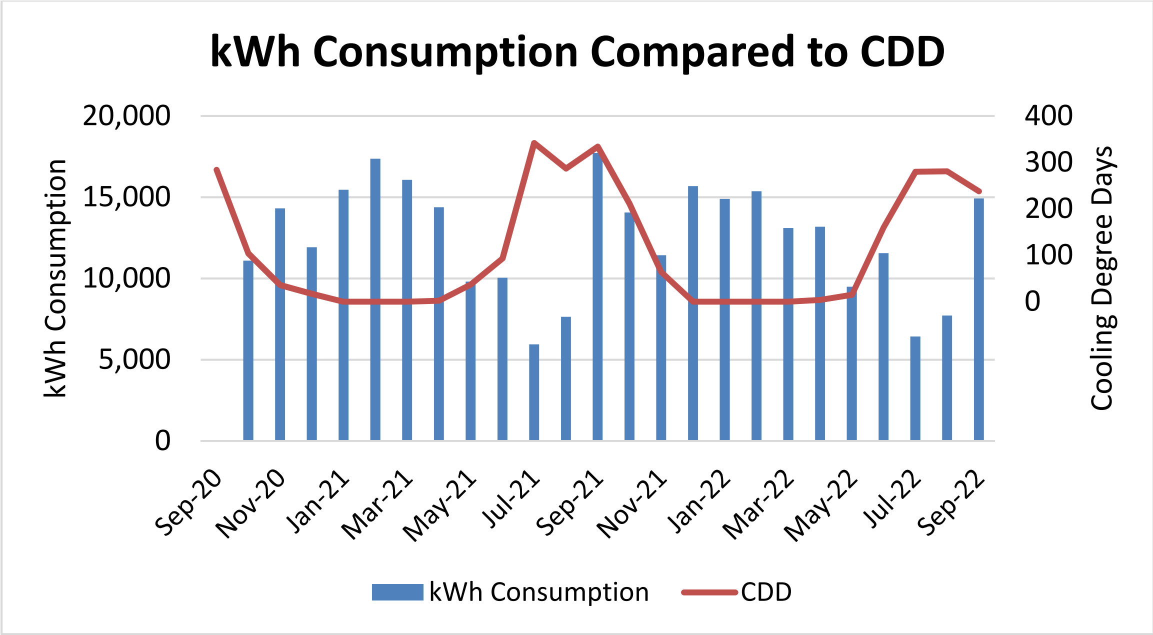


Figure 1: Comparison of Regional Cooling Degree Days versus kWh

Figure 2 represents the comparison of natural gas consumption (therms) and annual heating degree days (HDD). Natural gas consumption is highly corelated to outdoor weather which is expected as building heating is the primary use of gas in the building. The other uses such as domestic hot water and kitchen use are limited. The majority of the gas consumption is driven by the building envelope and ventilation.

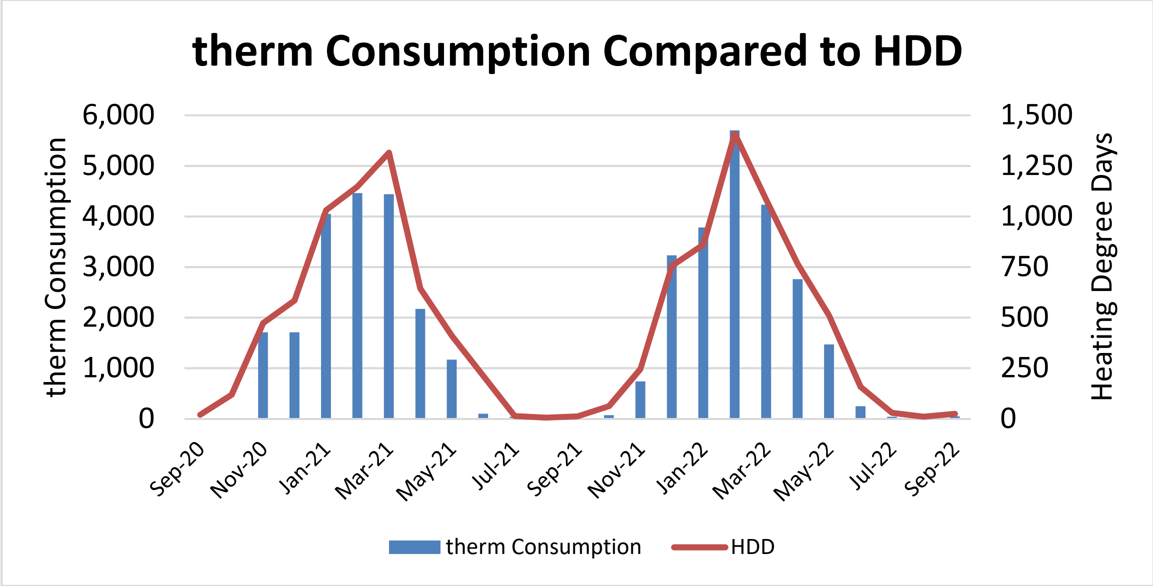


Figure 2: Comparison of Regional Heating Degree Days versus therms

3.2 Benchmarking

Benchmarking is a valuable tool for gauging energy usage relative to similarly classed facilities. Using the ENERGY STAR Portfolio Manager or Target Finder application, the facility's energy consumption can be compared to other facilities of similar size and use. Table 1 below shows the annual site energy consumption of a school building compared to the national average of a similar type facility, as well as a facility with an ENERGY STAR score of 75, which is the minimum requirement to apply for certification. The results indicate that Putnam County Elementary School has slightly above average performance which is commendable. With a rating of 58, Putnam County Elementary School is not eligible to apply for the ENERGY STAR. Implementation of the recommended measures will help Putnam County CUSD 353 improve the building's ENERGY STAR score and likely qualify to become ENERGY STAR certified.

Table 2: ENERGY STAR Target Results

ENERGY STAR Portfolio Manager	Site Energy (kBtu/ft^2/yr)	Total Annual Energy Costs ($)	ENERGY STAR Score
Putnam County High School	**72.0**	**$34,058**	**58**
National Average	78.8	$37,400	50
ENERGY STAR Rated	59.6	$28,300	75

3.3 Breakdown of Energy Consumption

Determining where and in what quantities energy is used throughout the building helps to prioritize energy improvement efforts to maximum effectiveness. SEDAC also estimated how energy is used throughout the elementary school and how much it costs for each function. Figure 3 shows an energy use breakdown in terms of kBtu/yr for each end-use category. Figure 4 shows the energy cost for each of these categories. The proportions are different between the two graphs because the unit cost of natural gas is less than the unit cost of electricity.

Figures 3 and 4 help visualize energy and money flows and give an indication of possible areas for improvement. Most of the school's energy is used by the heating systems. The lighting is the second largest user. Improving the efficiency and operations of these areas can provide abundant savings. Measures address these areas later in this report.

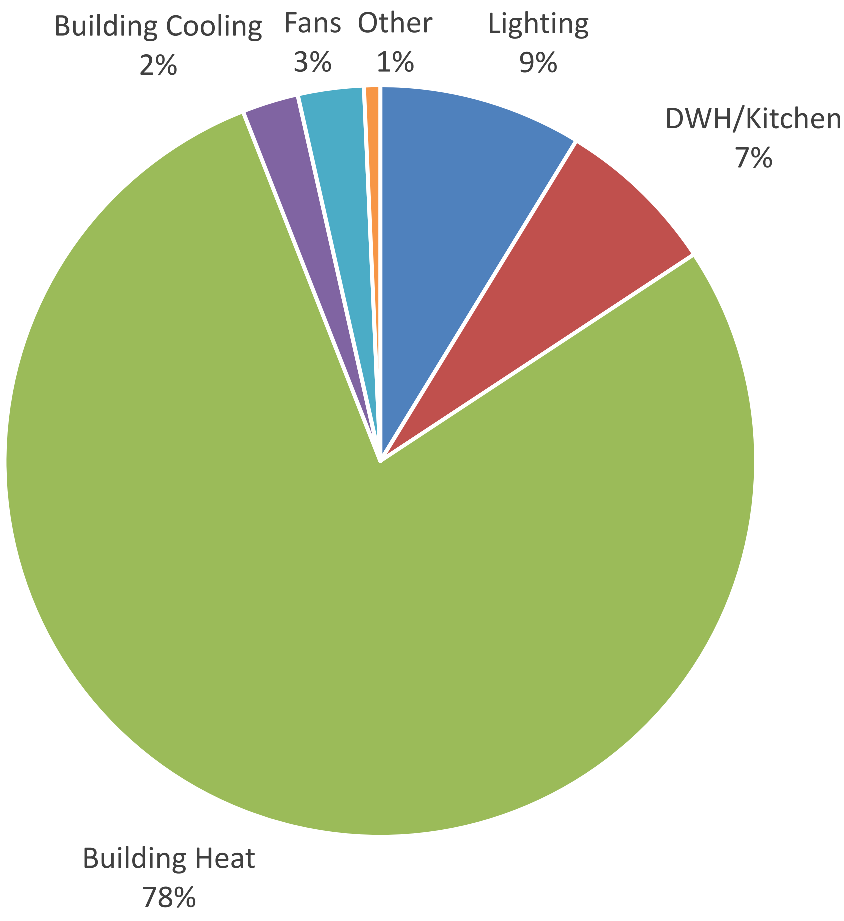


Figure 3: Energy Use Breakdown

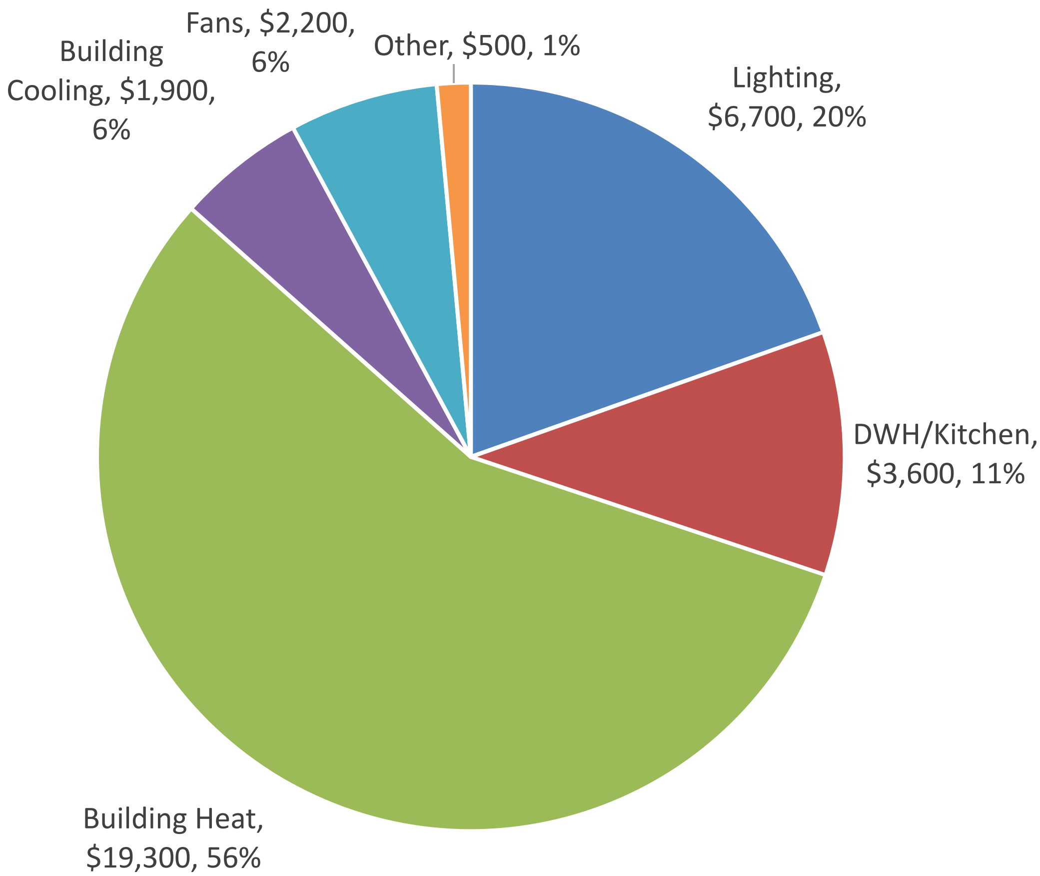


Figure 4: Energy Cost Breakdown

4 Energy Cost Reduction Measures

4.1 Measure–1 Install Individual Urinal Flush Valves

Issues and Observations:

Urinals installed when the school was originally constructed are still in use. They are equipped with common overhead flush tanks that serve up to 3 urinals each. Each tank flows approximately 1 gallon per minute to the urinals, or over half a million gallons per year. While this limits the maximum flow at any given time, water is used even when the urinals are not.

Recommendations:

It is recommended that the urinals be plumbed to individual flush valves. This would allow the urinals to only flush when used. This would dramatically decrease the volume of water used and avoid the need for the building maintenance staff to turn the tanks on and off to save water. Ameren does have an incentive for water savings, but the very short payback may make this ineligible for incentive.

Based on the economics, this measure is recommended.

4.2 Measure–2 Interior LED Lighting Upgrades

Issues and Observations:

Most of the lighting throughout the elementary school has been upgraded from the original T-12 lights to newer T-8 technology. Many of these fixtures use 8-foot lamps using 59-watt lamps. There were a few of the older T-12 lights remaining.

Recommendations:

It is recommended that all the fixtures be upgraded with LEDs. The simplest and most cost-effective way would be to use tubular LED retrofits. SEDAC recommends using Type B lamps, which do require some rewiring to bypass the ballast, but this avoids the ballast compatibility issues that Type A lamps have. Additionally, they remove the ballast as a future point of failure in the fixture.

An alternative that would likely be more costly but may be desirable if the fixture tombstones are in poor condition, would be to replace the fixtures or to install a strip light retrofit kit. These may have better performance and avoid the need to reuse the existing fixture tombstones but come with added cost.

Based on the economics, this measure is recommended.

4.3 Measure–3 Install Heat Pump Clothes Dryer

Issues and Observations:

To save costs of laundering rags and mops, the school had installed a washer and dryer to allow staff to do the laundering on site. The dryer is ducted to an exhaust vent, which is exhausted using the exhaust fan that was installed to serve the former locker room. This exhausts substantially more air than required for the clothes dryer itself. It also was observed that there was an accumulation of lint on the vent which needs to be periodically cleaned and there is likely a similar accumulation inside the ductwork. Traditional clothes dryers operate by heating clothes to drive moisture out of fabrics and into the air which is then deposited outside. It was stated that there are presently 2 loads per week done at the school.

Recommendations:

It is recommended that the clothes dryer be replaced with a heat pump model. These work like heavy duty dehumidifiers and are closed systems with a pair of coils to remove and condense moisture from fabrics, which can then be sent down the drain. This would eliminate the need to discharge large quantities of air out of the building using the locker room fan. Additionally, heat pump dryers use less than a quarter of the energy of traditional clothes dryers.

Heat pump clothes dryers have a condenser coil/filter that will need to be periodically cleaned and loading them with too many items may impair the performance. Placing the dryer up on a platform may make the task of cleaning the coil easier, depending on the coil location.

Based on the economics, this measure is recommended.

4.4 Measure–4 Energy Efficient Transformer

Issues and Observations:

The boiler room contains a transformer to take 240V and step it down to 120/208V. This may be done for two reasons. First would be the school may not have 120V service which would be very unusual. If that is the case, the school should work with the utility to remedy this. Alternatively, some of the school's equipment may not be dual rated to operate on either 208V or 240V leading to the need to transform the 240V utility voltage to 208V; most equipment built in the last few decades is dual rated and can operate on either 208V or 240V service which would negate the need for this transformation. Despite the transformer being located in the warm boiler room, it was producing a substantial quantity of heat, indicating substantial energy losses. It is estimated the present transformer is losing 3 KW of electricity or the same as 2 personal space heaters on high. Given the improvement of equipment efficiencies over time which reduce loads, it is likely that the transformer is also larger than it needs to be if it is even still required.

Recommendations:

It is recommended that the need for this transformer be evaluated to verify that the equipment that it serves is not able to take the utility provided voltage without transformation. If the transformer is no longer needed, it should be bypassed. If this transformer is still needed, then it should be replaced with a modern, energy efficient transformer, rated as DOE 2016 compliant or better.

Based on the economics, this measure is recommended.

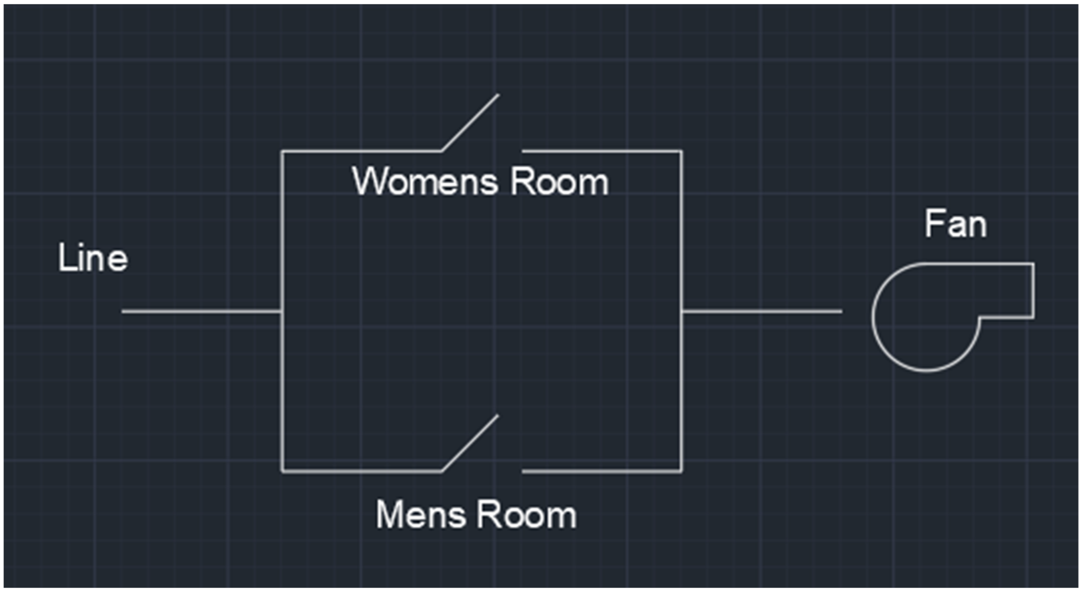
4.5 Measure–5 Bathroom Exhaust Fan Controls

Issues and Observations:

Presently, the 1954-bathroom exhaust fan operates 24 hours per day regardless of building occupancy. The restroom exhaust fan is estimated to move roughly 800 cubic feet per minute. This air must be made up through leaks or from the rooftop units bringing in moisture-laden outdoor air.

Recommendations:

It is recommended to install occupancy sensors within both the men's and women's restroom to control the exhaust fan. Connecting the sensors in parallel, as shown below, would allow the fan to operate any time either bathroom is occupied and for a period of time after it is vacated.



Based on the economics, this measure is recommended.

4.6 Measure–6 Pipe and Tank Insulation

Issues and Observations:

Putnam County Elementary School has a substantial quantity of piping and a steam heat exchanger with insulation that is failing and falling off. This contributes to the overheating of the boiler room.

Unfortunately, there is a substantial quantity of asbestos and a tight working space, increasing the difficulty and cost to install insulation.

Recommendations:

It is recommended that all the hot water and steam piping and the heat exchanger be insulated. At a minimum, they should be insulated in compliance with the International Energy Conservation Code. An excerpt of Table C403.12.3 from the IECC is provided here for reference. It is estimated that 100’ of 2” pipe, 40’ of 3” pipe, and 6’ of 6” pipe/tank will be insulated. Insulating additional piping will further increase the savings and corresponding increases in utility incentives would be realized.

SEDAC frequently finds that insulation above these values is often cost effective. The savings calculation is based on insulation values of ½” greater than the values below. Installing insulation above this level would increase the savings further.

Excerpt of Table C403.12.3 Minimum Pipe Insulation Thickness (in inches)

Fluid Temp Range	Nominal Pipe or Tube Size (inches)				
	<1	1 to <1.5	1.5 to <4	4 to <8	8+
201-250	2.5	2.5	2.5	3.0	3.0
141-200	1.5	1.5	2.0	2.0	2.0
105-140	1.0	1.0	1.5	1.5	1.5

Based on the economics, this measure is recommended.

4.7 Measure–7 Steam Trap Testing and Repair

Issues and Observations:

The school has a wing that is heated using steam. The school currently tests traps only when staff is doing maintenance in that area. Steam traps typically fail at a rate of around 3% per year. They can fail either closed (cold plugged) or open (blowing through). Typically, traps that fail closed are reported quickly as a no heat call. However, failing open is more common and less likely to be reported, as people will be warm. Additionally, many steam traps are located in areas that are difficult to reach and therefore are tested less often unless there is a program in place to systematically test the traps.

Recommendations:

The district should test all the steam traps and implement a routine trap testing program. Given the relatively small failure rate but the typical high cost of failed units, a testing program should include testing all the traps every 3-5 years. The program could include either testing all the traps on that cycle or 20-33% of traps every year, ensuring that every trap is tested in a cycle.

Based on the economics, this measure is recommended.

4.8 Measure–8 Install Programmable Thermostats

Issues and Observations:

The school has a variety of thermostats including some pneumatic thermostats and some digital thermostats. None of those observed were programmable and maintain a set temperature setpoint. However, it was reported that users are fairly good at adjusting thermostats when they leave, which would be in line with the low energy consumption for the school.

Recommendations:

The district should install programmable thermostats to allow Putnam County to further reduce the energy consumption of the HVAC systems. These can include wi-fi pneumatic thermostats for locations such as the one pictured, along with other wi-fi connected thermostats that can interface with the mini-splits and other HVAC systems. One downside to some wi-fi thermostats may be the use of batteries that need to be replaced periodically. If batteries are not replaced in these thermostats, the systems may over condition– either heating or cooling. If they are able to integrate with the current district BAS, the new thermostats may also provide more visibility into the operation of the building systems, including fault detection.

Based on the economics, this measure is recommended.

4.9 Measure–9 Install Heat Pump Water Heaters

Issues and Observations:

The school has a traditional electric resistance water heater to serve bathrooms. The boiler room contains a pair of natural gas water heaters with atmospheric venting that serves the kitchen. The gas-fired units are 6-year warranty water heaters, which are already over 10 years old and are likely reaching the end of their lives.

Considerations:

When the time comes to replace these water heaters, heat pump models should be considered due to their lower operating cost. They also do not require exhaustion of combustion gasses through a hole in the building envelope. They additionally do not have the carbon monoxide poisoning risk that natural gas water heaters have. Heat pump water heaters also provide some nominal cooling and dehumidification as they extract heat from the space around them of which there is plenty in the boiler room.

4.10 Measure–10 Increase Roof Insulation

Issues and Observations:

Due to the age of the school and the low profile of the roofs, it is anticipated that the roof only has R-10 insulation. Additionally, there are substantial quantities of equipment on the roof. The existing exhaust fans have very low equipment curbs, which would need to be raised to accommodate more roof insulation.

Considerations:

When equipment on the roof is replaced, the equipment curbs should be raised; it will cost less to raise the equipment curb when equipment is replaced rather than during roof replacement. Raising the equipment curbs will allow for installation of additional roof insulation when the roof is replaced in the future. Installing additional roof insulation will reduce winter heat loss and summer heat gain and increase the resiliency of the building in the event of loss of utility supply.

5 Incentives

Listed below are various additional opportunities to consider. Please note that the incentive information provided is current at the time the assessment is completed. For up-to-date information on available incentives, contact SEDAC any time at 800.214.7954. Alternatively, you may contact or your utility.

5.1.1 Utility Incentive Offerings

The Ameren Illinois Rebate Program offers rebates for energy efficiency improvements that save electricity. Categories of rebates include lighting, HVAC, water heating, specialty equipment, water-saving devices, variable frequency drives, new construction, retro-commissioning, compressed air leak survey & repair, and custom projects. More information and applications can be found here: https://amerenillinoissavings.com/business/find-incentives-on-energy-efficient-equipment/

Lighting upgrade rebate programs include the Instant Incentive Program and the Small Business Direct Install (SBDI) Program. Instant incentives are available through their online store with quantity limits or through authorized distributors without quantity limits. The SBDI Program is available through registered trade allies and avoids the paperwork of standard and custom incentives. SBDI services include a lighting assessment and project quote, including installation. The SBDI program has higher incentive levels than standard incentives; the incentives may cover up to 100% of the material and labor costs.

Instant Incentives: https://amerenillinoissavings.com/instant-incentives/.

Small Business Direct Install: https://amerenillinoissavings.com/business/industry-solutions/small-business/.

Table 3: 2023 Ameren Incentives

Ameren Offerings	Information
Linear T-8 LED 4' Tube Linear T-8 LED 8' Tube	\$10/lamp (SBDI) \$14/lamp (SBDI)
LED Fixture Replacing T-8 lamps	\$0.70/watt reduced (SBDI) \$0.50/watt reduced (Standard)
Steam Traps	\$40/trap (survey) \$140/trap (replacement)
Smart Thermostats	\$100/t-stat
Custom	\$0.24/kWh saved \$2.00/therm saved \$0.30/1,000 gallons saved

5.1.2 Contractors and Installers

Visit the Ameren Illinois Energy Efficiency Program Allies website for a list of mechanical and lighting contractors, engineers, architects, energy service companies, wholesalers, distributors, and retailers that can help get your energy efficiency project implemented.
https://amerenillinoissavings.com/business/business-contractors/

6 Conclusion

This report by the Smart Energy Design Assistance Center evaluated 10 energy cost reduction measures for potential application by the high school to reduce electrical and natural gas consumption and thereby save on utility costs. After thorough evaluation, 8 of the measures are recommended for implementation based on their effective rates of return.

The facility management and operators should be commended for their ongoing efforts to reduce energy consumption. As noted in Section 3 – Energy Consumption Analysis, Elementary School site energy use of 72 kBtu/ft^2 is better than the Energy Star U.S. Median Value. By also participating in a Smart Energy Design Assistance Center Program energy audit, the facility is exhibiting a sharpened focus as an organization dedicated to energy management practices. Undergoing an energy audit analysis sends a very strong message to one's community of a solid commitment to energy efficiency and sustainable business practices.

SEDAC recommends that the energy savings initiatives identified in this report be implemented to decrease the building's overall energy consumption. A total reduction of 49,100 kWh and 6,200 therms is possible through the implementation of the suggested measures shown in Table E2. This represents an approximate 30% utility cost savings and 27% energy savings. SEDAC recommends implementing this measure package, which includes:

- Measure-1: Individual Urinal Flush Valves
- Measure-2: Interior LED Lighting Upgrades
- Measure-3: Heat Pump Clothes Dryer
- Measure-4: Energy Efficient Transformer
- Measure-5: Bathroom Exhaust Fan Controls
- Measure-6: Pipe and Tank Insulation
- Measure-7: Steam Trap Testing and Repair
- Measure-8: Programmable Thermostats

The suggested measures will significantly reduce the electrical and natural gas consumption of the facility while providing an estimated annual total gas, electric, and water utility savings of $22,000 (at current costs).

The items included in this report are the primary elements of creating and managing a sustainable building; they are to serve as guides to implementation.

To demonstrate its effectiveness to the State of Illinois, SEDAC is asked to compile quarterly reports that document implementation of energy efficiency measures. We ask that you keep us apprised of all work towards implementation of our recommendations; this information will allow us to accurately reflect subsequent savings. We will also contact you periodically to discuss, answer questions, and review status.

Thank you for the opportunity to be of service. Please do not hesitate to contact us if we may be of further assistance.

7 Customer Interest Form

Below is a selection form that will allow SEDAC to gauge the interest of the client in implementing each individual measure. Please fill this out and return to SEDAC.

Measure #	Measure Description	Interest in Implementing?		Estimated Completion Date
		YES	NO	
1	Individual Urinal Flush Valves			
2	Interior LED Lighting Upgrades			
3	Heat Pump Clothes Dryer			
4	Energy Efficient Transformer			
5	Bathroom Exhaust Fan Controls			
6	Pipe and Tank Insulation			
7	Steam Trap Testing and Repair			
8	Programmable Thermostats			
9	Heat Pump Water Heaters			
10	Increase Roof Insulation			

Appendix A – Pre and Post Implementation Comparison

Section 3 of this report; Energy Consumption and Analysis, provided the following benchmarking for Putnam County Elementary School.

Table 3: Utility and Benchmark from October 2021 through September 2022

Fuel	Utility	Rate Class	Annual Consumption		Annual Cost ($/yr)	Annual Cost (%)	Unit Cost*	
Electricity	Ameren IL	DS-2	147,836	kWh	$14,037	41%	$0.095	/kWh
Natural Gas	Ameren IL	GDS-2	22,360	therm	$20,021	59%	$0.90	/therm
Floor Area	38,080 sf	Totals	2,740,416	kBtu	$34,058	100%		
		Site Energy Use Intensity	72	kBtu/sf/yr		Energy Cost Intensity	$0.89	$/sf/yr
		Electricity Use Intensity	3.9	kWh/sf/yr		Natural Gas Use Intensity	0.59	therms/sf/yr

If the elementary school were to implement the recommended package of this report, the benchmarking would look like this:

Table 4: Post Implementation of Package of measures - Utility and Benchmark

Fuel	Utility	Rate Class	Annual Consumption		Annual Cost ($/yr)	Annual Cost (%)	Unit Cost*	
Electricity	Ameren IL	DS-2	98,700	kWh	$9,300	39%	$0.095	/kWh
Natural Gas	Ameren IL	GDS-2	16,200	therm	$14,600	61%	$0.90	/therm
Floor Area	38,080 sf	Totals	1,957,000	kBtu	$23,900	100%		
		Site Energy Use Intensity	51	kBtu/sf/yr		Energy Cost Intensity	$0.63	$/sf/yr
		Electricity Use Intensity	2.6	kWh/sf/yr		Natural Gas Use Intensity	0.43	therms/sf/yr

The EUI reduces by 21 kBtu/sf/yr to 51 kBtu/sf/yr and the energy cost per square foot reduces by $0.26/sf/yr to $0.63/sf/yr for an annual cost savings of $10,200 plus $11,800 in water savings. This represents a 30% reduction in utility expenditures.

It is also anticipated that implementing the recommended measures will likely allow Putnam County Elementary School to achieve Energy Star Certification.