

COMMERCIAL NEW CONSTRUCTION

Final Savings Report

Erie County Vocational Technical
School
Erie, PA

May 5, 2025
1342421-A

Prepared for



Met-Ed • Penelec • Penn Power • West Penn Power

energysavePA-business.com

Executive Summary

This report documents the verification results of energy conservation strategies for the Erie County Vocational Technical School project, showing the results of the verification model relative to the baseline energy model.



Enrollment



Analysis



Results



Verification



Incentives

Upon construction completion, Willdan verified the selected strategies via a review of construction drawings and submittals.

Energy Conservation Investments - Simple Payback Analysis

Project Incremental Construction Cost	\$633,070
Penelec Incentive	\$56,898
Annual Energy Cost Savings	\$16,816
Payback with incentive (in years)	34.3

Note: The computer model offers sophisticated predictions of energy savings with estimations as good as any other means available for a building that has not been built. The actual energy use of this building will be different from simulated results. Building systems and other operating parameters will result in annual energy costs that will be different from what is predicted here. The realization of energy savings is the responsibility of the owner/operator of the building – not Penelec or Willdan. Savings are not guaranteed.

The costs of energy efficiency programs are recovered through customer rates in accordance with PA Act 129 of 2008. For a complete list of commercial, industrial, residential, and low-income energy efficiency programs, please visit energysavePa.com. FirstEnergy's Pennsylvania utilities, their parents, subsidiaries, employees, affiliates and agents assume no responsibility for the performance of the equipment or equipment warranty, the quality of the work, labor and/or materials supplied, and/or the acts or omissions of any contractor.

By participating in these energy efficiency and peak demand reduction programs, customers agree to allow their utility to retain ownership of all Capacity Rights which refers to the demand reduction associated with any energy efficiency and peak demand reduction measure for which incentives were provided by the Company. Your utility will aggregate these energy efficiency demand reduction attributes into the PJM capacity market with proceeds being used to offset the program costs. PA customers who have existing contracts with third party demand response service providers that were executed before June 1, 2021 (i.e., the start of Phase IV of Act 129 EE&C), have the option of retaining the PJM capacity rights associated with EE&C projects when participating in FirstEnergy PA Act 129 energy efficiency and peak demand reduction programs.

Whole Building Results Summary

The following results are based on an ASHRAE 2016 90.1 baseline.

	Baseline	Verified Bundle
	Annual Energy Cost	\$188,317
	Annual Energy Cost Savings	\$16,816
	% Annual Energy Cost Savings	9%
	Annual Electric Consumption (kWh)	975,045
	Annual Electric Consumption Savings	156,719
	% Annual Electric Consumption Savings	16%
	Electric Peak (kW)	634.8
	Electric Peak Savings	111.3
	% Electric Peak Savings	18%
	Annual Gas Consumption (Therm)	45,035
	Annual Gas Consumption Savings	2,943
	% Annual Gas Consumption Savings	7%
	EUI (kBtu/ft²/yr)	55.4
	EUI Savings	5.9
	% EUI Savings	10%
	Total Incremental Cost	\$633,070
	Penelec Total Incentive*	\$56,898
	Simple Payback with Incentive (years)	34.3

* The total incentive of \$56,898 is calculated by the lesser of two calculations or capped at \$500,000:

- $$\begin{aligned}
 & \$0.15/\text{kWh savings} \times 156,719 \text{ kWh (electric consumption savings as noted in the chart above)} \\
 & + \\
 & \$300/\text{kW savings} \times 111.3 \text{ kW (electric demand savings as noted in the chart above)} = \$56,898
 \end{aligned}$$
- 50% of the incremental cost, which is \$633,070 for this project = \$316,535

List of Verified Strategies

The table below shows the selected energy savings strategies, their relative contribution to the bundled savings, and the verification parameters that those savings are based on.

Space Asset Area	Strategy Description	Verified % of Cost Savings
HVAC	See Appendix A	-28%
Mechanical		
Facility	VFD on building chilled water pump	6%
Facility	VFD on building heating water pump	2%
Facility	19% improved chiller efficiency	7%
Facility	Improved condensing gas boiler efficiency to 94.5%	19%
VAV AHU (Elect. Tech)	Reduced fan system power to 0.65 bhp/1,000 CFM	4%
VAV AHU (Graphics & Media)	Reduced fan system power to 0.70 bhp/1,000 CFM	4%
VAV AHU (Early Childhood)	Reduced fan system power to 0.80 bhp/1,000 CFM	< 1%
AHU (Const. Trades)	Reduced fan system power to 0.80 bhp/1,000 CFM	1%
VAV AHU (Maint. & Fabr.)	Reduced fan system power to 0.91 bhp/1,000 CFM	2%
VAV AHU (Admin)	Reduced fan system power to 0.70 bhp/1,000 CFM	2%
VAV AHU (Lect. Hall)	Reduced fan system power to 0.66 bhp/1,000 CFM	< 1%
VAV AHU (Culinary)	Reduced fan system power to 0.70 bhp/1,000 CFM	5%
Architectural		
Administration	Unit U: 0.46 Center of Glass U: 0.33 SHGC: 0.62 Visible Transmittance: 0.73	< 1%
Automotive	Unit U: 0.46 Center of Glass U: 0.33 SHGC: 0.62 Visible Transmittance: 0.73	< 1%
Construction Trades	Unit U: 0.46 Center of Glass U: 0.33 SHGC: 0.62 Visible Transmittance: 0.73	< 1%

Space Asset Area	Strategy Description	Verified % of Cost Savings
Culinary	Unit U: 0.46 Center of Glass U: 0.33 SHGC: 0.62 Visible Transmittance: 0.73	-2%
Early Childhood	Unit U: 0.46 Center of Glass U: 0.33 SHGC: 0.62 Visible Transmittance: 0.73	-1%
Electrical Technology	Unit U: 0.46 Center of Glass U: 0.33 SHGC: 0.62 Visible Transmittance: 0.73	-1%
Graphics & Media	Unit U: 0.46 Center of Glass U: 0.33 SHGC: 0.62 Visible Transmittance: 0.73	< 1%
Maintenance & Fabrication	Unit U: 0.46 Center of Glass U: 0.33 SHGC: 0.62 Visible Transmittance: 0.73	< 1%
Administration	Increased roof assembly thermal resistance to R-30	< 1%
Automotive	Increased roof assembly thermal resistance to R-30	< 1%
Construction Trades	Increased roof assembly thermal resistance to R-30	< 1%
Culinary	Increased roof assembly thermal resistance to R-30	< 1%
Early Childhood	Increased roof assembly thermal resistance to R-30	< 1%
Electrical Technology	Increased roof assembly thermal resistance to R-30	< 1%
Graphics & Media	Increased roof assembly thermal resistance to R-30	< 1%
Main Lecture Hall	Increased roof assembly thermal resistance to R-30	< 1%
Maintenance & Fabrication	Increased roof assembly thermal resistance to R-30	< 1%
Mechanical Mezzanine	Increased roof assembly thermal resistance to R-30	< 1%
Administration	Increased wall assembly thermal resistance to R-21	< 1%
Automotive	Increased wall assembly thermal resistance to R-21	< 1%
Construction Trades	Increased wall assembly thermal resistance to R-21	< 1%

Space Asset Area	Strategy Description	Verified % of Cost Savings
Culinary	Increased wall assembly thermal resistance to R-21	< 1%
Early Childhood	Increased wall assembly thermal resistance to R-21	< 1%
Electrical Technology	Increased wall assembly thermal resistance to R-21	< 1%
Graphics & Media	Increased wall assembly thermal resistance to R-21	< 1%
Maintenance & Fabrication	Increased wall assembly thermal resistance to R-21	< 1%
Mechanical Mezzanine	Increased wall assembly thermal resistance to R-21	< 1%
Electrical		
Facility	Exterior Lighting Load: 5.59 kW	7%
Administration	Occupancy sensor controls, 66% of space	< 1%
Automotive	Occupancy sensor controls, 34% of space	2%
Construction Trades	Occupancy sensor controls, 7% of space	< 1%
Graphics & Media	Occupancy sensor controls, 93% of space	3%
Maintenance & Fabrication	Occupancy sensor controls, 32% of space	2%
Administration	Reduced lighting power density to 0.40 W/ft ²	5%
Automotive	Reduced lighting power density to 0.48 W/ft ²	7%
Construction Trades	Reduced lighting power density to 0.43 W/ft ²	6%
Culinary	Reduced lighting power density to 0.46 W/ft ²	10%
Early Childhood	Reduced lighting power density to 0.48 W/ft ²	< 1%
Electrical Technology	Reduced lighting power density to 0.41 W/ft ²	8%
Graphics & Media	Reduced lighting power density to 0.39 W/ft ²	10%
Main Lecture Hall	Reduced lighting power density to 0.37 W/ft ²	3%
Maintenance & Fabrication	Reduced lighting power density to 0.45 W/ft ²	9%
Mechanical Mezzanine	Reduced lighting power density to 0.17 W/ft ²	5%
Service Water Heating		
Facility	Improved SWH efficiency to 96%	3%
Total Savings		100%

**Denotes new strategy that exceeds modeled goals and may offset other strategies that do not meet the modeled goals*

Appendix A. Project Information

Building Summary		
Location	Erie, PA	
Narrative	Vocational technical school retrofit	
Space Asset Areas	Area	Number of Stories
Mechanical Mezzanine	19,100 ft²	1
Electrical Technology	17,648 ft²	1
Graphics & Media	8,995 ft²	1
Automotive	29,256 ft²	1
Early Childhood	3,212 ft²	
Construction Trades	10,264 ft²	
Maintenance & Fabrication	16,225 ft²	
Administration	10,804 ft²	
Total	141,395 ft²	2
Exterior Lighting Area	148,507 ft²	
Utilities		
Electric Utility	Penelec	
Gas Utility	N/A for Incentive	
Schedule		
Construction Documents Complete		
Construction Start		
Occupancy	03/31/2025	
Baseline Reference	ASHRAE 2016 90.1	
Other Notes		

Systems Summary	
HVAC	Mechanical Mezzanine: single zone air handler with gas boiler, no cooling Electrical Technology, Graphics & Media, Early Childhood, Maintenance & Fabrication, Administration: central air handler with gas boiler and air-cooled chiller cooling Automotive, Construction Trades: single zone air handler with gas boiler and air-cooled chiller cooling

Appendix B. Verified Isolated Strategy Results

The table below includes detailed results modified based on verification findings shown earlier in this report.

Space Asset Area	Strategy Description	Peak kW Savings	kWh Savings	Gas Savings (Therm)	Energy Cost Savings	Inc. Cost
HVAC	See Appendix A	-13.5	-56,139	349	-\$7,141	\$466,997
Facility	VFD on building chilled water pump	0	12,074	0	\$1,631	\$4,125
Facility	VFD on building heating water pump	0	4,000	-54	\$472	\$4,288
Facility	19% improved chiller efficiency	54.6	13,555	0	\$1,829	\$89,979
Facility	Improved condensing gas boiler efficiency to 94.5%	0	109	3,897	\$4,924	\$26,798
VAV AHU (Elect. Tech)	Reduced fan system power to 0.65 bhp/1,000 CFM	6.4	8,436	-72	\$1,049	\$2,157
VAV AHU (Graphics & Media)	Reduced fan system power to 0.70 bhp/1,000 CFM	4.9	7,206	-4	\$968	\$1,100
VAV AHU (Early Childhood)	Reduced fan system power to 0.80 bhp/1,000 CFM	1.2	1,371	-16	\$167	\$393
AHU (Const. Trades)	Reduced fan system power to 0.80 bhp/1,000 CFM	1	2,404	-49	\$263	\$627
VAV AHU (Maint. & Fabr.)	Reduced fan system power to 0.91 bhp/1,000 CFM	3.2	3,278	-35	\$402	\$1,983
VAV AHU (Admin)	Reduced fan system power to 0.70 bhp/1,000 CFM	2.3	3,910	-28	\$496	\$1,321
VAV AHU (Lect. Hall)	Reduced fan system power to 0.66 bhp/1,000 CFM	0.9	987	-10	\$119	\$573
VAV AHU (Culinary)	Reduced fan system power to 0.70 bhp/1,000 CFM	7.2	10,030	-44	\$1,299	\$2,592
Administration	Unit U: 0.46 Center of Glass U: 0.33 SHGC: 0.62 Visible Transmittance: 0.73	-1.3	-1,752	42	-\$181	\$102

Space Asset Area	Strategy Description	Peak kW Savings	kWh Savings	Gas Savings (Therm)	Energy Cost Savings	Inc. Cost
Automotive	Unit U: 0.46 Center of Glass U: 0.33 SHGC: 0.62 Visible Transmittance: 0.73	-1.7	-1,282	125	-\$13	\$157
Construction Trades	Unit U: 0.46 Center of Glass U: 0.33 SHGC: 0.62 Visible Transmittance: 0.73	0	242	-1	\$32	\$45
Culinary	Unit U: 0.46 Center of Glass U: 0.33 SHGC: 0.62 Visible Transmittance: 0.73	-2.7	-4,161	95	-\$441	\$236
Early Childhood	Unit U: 0.46 Center of Glass U: 0.33 SHGC: 0.62 Visible Transmittance: 0.73	-1.9	-2,988	53	-\$334	\$136
Electrical Technology	Unit U: 0.46 Center of Glass U: 0.33 SHGC: 0.62 Visible Transmittance: 0.73	-0.1	-2,243	16	-\$283	\$67
Graphics & Media	Unit U: 0.46 Center of Glass U: 0.33 SHGC: 0.62 Visible Transmittance: 0.73	-1.5	-992	3	-\$129	\$152
Maintenance & Fabrication	Unit U: 0.46 Center of Glass U: 0.33 SHGC: 0.62 Visible Transmittance: 0.73	-0.3	372	-2	\$47	\$51
Administration	Increased roof assembly thermal resistance to R-30	-0.1	-7	-22	-\$27	-\$1,062
Automotive	Increased roof assembly thermal resistance to R-30	-0.3	-72	-70	-\$98	-\$2,875
Construction Trades	Increased roof assembly thermal resistance to R-30	-0.1	-12	-22	-\$28	-\$1,009
Culinary	Increased roof assembly thermal resistance to R-30	0	-93	-4	-\$17	-\$227

Space Asset Area	Strategy Description	Peak kW Savings	kWh Savings	Gas Savings (Therm)	Energy Cost Savings	Inc. Cost
Early Childhood	Increased roof assembly thermal resistance to R-30	0	-10	-7	-\$9	-\$316
Electrical Technology	Increased roof assembly thermal resistance to R-30	-0.1	-9	-38	-\$46	-\$1,734
Graphics & Media	Increased roof assembly thermal resistance to R-30	-0.1	29	-6	-\$2	-\$884
Main Lecture Hall	Increased roof assembly thermal resistance to R-30	0	19	-10	-\$8	-\$460
Maintenance & Fabrication	Increased roof assembly thermal resistance to R-30	-0.2	-4	-31	-\$37	-\$1,595
Mechanical Mezzanine	Increased roof assembly thermal resistance to R-30	0	-25	-21	-\$28	-\$1,877
Administration	Increased wall assembly thermal resistance to R-21	0	22	8	\$13	\$92
Automotive	Increased wall assembly thermal resistance to R-21	0.1	134	41	\$70	\$694
Construction Trades	Increased wall assembly thermal resistance to R-21	0	23	29	\$39	\$421
Culinary	Increased wall assembly thermal resistance to R-21	0.1	105	32	\$55	\$504
Early Childhood	Increased wall assembly thermal resistance to R-21	0.1	32	20	\$33	\$291
Electrical Technology	Increased wall assembly thermal resistance to R-21	0	69	11	\$25	\$143
Graphics & Media	Increased wall assembly thermal resistance to R-21	0.1	10	21	\$29	\$325
Maintenance & Fabrication	Increased wall assembly thermal resistance to R-21	0.1	76	37	\$55	\$475
Mechanical Mezzanine	Increased wall assembly thermal resistance to R-21	0	111	31	\$56	\$985
Administration	Occupancy sensor controls, 66% of space	0.1	894	-11	\$108	\$870
Facility	Exterior Lighting Load: 5.59 kW	0	12,550	0	\$1,695	\$4,070

Space Asset Area	Strategy Description	Peak kW Savings	kWh Savings	Gas Savings (Therm)	Energy Cost Savings	Inc. Cost
Automotive	Occupancy sensor controls, 34% of space	1.5	4,540	-110	\$479	\$5,203
Construction Trades	Occupancy sensor controls, 7% of space	0	551	-9	\$64	\$1,825
Graphics & Media	Occupancy sensor controls, 93% of space	1.1	6,811	-22	\$895	\$1,600
Maintenance & Fabrication	Occupancy sensor controls, 32% of space	0.8	3,792	-55	\$442	\$2,885
Administration	Reduced lighting power density to 0.40 W/ft ²	4.8	11,391	-152	\$1,348	\$1,372
Automotive	Reduced lighting power density to 0.48 W/ft ²	8.2	16,948	-477	\$1,687	\$3,714
Construction Trades	Reduced lighting power density to 0.43 W/ft ²	4.9	12,906	-248	\$1,427	\$1,303
Culinary	Reduced lighting power density to 0.46 W/ft ²	6.3	19,442	-110	\$2,488	\$2,692
Early Childhood	Reduced lighting power density to 0.48 W/ft ²	0.6	1,929	-38	\$215	\$408
Electrical Technology	Reduced lighting power density to 0.41 W/ft ²	7.4	18,885	-312	\$2,158	\$2,240
Graphics & Media	Reduced lighting power density to 0.39 W/ft ²	5.1	19,374	-65	\$2,535	\$1,142
Main Lecture Hall	Reduced lighting power density to 0.37 W/ft ²	2.3	5,909	-105	\$667	\$595
Maintenance & Fabrication	Reduced lighting power density to 0.45 W/ft ²	8.6	19,504	-313	\$2,239	\$2,060
Mechanical Mezzanine	Reduced lighting power density to 0.17 W/ft ²	1.2	11,307	-189	\$1,291	\$2,425
Facility	Improved SWH efficiency to 96%	0	0	611	\$769	\$2,899

Appendix C. Project Participants

Name	Company
Jessica Tcihenor	CLEAResult
Jamie Mintz	FirstEnergy
Todd Kirkpatrick	FirstEnergy
Joe Hatcher	Willdan
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