



Dunbar Integrated Building Solutions
Initial Energy Evaluation Report

Prepared for

Central Academy Board of Directors

Project

Energy Conservation Measures at
Central Academy School

October 21, 2013

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Executive Summary

Overview

Dunbar is pleased to present our Initial Energy Evaluation Report to the Central Academy Board of Directors regarding Central Academy School located at 2727 Kenwood Blvd., Toledo, Ohio to identify certain facility upgrades that reduce operational costs. Based upon available information, our preliminary site visit on October 21st, 2013, examination of the building drawings and utility cost, we have identified several energy conservation opportunities that will generate significant cost savings compared to historical energy costs, as well as provide additional important benefits.

Central Academy will see significant improvements in the energy efficiency thereby decreasing the operational cost of the facility. Furthermore, by implementing the measures described in this report, maintenance costs will decrease.

This Initial Energy Evaluation report presents the various combinations of Facility Improvements and the Financial Impact.

Benefits

Immediate Financial Benefit:

For this project, facility improvements will reduce ongoing energy and maintenance costs, which will result in an estimated annual savings of **\$20,500 (29% reduction)** for the projects outlined in the “High Performance Building Solution” section. The proposed changes result in a reduction in gas, electric and maintenance, which will reduce operating costs by **\$0.69/square-foot**.

Improved Energy Star Rating:

Many of the projects improvements are intended to improve the Facility’s energy star rating. The building’s current energy star rating is a “21” on a scale ranging from 1 to 100.

Project Funding from Energy Savings Project is Self Funding:

The savings generated from this project will free up capital for other projects. The energy and operational savings generated from this project could finance an estimated \$ 205,000 in building upgrades

Positive Intangible Facility Impact:

Many of the projects improvements are designed to improve student and employee comfort, improve the working environment and the building's energy efficiency and operational cost, reduce the carbon footprint and reduce greenhouse gas emissions in the affected Central Academy.

Project Goals and Objectives

The goal of this program is to utilize the comprehensive Dunbar Integrated Building Solutions approach to respective energy and operational cost savings to fund building infrastructure improvements without impacting the annual budget.

Identify potential building improvements to qualify for the Ohio Straight A Grant Program.

Facility Description

Facility under consideration is Central Academy of Ohio located at 2727 Kenwood Blvd, Toledo, Ohio.

Central Academy School currently has an existing occupant load of 159 students, serves grades 1-6 and an estimated 14 faculty personnel. Central Academy is primarily a two story building with a cafeteria, multi-purpose room and auditorium. The existing school building was constructed in 1953 and has a floor area of 35,919 square feet. Per the 2012 school calendar, Central Academy is in operation from September 6th through June 19th. Additionally the school office is in operation throughout the summer months from 8am to 2pm, the number of days in the school year is estimated at 183-days.

Utilities

Existing Systems:

Central Academy currently produces a portion of its heating from two low pressure (10psi) steam natural gas boilers and utilizes a 2-pipe system for delivery to heating only, air handling units. The balance of heating is served from a steam to hot water heat exchanger providing perimeter heating to the building. This equipment is original and has exceeded it's expected useful life.

Remaining portions of the school are air conditioned and heated with roof top units (RTU's) with natural gas heat. Cooling is currently provided to the café, multi-purpose room and auditorium by three (3) rooftop air conditioning units installed in 2011.

Domestic hot water is provided by a natural gas water heater and stored in a 500 gallon storage tank. The domestic water system is oversized by a factor of 10 and is very inefficient.

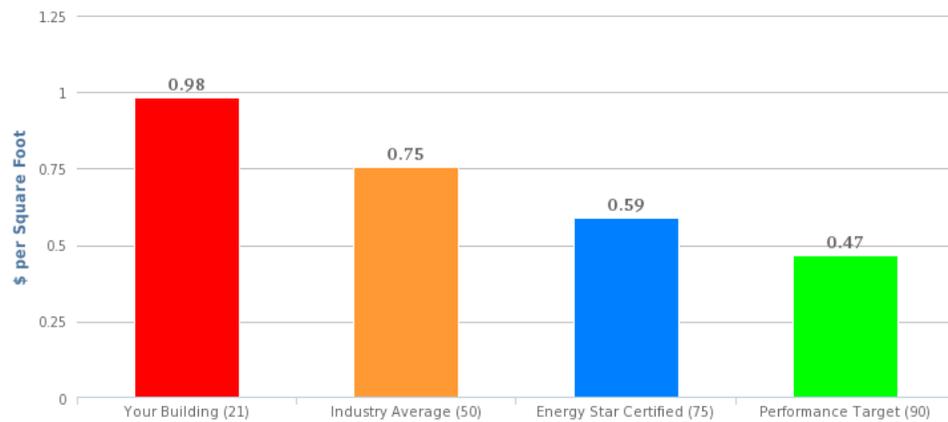
Electricity and Gas

Central Academy is currently under contract to receive all of its electric from the First Energy Electric Company. Service for natural gas is currently provided by the local Gas provider. Service for water is currently unknown and was not made available. The average blended rate is as follows:

- Cost per kilowatt-hr (kWh) \$0.12/kWh
- Cost per Therm \$0.85/Therm
- Cost per Gallon \$0.01/Gallon

Energy Use Analysis

For this analysis, Dunbar used energy bills provided by Central Academy, which covered a period from July 2011 through June 2012. During that period of time, the Facility's total annual energy expenses, not including water utilities for Central Academy totaled **\$35,296**. The breakdown of these expenses is shown in the tables below and all of the data collected for this Assessment can be found at the end of this section.



Electricity

For Central Academy the combined electricity consumption is the largest component of the Facility's annual utility expense estimated at **51%** of the total cost. For the electric bills we reviewed it is estimated that the Facility spent **\$17,872** on electricity from First Energy Power.

For the baseline year of this assessment, the average cost of electricity for the Facility was **\$0.12/kWh**.

Natural Gas

For Central Academy the combined Natural Gas is the second largest component of the Facility's annual utility expense at **49%** of the total cost. For the natural gas bills we reviewed the Facility spent **\$17,423**.

For the baseline year of this assessment, the average cost of natural gas for the Facility was **\$0.85/Therm** from your Gas Energy Provider.

Water

For Central Academy, the combined water consumption, sewer discharge and expense were not made available for evaluation and therefore estimated to be the third largest component of the Facility's annual utility expense.

For the baseline year of this assessment, the average cost of water for the Facility is estimated at **\$0.01/Gallon** based on other similar projects located in the Toledo area.

Dunbar Integrated Building Solution

For this Assessment, Dunbar has identified (xx) Energy Conservation Measures (ECM) for Central Academy that are under consideration. The Energy Conservation measures are based on our examination of the site visit on October 21st, 2013, analysis of historical energy expenditures, as well discussions with maintenance staff.

A detailed listing of cost and savings for each ECM is provided at the end of this section.

Energy Conservation Measures:

- ECM-1 Building Weatherization – (Building Envelope Penetrations)
- ECM-2 Hot Water Boiler System – Replacement
- ECM-3 Interior Lighting & Occupancy Sensors – (Building) Upgrade/ Replacement
- ECM-4 Heating & Ventilating Unit Retrofit
- ECM-5 Water Pumps w/ VFD's – Upgrade
- ECM-6 Automatic Temperature Controls – Upgrade

Building Weatherization – (Building Envelope, Penetrations)

For this Energy Conservation Measure, Dunbar has evaluated the condition of the existing building envelope and penetrations (i.e. Doors, Windows, and Mechanical Systems, etc.) for air infiltration resulting in a reduction in electrical and gas energy consumption in comparison to what is proposed in the construction documents.

The estimated annual energy savings generated from this ECM is **\$ 1,900/ year.**

Interior Lighting and Occupancy Sensors – Upgrade/ Replacement

For this energy cost savings measure, Dunbar has evaluated the installation of new lighting systems and occupancy sensors throughout the entire building in comparison to the existing building's lighting systems resulting in the reduction of the building's connected load and energy usage .

The estimated annual energy savings generated from this ECM is **\$ 7,800/year.**

Building Mechanical Systems – Upgrades/Replacements

- Automatic Temperature Controls – Upgrade

For this measure, Dunbar has evaluated the installation of Automatic Temperature Controls (DDC/building automation system) for the building in comparison to the existing building's pneumatic controls and compressor (boiler room) for a reduction in overall energy consumption.

- Water Pumps w/ VFD's – Upgrade

For this improvement, Dunbar has evaluated the proposed installation of hot water pumps with variable frequency drives (VFD's) that serves the (2-pipe) hydronic piping system in comparison to the existing pump system.

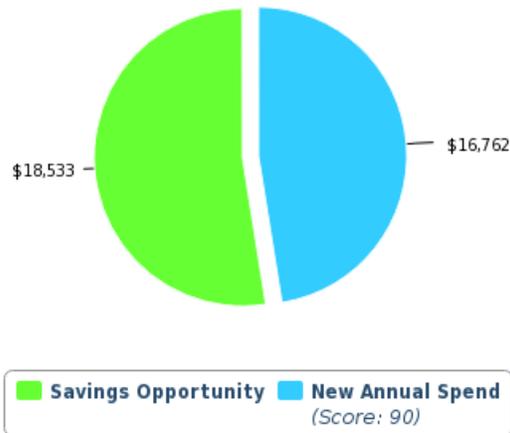
- Steam Heating & Ventilation Systems – Upgrade

For this improvement, Dunbar has evaluated the proposed retrofit of two existing heating and ventilating units serving the classrooms for a reduction in gas and electrical energy consumption.

- *Hot Water Boiler System – Upgrade/ Replacement*

For this energy conservation measure, Dunbar has evaluated the proposed installation of (2) natural gas fired hot water boilers and (2-pipe) hydronic piping system in comparison to the existing low pressure steam (10psi) natural gas fired (2) boilers for system efficiency and a reduction in gas energy consumption.

For the above “Building Mechanical Systems – Upgrades/ replacements” the estimated combined annual energy and maintenance savings generated from these three ECM’s is **\$10,800/ year.**



Financial Summary

In this Dunbar Integrated Building Solutions report, Dunbar identified and evaluated the above Energy Conservation Measures and have grouped the ECMs to illustrate the financial benefits of the proposed Central Academy energy improvements project.

For the items outlined in the ECMs, the financial impact of these projects to the Facility would be as follows:

Project Economics	
Funding From Energy Savings	
Combined Energy Savings	\$ 10,500 / Year
Energy Incentives	\$ 12,000 (estimated)
Operational and Maintenance Savings	\$ 10,000 / Year
Net Project Value	\$ 205,000
Value to Central Academy School	
Net Present Value	\$79,000
Internal Rate of Return (15-yr Life Cycle)	5.1%
Simple Payback	10.4 - Years

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