The Jordan Institute

Building Climate Change Solutions

ENERGY FACT SHEET

MERRIMACK VALLEY HIGH

This picture shows the shell of the original building being insulated and air sealed. Construction began in 2005 and ended in 2008. The school has already seen significant energy savings.

Summary

Location: Penacook, NH
Building Type: Public High School
Original Building Date: 1967
Project Scope: Thorough renovation with space additions
Total Project Size: 113,000 ft^2 + additions of 28,000 ft^2 = *141,000 ft^2*
Date Completed: 2008
Students Served: 900 (approx)
Faculty / Staff: 60 (approx)
Certifications: NE CHPS Verified (Collaborative for High Performance Schools)
Total Project Cost: $12.4 M
Cost per square foot: $88

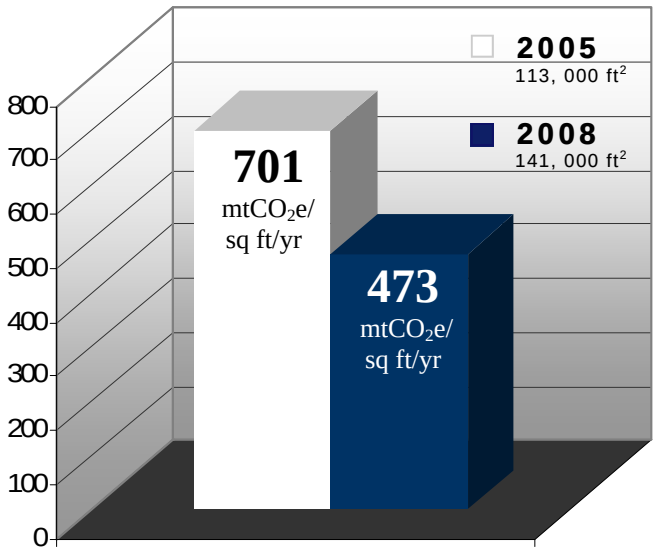
Planning for improvements to the Merrimack Valley High School (MVHS) began in the mid-1990s. In 1997, the MVHS was slated for the second phase of a 10 year renovation plan. The existing building had served for almost 40 years without significant improvements. Though well maintained, it was out-dated for current educational needs and operational realities. Central to the renovation plan was a cost-effective replacement for the old, expensive electric radiant heating system. The building envelope, designed for an era of much cheaper energy supplies, clearly needed improved insulation and air sealing.

Overall, the renovation plans included:

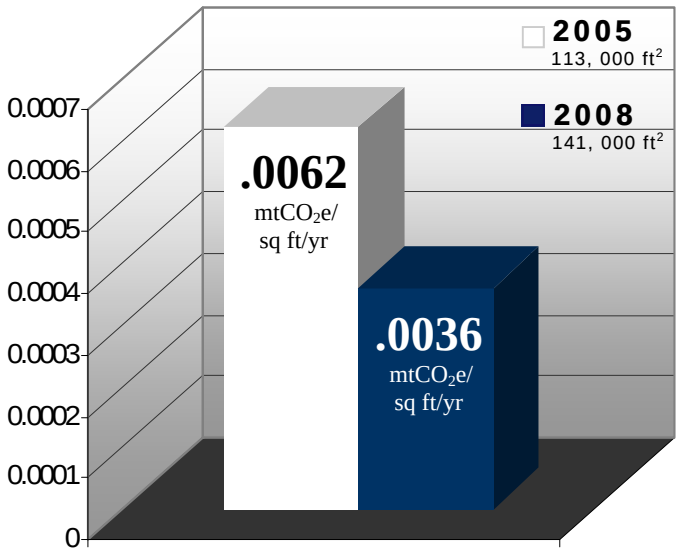
- Wood chip-fired boiler for both the Middle and High Schools
- New hydronic heating distribution system
- New air exchange / ventilation system
- Significant air sealing & insulation additions to the entire envelope, including exterior finish enhancement
- New main entrance, fitness center, exit stair towers
- Upgrade & expansion of library, food service areas, music spaces, science facilities and computer labs
- Electrical improvement (lighting, pumps, motors, controls, remote sensing etc.

Comparing PRE and POST Renovation: 2005 and 2008

Green House Gas Emmissions • • •

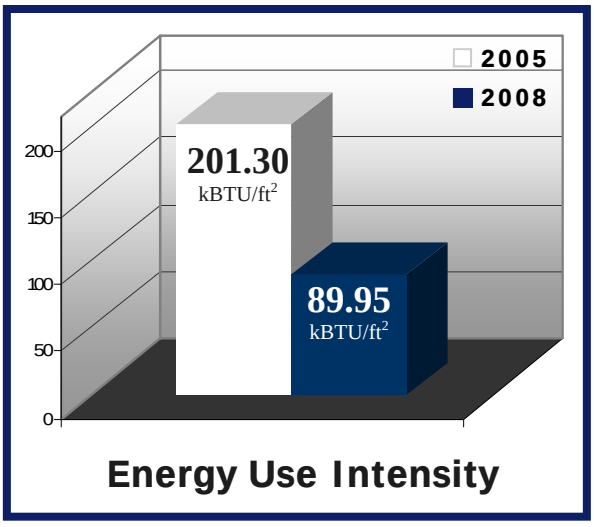


Total Green House Gas Emissions
Per Year in Metric Tons CO_2 Equivalents
33% Reduction in Total GHG's



Green House Gas Emissions
Metric Tons GHG per Square Foot per Year
42% Reduction in Total GHG's

• • • Total Energy Use, Before & After Renovation



Energy Use Intensity

57%
Energy
Savings

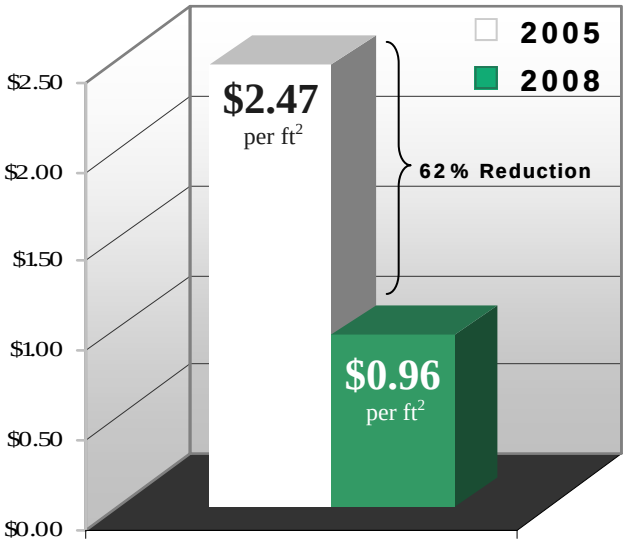
The Merrimack Valley High School is now in full operation, serving its students, setting an energy example for its communities, and creating significant savings for its taxpayers.

Energy Use Intensity (EUI): A building's total energy use is written as an annual EUI. EUI is the sum of all energy usage displayed in British Thermal Units (BTUs) per square foot (BTU/sq ft). Usually a building's energy performance will be converted into 1000BTU/sq ft or kBTU/sq ft, annually. It is an industry-wide recognized value.


Wood Chip Heating Plant

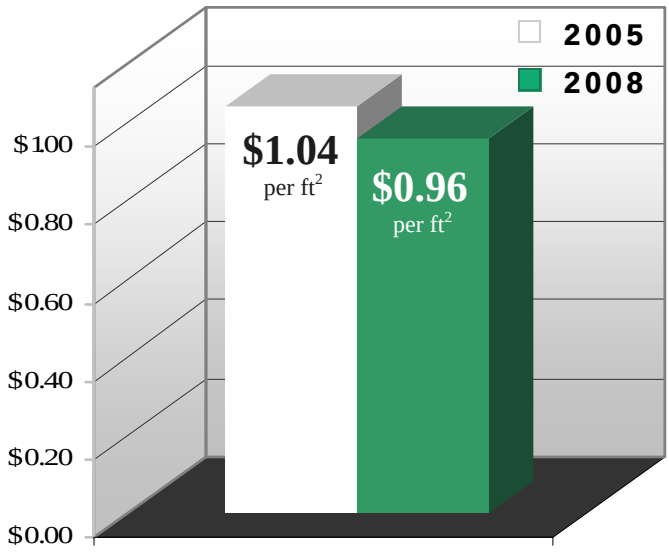
Comparing PRE and POST Renovation: 2005 and 2008

• • • Cost Savings Based on Usage



Cost Use Intensity

Holding electric rates constant at
$0.142/kwh before and after renovation



Cost Use Intensity

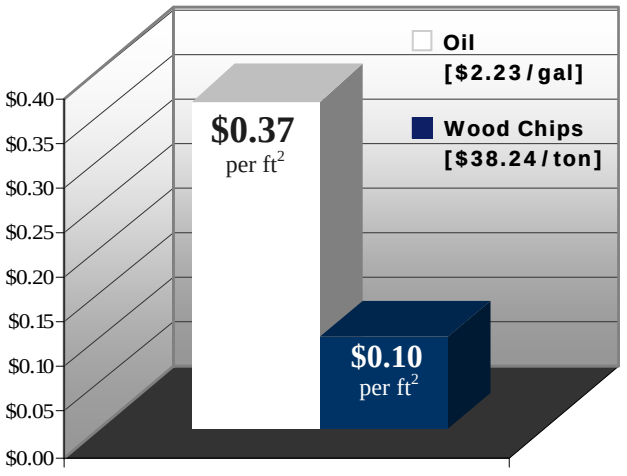
Using historic electric rate for 2005 ($0.06/kwh)
and actual electric rate for 2008 ($.142/kwh)

61% Cost Savings
Even with an increase in
overall square footage

BEFORE: Primary Heating from **electricity** with no mechanical ventilation, smaller square footage. AFTER: Primary Heating from **wood chips** with mechanical ventilations, higher plug loads, more square footage.

Cost Use Intensity (CUI): This is the sum of all annual energy costs per square foot ($$/sq ft). This is also an industry-wide recognized value.

Heating Cost Comparison • • •



FY 08 Heating Cost Comparison: If Oil vs. Wood

Renovation of existing building, exterior wall demolished to be replaced with new high performance exterior envelope.

CHPS—Collaborative for High Performance Schools

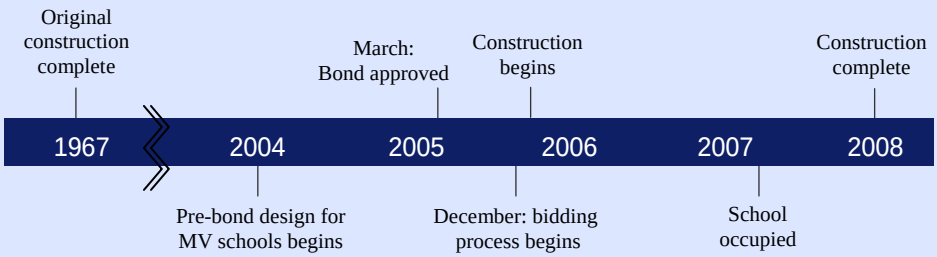
The Merrimack Valley High School is the first school building in NH to be verified by the State Department of Education as a high performance facility. That means it has met the high performance standards adopted by the Department, using the NE-CHPS guidelines (see below), and it means that the taxpayers will receive an extra 3% bonus in School Building Aid from the State to further off-set local costs for the project.

The mission of the Collaborative for High Performance Schools (CHPS) is to facilitate the design, construction and operation of high performance schools: environments that are not only energy and resource efficient, but also healthy, comfortable, well lit, and containing the amenities for a quality education. CHPS helps facilitate and inspire change in our educational system.

The goals of CHPS are to:

- Increase student performance with better-designed and healthier facilities,
- Raise awareness of the impact and advantages of high performance schools,
- Provide professionals with better tools to facilitate effective design, construction and maintenance of high performance schools,
- Increase school energy and resource efficiency, and
- Reduce peak electric loads

Project Timeline



DESIGN TEAM

Architect
Banwell Architects, Lebanon, NH

General Contractor
Hutter Construction, Concord, NH

Civil Engineer
Nobis Engineering; Concord, NH

Electrical Engineer
Allied Engineering; Westbrook, ME

Mechanical Engineer
GWR Engineering; Shelburne, VT

Structural Engineer
Steffensen Engineering; Auburn, NH

MANAGEMENT TEAM

Superintendent
Dr. Michael Martin

Business Administrator
Robin Heins

Facilities Director / Project Administrator
Fred Reagan

Plant Manager
Neil Barry

Consultant / Advisor
Bernie Davis

The Jordan Institute would like to thank both the Management Team and the Design Team for their enthusiastic cooperation and support in compiling the data needed to produce this fact sheet. We are pleased to present their excellent example for other school districts to study and emulate.

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