

AIRXCHANGE®

partnering with industry for
sustainable energy recycling technology

Case Study: Doherty Memorial High School



Doherty Memorial High School Lowers Renovation First Cost and Saves Energy

Background

Located in Worcester Massachusetts, Doherty Memorial High School is typical of many schools designed in the 1960's. With two classroom wings joined together by hallways and anchored by an auditorium and gymnasium, the red brick school is home to approximately 1500 students.

After 40 years, the school needed to replace the original hot water boilers and unit ventilators serving the upper and lower classroom wings. To design their new heating and ventilating system, the school enlisted the services of Shooshanian Engineering (SEi), Boston MA.

New Design Evaluated

The original system design incorporated two gas fired hot water boilers sized to provide individual classroom unit ventilators with enough heating capacity to condition both the return and outdoor air loads. Rooftop exhaust fans pulled room air from each classroom to complete the ventilation process.

As recommended by the EPA and DOE, SEi evaluated the use of Energy Recovery Ventilation (ERV) as part of the new design. ERVs recycle energy from building exhaust air to efficiently precondition outdoor air ventilation, thereby reducing annual operating costs and boiler size requirements. After evaluating several ERV strategies, including fixed plate and run around loop, SEi determined that an ERV incorporating Airxchange rotary energy recovery wheels provided the best value.

Estimates of installation and operating costs were evaluated for two designs: one with ERV and one without. As expected, the ERV based design provided the lowest operating cost. However,

Key Statistics

Location:	Worcester, MA
School Size:	1500 students
Project Scope:	Replacement
Heating System:	Hot Water Boiler
Ventilation System:	Standalone Energy Recovery Ventilators

Impact of Energy Recovery Wheels

Design Outdoor Airflow:	38,250 CFM
First Cost Savings due to Smaller Boiler:	\$52,800
Annual CO ₂ Emission Reduction:	Approx. 170 Tons
Annual Energy Savings:	Approx. \$31,277
Utility Rebate:	\$32,000

“Selecting the ERVs was a good shift away from unit ventilators, since it significantly reduces our energy consumption. This is particularly important because the cost of energy is heading nowhere but up.”



Jeff Lassey
Director of Facilities
Worcester Public Schools

SEi was pleasantly surprised to discover the ERV based design, incorporating a smaller boiler and less expensive fan coil units, also provided the lowest installed cost. The capital equipment savings, made possible by incorporating Energy Recovery Ventilation in the design, more than offset the added cost of the ERV's resulting in an instant payback.

ERV Impact on School Design with 38,250 CFM Outdoor Air

AIRXCHANGE WHEELS HEATING CAPACITY (BTU/H)	EQUIVALENT BOILER HORSEPOWER (HP)	ESTIMATED AVOIDED BOILER COST	ESTIMATED ANNUAL OPERATING SAVINGS	UTILITY REBATE
2,113,382	63	\$52,800	\$31,277	\$32,000

New System Installed

Installation included thirteen rooftop ERV units, each supplying from 1200 to 4600 cfm of ventilation air along with a single boiler to replace the two original boilers. Existing exhaust ducts provided exhaust air to the ERVs while new ductwork was added to deliver fresh outdoor air to each classroom. The design called for removal of the outdoor air intakes in the walls and installation of fan coil units in place of unit ventilators. Performance of the new system is monitored using Automated Logic software as shown to the right.

The new system has received positive comments from teachers who expressed appreciation for the added fresh air and the ability of the classrooms to come up to temperature quickly at the beginning of the school day. "Even at the coldest temperatures the comfort of the supply air is amazing," said Jeffrey Lassey, Director of Facilities with Worcester Public Schools. "You can feel the classroom come up to temperature much faster than with the old unit ventilators, and with the ERV system, we've reduced our energy costs considerably," he added.

Reduction in energy use over a 20 year period is expected to save approximately 3400 tons of CO2 emissions and \$625,540 at current energy prices.

Utility Rebate for ERV System

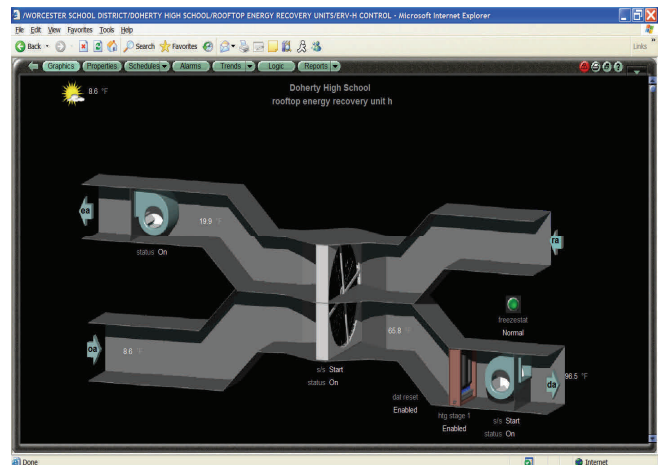
NSTAR, the local gas utility serving the city of Worcester, provides incentives for installation of energy efficient equipment through an energy rebate program funded by its commercial customer base. For the installation of an ERV based system and reduced boiler size, Doherty Memorial High School was awarded a \$32,000 rebate from NSTAR.

"Make sure to select Energy Recovery Ventilation from the outset in the design process in order to take full advantage of utility rebates slated for energy efficiency."

Tom Angelo
NSTAR



Installation Contractor Dan McCabe standing next to new ERV with Airxchange wheels installed at Doherty Memorial High School.



Software showing entering outdoor air heated from 8.6°F to 65.8°F utilizing recycled energy.

About Airxchange

Established in 1982 Airxchange has extensive experience in the design, manufacture, sale, and support of energy recovery ventilation components to manufacturers of Heating, Ventilating and Air Conditioning (HVAC) equipment. The company played a pioneering role in the formation of industry standards and third party performance certification programs, which validate their transformative technology. Airxchange technology is now widely available through leading HVAC manufacturers.

For more information about Airxchange, please visit www.airxchange.com.