



AIRXCHANGE

Turtle River Montessori School

CASE STUDY

Energy Recovery System Reduces Cost of Cooling Outside Air by 70% at Florida School

The developers of Turtle River Montessori School in Jupiter, Florida, wanted students to have the best possible indoor air quality. They also wanted to provide it in the most energy-efficient manner. Looking for suggestions as to how to make this new school's HVAC system "green," Brad Brown of KAMM Consulting, the mechanical engineer for the developer, approached Charles Eno, sales engineer for Florida Air Conditioning Distributors. Eno immediately thought of high-efficiency air-to-air Energy Recovery Ventilation (ERV) to reduce outside air (OA) load – the required rate of heat removal from outside air. Eno recommended an ERV system that contained an energy recovery wheel (also known as a heat wheel or enthalpy wheel). With rising energy costs and climate concerns, these wheels are an ideal way to reduce HVAC costs while complying with code-mandated outside air requirements. ERV wheels dramatically reduce this cost by recycling the heating and cooling energy in exhaust air (not the air itself), thereby reducing the load on the HVAC system by as much as 80%. This reduction in load not only translates into significant ongoing cost savings, but also allows the downsizing of HVAC equipment, thereby reducing first cost and providing an immediate return on investment.

The energy recovery ventilation (ERV) system installed at the Turtle River School saved approximately \$25,000 in construction costs... and has delivered additional savings of approximately \$6,000 per year.

Florida Air Conditioning Distributors prefers ERV wheels manufactured by Airxchange, of Rockland, Massachusetts, because of their long history of reliable

service, AHRI-certified performance, and ease of maintenance. Airxchange offers a full line of ERV wheels that are sold through HVAC equipment manufacturers in integrated packaged systems, as accessories for packaged units, or as ERV options. Through its patented designs, new materials, and innovative manufacturing techniques, Airxchange provides practical energy recovery solutions for all HVAC systems (100–35,000 CFM). In addition, Eno knew that, with a standard 5-year warranty, Airxchange ERV wheels would outlast the competition's aluminum energy exchange devices in the salt air of Florida's east coast

Florida's air is usually quite warm and humid, but Eno was able to demonstrate that by recovering 70% of the school's exhaust-air energy and recycling it, the ERV system he recommended would allow the architect to reduce the required size of the school's packaged HVAC unit by half.



Because the ERV would dramatically lower the OA load, the school could get by with a much smaller, much less expensive HVAC system. The design was modified accordingly, and the ERV system was paired with a high-efficiency

unitary air-conditioning unit on a single plenum curb to minimize internal duct connections and to simplify the installation on the roof of the school.

The Airxchange energy recovery wheel was mounted horizontally, keeping the height of the packaged HVAC system to a minimum and preserving the building's architectural profile. With the ERV wheel in this configuration, it is very easy for maintenance personnel to check its operation and change filters.

Most energy recovery wheels are difficult and time-consuming to clean, and contaminant build-up in the wheels can significantly reduce performance over time. The Airxchange wheel's unique design, however, includes lightweight, durable segments (shaped like pie slices) that can be easily removed for cleaning on or off the site. In less than 30 minutes, one person can replace all segments with new or previously cleaned spares and return the wheel to service. If properly filtered, and if the filters are maintained in accordance with the manufacturer's recommended schedule, however, energy recovery wheels installed in schools rarely need cleaning. In effect, the downsizing of the overall HVAC system paid for the ERV system. In addition, thanks to ERV, the school saves approximately \$500 every month on its utility bill.

Humidity is well controlled by the school's HVAC system despite the very high intake of outside air, and indoor comfort levels are excellent. According to Eno, the system manages all of the outside air ventilation for the whole building, conditioning it and feeding it into the returns of all the air handlers. The air handlers are a part of a building-wide variable refrigerant flow (VRF) system that modulates the refrigerant flowing through the coil. This maintains desired humidity without overcooling the building and prevents the coil from icing up as well. The success of the HVAC system at the Turtle River Montessori School has led engineers at KAMM Consulting to make use of this same type of ERV design on several other projects, specifying the Airxchange energy recovery wheel for each one.



Because ERVs reduce the outside air load on the HVAC system, the rooftop unit at Turtle River is about half the size it would have been without an Airxchange wheel.

Value of New Energy Recovery Wheels at Turtle River Montessori School

Location:	Jupiter, FL
Project Completed:	2009
Building Size:	21,000 sq. ft.
Building Occupancy:	175 people

Impact of Energy Recovery Wheels

Building Design Load:	45 tons
Design Outdoor Airflow:	7,500 CFM
Outdoor Air Load on Design Day:	424,430 BTUH (35.4 tons)
Outdoor Air Load Using ERV:	132,000 BTUH (11 tons)
Total Recovery Energy:	24.4 tons
Energy Efficiency Ratio (EER) of Rooftop Unit:	10
Recovery Efficiency Ratio (RER) of Energy Recovery Wheel:	90
Combined Efficiency Factor (CEF)	17.8
Improvement Over HVAC System With No Energy Recovery:	70%
Estimated First-Cost Savings From Unit Downsizing:	\$25,000
Annual Energy Savings:	Approx. \$6,000



Installed in the school's rooftop HVAC unit, the Airxchange ERV wheel dramatically reduces the cost of conditioning outside air (OA) by recovering and recycling energy from exhaust air, significantly reducing the OA (and total) load on the HVAC system.

About Airxchange

Airxchange has 35 years of extensive experience in the energy recovery industry. Our mission is to design and manufacture high quality products that perform reliably and effectively for the life of the HVAC system, reduce energy consumption, and improve indoor air quality. The addition of high-tech materials and innovative designs to a technology based on fundamental scientific principles has earned us the trust of our valued OEM customers. We will continue to innovate and support our customers to meet evolving market demands for energy recovery ventilation technology. Visit airxchange.com for more info.