

Florida School Cuts Outside Air Cooling Costs by 70%



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.

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.

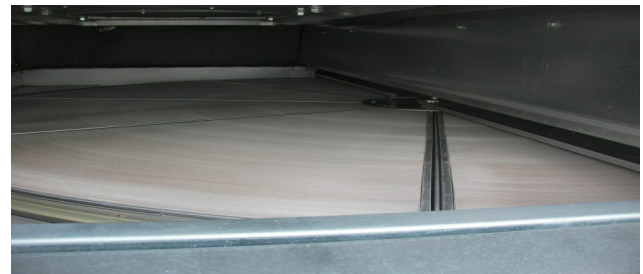
Eno recommended an ERV system that contained an energy recovery wheel (also known as a heat wheel or enthalpy wheel). With rising energy costs and climate concerns, these wheels are an ideal way to reduce HVAC costs while complying with code-mandated outside air requirements.



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.

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 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.



The indoor air quality is excellent. The building is very comfortable, and the air always smells fresh and clean."

Bubli Dandiya, Owner, Turtle River Montessori School

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.

Statistics:

Location:	Jupiter, Florida, USA
Project completed:	2009
Building size:	21,000 sq. ft.
Building occupancy:	175 people
Building design load:	45 tons, satisfied by 4 VRF systems (3@12.5 tons, 1@8 tons)
Outside air flow at design:	7,500 CFM
Outside air load (design day):	424,430 BTUH (35.4 tons)
Outside air load using ERV:	132,000 BTUH (11 tons)
Total recovered energy:	24.4 tons
Energy efficiency ratio (EER) of rooftop HVAC 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
Estimated ongoing savings:	About \$12,000 per year (\$6,000 from downsized HVAC unit and \$6,000 from energy recovery ventilation)

