Overview
The Consulting Engineer of record for this project was Shrout, Tate, Wilson Engineers, Lexington, Kentucky. The original HVAC design was based on the Ventilation Rate Procedure (VRP) in ASHRAE Standard 62.1 which is the traditional method used on this type of project. The ventilation requirements using the VRP required the consulting engineer to use dedicated outside air units to dehumidify, cool and heat the large quantities of raw outside air. Tom Shrout, the Principal at the consulting firm expressed his concern on the high design cost using outside air equipment that required oversize ducts, more structural roof steel to support the weight of the units, special controls and oversized electric service compared with the use of the IAQ procedure.

The Solution
The Consulting Engineer was introduced to the Bioclimatic product line and the IAQ Modeling Software during the school design phase. Bioclimatic products were used in the original design on completion of the budget process.

The opportunity was eventually available to demonstrate the cost savings that could be realized using the Bioclimatic System. The IAQ computer runs were prepared together with an equipment proposal and presented to the consultant for review. Following his review, the consultant reached the decision that the reduction of outside air from 15 cfm (VRP) to 5 cfm per person would reduce the project cost an amount sufficient to bring it in under budget. The HVAC design utilized Bioclimatic equipment to reduce the ventilation air to 5 cfm per person. At 5 cfm per person, the dedicated outside air units were no longer required, the structural steel, the electrical service and the ventilation duct work were all reduced in size and capacity. The cost reduction for all trades involved more than offset the price of the Bioclimatic equipment. Bioclimatic designed and manufactured side access housings with Bi-polar Ionization and particulate filters ducted to the return side of each water source heat pump.

Bioclimatic has a proven design process and equipment that will permit the reduction of ventilation air based on the Indoor Air Quality Procedure (IAQ) in ASHRAE Standard 62. The IAQ procedure has been integral to ASHRAE 62 since 1981, but most consultants do not use the IAQ Procedure because of the time consuming process to identify the many variables and complete the mass balance calculations in the appendix of the ASHRAE Standard 62. Bioclimatic has reduced the time consuming calculation process to a few key strokes with the use of independently validated IAQ software that contains all of the mass balance equations and includes the efficiency of Bioclimatic products. A few simple inputs for each zone include supply air, ventilation air, occupants, space volume, air distribution method and application type are all that is required to run the IAQ modeling software.

The use of the Bioclimatic IAQ software and products reduced the capital cost (after purchase and installation of Bioclimatic equipment) for Hart County School District approximately $100,000.
The Results
Munfordville Elementary School has been operating for over two years. The reduction in ventilation air from the original design of 15 cfm to 5 cfm per person saves the school district approximately $20,000 per year in energy costs. The Director of Construction and Facilities for Hart County, Dale Watkins, stated, “When the school opened, there were no odors or occupant complaints associated with the new construction. It simply smelled like fresh outdoor air, indoors. The equipment worked as designed. Any new schools in Hart County will be designed with the Bioclimatic System.” Since opening this school, the documented absentee rate is 50% lower than all other schools in the district according to the Hart County School records.

The use of the Bioclimatic bi-polar ionization technology in the school not only breaks down gas produced by the building, furnishings and occupants, it also kills mold, bacteria and virus. It is the only air purification system that can kill contaminants in the space where the occupants are located. Many hospitals and government installations use bi-polar ionization to control airborne pathogens. The system in Munfordville works so well that some teachers with allergies stay late to grade papers rather than working at home. This is a meaningful testimonial for the allergen control benefits with the use of Bioclimatic’s technology.

Ownership Costs
Maintaining the system is easy. The MERV 6, 30% prefilters are changed every three months. The MERV 13, 85% high efficiency filters are changed every six to eight months. The bi-polar ionization tubes are washed annually with a mild detergent and have an average life of approximately 30,000 hours (5 to 6 years between replacement). Bioclimatic provides a non-traditional Follow-up Service Program where periodic factory inspections, testing, calibration, minor repairs (if required), and reporting are provided free of charge and included with every system. The Follow-up Service Program is included for the first three years of operation and continues when replacement ion tubes and parts are purchased.

Note: The high efficiency filters may not be required for compliance with the IAQ Procedure in Standard 62. In this project, higher efficiency filters than required were provided to attain an improved level of particulate control.

Our Experience
Bioclimatic has been designing and manufacturing bi-polar ionization and air purification equipment continuously for more than 25 years. Over 200 schools have been designed or retrofitted with our equipment; moreover, they also used our IAQ software to accurately predict satisfactory results. This is the only system that truly affords a capital cost reduction, provides long term energy and operational savings and simultaneously provides acceptable indoor air quality. Many school districts are funded based on attendance. Experience at Munfordville over the past two years indicates a significant attendance improvement and a corresponding increase in funding if applicable in this district.

Partial List of Current School Districts
Gwinnett County, GA     Gallatin, TN
Jacksonville, FL       Waynesboro, VA
Akron, OH              East Lansing, MI
Pensacola, FL          Covington, VA

Contact your local Bioclimatic Representative today to learn more about our Systems.