



TEAM NAME **EOS**
TEAM INSTITUTION **VIRGINIA TECH**
CONTEST **ELEMENTARY SCHOOL**

PROJECT SUMMARY

The aging of school facilities is a significant issue affecting public school systems across the country. In Virginia, approximately 40% of K-12 schools, more than 800 schools, are at least 50 years old. Addressing facilities with aging infrastructure and systems is critical for any school district with a 21st Century mission of empowering students to learn through technology in a rapidly growing and changing world.

In 2009, a public county school system in rural Virginia completed new construction of an elementary school, replacing an aging facility originally built in the 1960s. The school board determined that it was more cost effective to build a new school than to renovate such an aging school. The new school met the 2006 IECC requirements, and included design features such as improved orientation for maximum solar gain, daylighting strategies that use clerestory windows with integrated light shelves for diffusion, a solar thermal hot water system, and a geothermal well field connected to water source heat pumps. The building was certified as the one of the first **LEED Gold** schools in this region of Virginia. However, the school **falls short of the EUI target for Zero Energy Schools**.



RELEVANCE OF PROJECT TO THE GOALS OF THE COMPETITION

While the school introduced above can be considered a regional reference model for other school districts, Virginia Tech’s Team EOS sees an opportunity to advance this vision to the highest standards in energy efficiency. We will take this LEED-certified school as a baseline design and demonstrate how to bring it to the next level through the implementation of innovative zero energy strategies that offer 21st Century technology and learning opportunities for students and communities across Virginia.

WE SEE OUR DESIGN AS AN OPPORTUNITY TO DEVELOP A NET ZERO PROTOTYPE FOR SCHOOLS ACROSS VIRGINIA AND OTHER STATES IN THE MIXED HUMID CLIMATE ZONE.

DESIGN STRATEGY AND KEY POINTS

- Reduce baseline EUI of an existing school by 64% to meet our RTNZ target goal.
- Introduce cyclical systems as the core approach to our zero energy strategy.
- Introduce photovoltaics as well as combined heat and power (CHP) generation through anaerobic digestion for a diversified on-site renewable energy strategy.
- Introduce hydroponic phytoremediation for improved indoor air quality and as a supplement to a high-efficiency energy recovery ventilation system.
- Demonstrate the thermal, air, and vapor control of a high performance envelope design by giving preference to rapidly renewable and healthy materials to reduce enclosure losses.
- Integrate natural and electric lighting strategies with advanced control features for activity specific lighting needs.

PROJECT DATA

Location	Rural Virginia
Climate Zone	Climate Zone 4A
Building Type	Educational (E)
Construction Type	Type V-A
Design Occupancy	350 Students + Faculty
Design Floor Area	38,500 sq. ft.
Design Story/Height	2 stories, max height 39'-0"
EUI	22.3 kBtu/ft ² yr