Going Green

Driving Question:
How sustainable is our school?

Context: Many factors have combined to encourage schools and communities to adopt recycling and energy conservation. These forces include the cost and availability of raw materials; and the costs and effects of energy extraction, production, and transportation. As landfills get close to capacity, communities are requiring households and businesses to recycle more and more of the items that all of us have just tossed away in the past. People want to leave our communities and the world in as clean and pollution-free a state as possible for future generations. How sustainable is your school? How does math inform an environmental analysis?

Project: After researching energy usage and recycling plans, students audit their school's energy usage, recycling practices, or another pressing environmental problem. The develop a solution to problems they identify. They present an audit report and solution plan to the school and invited guests with a companion multimedia presentation format.

Approach: Students undertake a comprehensive audit of the energy and materials coming into and leaving the school, using math to tabulate inputs and outputs to their system. They consider energy, water, food, and transportation. They explore green buildings, created with all-recycled materials and using very little non-renewable energy for heating, cooling, and lighting. Finally, based on the audit, they identify something that can be done to improve the situation. They set goals and develop an action plan which they share with their community. This unit can serve as a capstone for the full-year environmental science course.

Expert Involvement: Classrooms using experts will engage professionals such as local civil engineers, green contractors, EPA representatives to provide data and review audits and action plan.

Primary Standards: Next Generation Science Standards – Performance Expectations

HS-ESS3-2 Analyze and revise solutions for developing, managing, and utilizing resources that would increase economic, social, environmental, and/or cost: benefit ratios.

HS-ESS3-3. Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.

HS-ESS3-4 Evaluate or refine a technological solution that reduces the impacts of human activities on natural systems.

HS-PS3-1. Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.

HS-ETS-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

HS-ETS-4. Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.