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Partnering organizations provide support through grants, donations, time, and materials. A local environmental architectural firm provides STEM funding. A very meaningful affiliation is with the Chester County Food Bank, through which students learn the importance of growing, eating healthy items, and helping the food-deprived. Longwood Gardens National Institute for Garden-Based Learning showcases Patton gardens to other schools. Tri-M donated a solar array to power the greenhouse that not only reduces electricity costs for the district, but teaches Patton students the benefits of using renewable energy through an interactive dashboard. Patton partners with local farmers, beekeepers, and Whole Foods, among others.

### **Northampton Community College, Bethlehem, Penn.**

*An entire campus built to green standards*

Located in northeastern Pennsylvania, Northampton Community College (NCC) is a public two-year institution offering over 100 credit and noncredit programs to more than 30,000 students each year. NCC's Statement of Values speaks to the school's "commitment to the long term health of the institution, the community, the economy and the environment."

NCC's Monroe campus is the foremost example of this commitment, embodying the school's focus on reducing environmental costs and impact. It is the first college campus constructed entirely to meet Silver LEED certification. Building placement was limited to meadow grass areas, poor soil areas, and rock outcrop. Excavated rock was processed onsite into stone for base improvements. Buildings flow with the natural land contours. Floor-to-ceiling windows made of high-performance glass maximize southern exposure and natural light. Native vegetation reduces storm water runoff. The 205,500 square foot campus is four times larger than the NCC's original site, but incurs energy costs of only \$87,000 a year due to geothermal system, high-efficiency HVAC and lighting systems, and a solar canopy that provides about 40 percent of the campus electricity. A digital metering and monitoring system provides real-time energy performance information.



NCC's main campus offers further examples of how good environmental stewardship intertwines with improving health and wellness and offering strong sustainability education. Here, 40 acres of unused, wooded, and grassy land are now a living laboratory. School leaders have worked to reduce the effect of mowing and grounds maintenance by allowing a portion of the land to go to succession, over time increasing the amount of wooded area on campus. A community garden known as the East 40 connects gardeners from the college and the community for service learning, sustainable gardening, ecological awareness, and healthy living. Biology students conduct flora and fauna inventories, and Irish Literature students plant crops to learn about the value of land ownership in the context of 19th century Irish land laws. Culinary students practice farm-to-table cooking strategies and participate in composting. Northampton programs empower community members to grow their own food through the availability of individual garden plots and community education; create opportunities for partnerships with area schools, food banks, and nonprofit organizations; promote environmental and spiritual well-being; and maintain the integrity and health of the land.

NCC's walking trails, outfitted with mileage and directional signage, encourage walkers and runners throughout the year. Both campuses feature state-of-the-art fitness centers with personal training. Faculty and staff have free access to credit and noncredit fitness courses. The Health and Wellness Center provides first aid treatment, health counseling, and programming to students. A faculty and staff committee dubbed the Wellness Warriors encourages coworkers to adopt healthy lifestyles by sponsoring wellness seminars, cooking demonstrations, and a walking program.

From an academic perspective, the college's environmental science associate's degree prepares students for careers in wildlife conservation, resource management, law, and human ecology, and courses inspire students to begin making a difference right away.

Following a lecture on plastic pollution, students began a movement to reduce, and eventually eliminate, the use of disposable plastics in food services. STEM faculty members have used federal EPA grants to partner with a local community supported agriculture program and an avian research center and to provide experiential learning for Monroe students. In 2015, NCC's National Endowment for the Humanities-funded programming, called Agriculture and the American Identity, is exploring how U.S. culture is evolving and food relationships are re-localizing, through an examination of food, who grows it, and how and where it is grown and consumed. Also new in 2015 are the school's single-stream recycling, community garden, designated parking spaces for low-emission vehicles, and campuswide reduction of printer-paper use. In short, environmental education leads to action at Northampton.



## **Rhode Island**

### **Paul W. Crowley East Bay Met School, Newport, R.I.**

*A sustainable new building and blossoming partnerships for a beautiful world*

The Paul W. Crowley East Bay Met School (Met) is a place-based learning environment in the field of sustainability and energy production. The school is recognized as a local and regional leader in environmental advocacy, with a slate of activities in process, including recycling, experiential learning in the environment, and watershed monitoring. The 151 Met students, over 66 percent of whom are eligible for free and reduced-price lunch, work alongside local environmental organizations as volunteers and interns in order to enact positive change in their communities.

In January 2014, Met moved into a new building, constructed by Gilbane Building Company. It was built using construction processes and materials that reduce environmental impact, the facility features green technologies, such as geothermal, solar thermal, and photovoltaic systems. The facility was designed to reduce water usage by more than 20 percent, and 50 percent of the construction waste was recycled or redirected. Materials used in construction were low-emitting VOC products, daylighting is incorporated into lighting controls, and air-sealing barriers were used in construction. Filtered water bottle filling stations note the number of plastic bottles saved, and extra-porous pavement, a water retention pond, and a rainwater harvesting system are used to avoid directing runoff to sewers. Fifty percent of students ride public transportation.

In addition to the green building design, the school administration and school educational staff have taken measures to ensure the health and safety of its students. Some examples include contracts with a professional pest control companies that use procedures and materials that are safe for occupants and environmentally responsible. All procurements are managed by the school's business office in a manner that regulates the types and quantities of chemicals being purchased. The school also holds a contract with an HVAC contractor to conduct monthly, quarterly, and yearly preventive maintenance, system inspections, filter changes, and system monitoring. Cleaning products used are 100 percent certified green. The building is Collaborative for High Performance Schools – Northeast v 2.0 certified).

Met's nutrition and fitness initiatives include advisory-based activities such as hiking, canoeing, kayaking, rafting, visiting trampoline parks, and swimming. Students also



intern with fitness-related Sail Newport, the U.S. Navy's Recreational Center, Narragansett Surf and Skate Shop, Core Fitness, Newport Equestrian, and Bike Newport, among other organizations. Annual schoolwide activities include students versus staff athletic competitions and beach and mountain bike days.

Met has a school-based chef who prepares healthy meals and offers free lunch to all students. The chef, along with a parent group, leads a student food group, which teaches students to prepare healthy meals at home. Met has built raised beds for student and community gardening. The school offers a coordinated school health approach, including mental health services and school climate programs through counseling and student-initiated learning opportunities, as well as by collaborating with community organizations, including hospitals and mental-health providers. This covers such areas as nonviolence, stress management, meditation, substance abuse, student voice and leadership, individual and group counseling, the mind-body connection, social skills, and communicating emotion through arts.

Met's mission is to educate and empower youth through relentless commitment to student-centered learning and personal growth. The school has made a commitment to using its facility as a learning tool and integrates readings and written components about the school's sustainable features at every grade level. Many staff members attend the state's annual sustainable schools summit. While the school does not currently offer AP courses, students can earn college credit in several sustainability-related subjects at nearby colleges and universities.

Met has offered an Environmental Studies Advisory since 2012, where students make sustainability and environmental justice the focus of their high school education. Students participate in trips, view documentaries, engage with guest speakers, take part in whole-school culture-building experiences, and work on individual projects and internships. The Advisory often conducts its classes in the 30-acre park next to the school. Other schoolwide outdoor education activities include hiking, sailing, aquatic landscaping, invasive species removal, bird watching, gardening, farming, and excursions to marshes, beaches, and mountains, all the while learning principles such as Leave No Trace and wilderness ethic.

The school also supports a unique real-world learning and internship-based program. Through these strong community connections, students are partnered with experts who serve as mentors to authentic projects. Students' projects have included: traveling to Sweden to learn how the country has been able to maintain a recycling rate of about 85 percent; clearing invasive species from land trust at Norman Bird Sanctuary; conducting water testing in collaboration with Salve and Aquidneck Watershed Council; engaging in beach clean-ups; taking outings to a section of trail adopted by the school; and participating in Envirothon. At the end of





each trimester, each student presents his or her learning to a panel of teachers, parents, and peers, showcasing his or her environmental knowledge.

The Met school green team, founded in 2008, focuses on a different project each year and has maintained the school's recycling rate above 85 percent every year. The group has met with U.S. senators, traveled to Washington, D.C., and advocated for environmentally sound policies.

### **Ponaganset High School, North Scituate, R.I.**

*Dedication to renewable energy technologies results in big money for a small school*

Ponaganset High School is deeply committed to reducing environmental impact and energy costs by creating the best learning environment for students and faculty and providing outstanding opportunities in environmental and sustainability education. Ponaganset was among the first schools to participate in the RI Solar on Schools program. During the renovation process of Ponaganset's building in 2009, extensive effort was put into reducing costs and environmental impact, saving energy, and building the best possible school. The school has reduced GHG emissions by 35 percent over five years.

To meet the goals of the school community, an energy subcommittee was created to determine and implement the most efficient and feasible energy systems. The choice of a biomass heating system, providing a whopping 47 percent of the school's energy usage, is an excellent example of renewable energy use in school. The biomass heating system uses waste wood chips from the local lumber industry to heat the entire school, providing huge savings compared to oil, reducing emissions, and benefiting the local economy. Improved insulation, energy efficient windows, computerized HVAC systems, room occupancy sensors, and daylighting also were installed in the renovation and expansion of Ponaganset. These energy saving building features were funded through a partnership with the energy services company ConEdison Solutions.

Health and wellness of students and staff is a high priority at Ponaganset High School. The school's computerized HVAC system controls the Energy Recovery Ventilation Systems to filter any particulate matter from the air and ensure healthy air quality for all students and faculty. Ponaganset has implemented the EPA IAQTfS and has established an IAQ Plan.

Approximately 84 percent of the school grounds are devoted to ecologically beneficial uses. The site features 138 acres of naturally forested areas interspersed



with scenic foot trails used by students, faculty, and community members for athletic events and recreation. Outdoor facilities include a renowned cross country course that winds through the native forest and is used annually for the statewide track meet. The facilities also include a newly refurbished track, tennis courts, soccer, football, and baseball fields as well as a pond that is used for canoeing and kayaking by physical education students. The physical education curriculum also includes outdoor units on archery and the wide open field areas are used by both science and STEM Academy students in classes ranging from chemistry to aerospace engineering.

Ponaganset High School has a comprehensive wellness policy addressing the cornerstones of good health including proper nutrition through healthy food and beverages, cafeteria climate, and physical activity. Sodexo provides healthy, locally grown produce. School staff includes four guidance counselors, a social worker, a psychologist, and a drug and alcohol counselor. The Citizens and Students Together program supports the work of both Youth to Youth and STARS, which are organizations promoting healthy lifestyles and student leadership. STARS, in particular, supports activities through an advisory program that focuses upon improving the emotional environment of the school, and includes anti-bullying and other programs.

Ponaganset students have demonstrated dedication to renewable energy technologies at both the state and national level through innovative projects, including a fuel cell powered rock and roll band and electric/fuel cell vehicle. These renewable energy projects led to the development in 2003 of the alternative energy and sustainable systems classes that are offered at the school. Students in these classes explore a wide variety of renewable energy technologies including hydrogen fuel cell, photovoltaic and hot water solar power, wind, electric vehicle and battery technology, biodiesel, and aviation biofuels. In 2008, a group of students and their science teacher demonstrated the viability of biodiesel with the Coast to Coast Biodiesel Pickup Project, a 7,000 mile roundtrip using pure biodiesel, a project that was chronicled with a blog featuring pictures from the cross-country trip. Students also demonstrated fuel cell technology by creating a street legal, zero-emission electric vehicle/Fuel Cell Model T, a project that was covered in *Hot Rod* magazine and other media. These renewable energy projects led to a \$984,000 U.S. Department of Energy (DOE) grant for the construction of an Alternative Energy Lab dedicated to renewable energy education. As part of this grant a small solar building was built from scratch by students in the STEM Academy.

Ponaganset is committed to agricultural education. The Academy of Agriculture and Natural Resources has gained status as a state career and technical education program by demonstrating excellence in the practice of educating students in the subject, and incorporates and instructs in the sustainability practices that occur



throughout the agricultural industry. The two greenhouses, aquaculture facilities, and a sustainable gardening area offer agriculturally focused students numerous opportunities to explore and report sustainable practices in plant and animal system pathways. Each year, students participating in Future Farmers of America prepare an annual banquet serving the chickens, lettuce, and tomatoes that they have raised.

## Virginia

### **Coles Elementary School, Manassas, Va.**

*A global cross-section of students engages with the environment*

Coles Elementary serves 500 students from 32 countries speaking 19 languages, and offers two center-based programs (hearing impaired and emotional disabilities). The school's Environmental Club members have spearheaded work to decrease energy consumption, resulting in the school reducing GHG emissions by a whopping 30 percent over two years and energy use by 21 percent over just one year. The building was ENERGY STAR certified in 2014 with a score of 81. Coles has No Paper days throughout the year, when no paper is used during instruction; Lights-Off Fridays, when students dine in natural daylight; and student monitoring of recycling of ink cartridges, eyeglasses, paper, plastic, and clothing.

In fostering environmental literacy, Coles partners with various organizations to create nine school gardens including a certified Monarch Waystation, six organic vegetable plots, fruit and herb gardens, a shade garden, and a sensory garden. Students engage in outdoor, hands-on, project-based learning, including dissecting flowers, researching the effects of different soils on seeds, learning about native butterflies in Virginia, and raising Monarch butterflies. Students use 375 gallons of recycled water collected in rain barrels to hand-water the gardens.

Social issues, responsibilities, laws, and moral obligations are explored as students conduct experiments and collect data to make decisions about self-sustaining ecosystems and students harvest vegetables to feed needy families. Students use real-world math and science to measure the gardens, start seedlings, test the pH of soil, dissect plants, and learn about life cycles. Beyond the garden, students create environmental stewardship public service announcements, label drains for watersheds to raise awareness about where water goes, visit the nearby Eastern Area Grounds for Learning Environmental Science center, and learn about the lifecycle of butterflies, among other environmental literacy enhancing projects.

Teachers' use professional development and curricular materials from PLT, Trout in the Classroom, and Project WILD; problem-based learning from George Mason





University as part of James Madison University's AmeriCorps VISTA grant; and Children's Engineer Training. Environmental and STEAM education has been integrated throughout daily instruction in all content areas.

The school's health and wellness team designed an outdoor fitness trail to enhance outdoor learning. The trail is used daily by students in the first through fifth grades as part of their morning routine before entering the school under the supervision of a physical education teacher. Coles uses Fitnessgram assessments and partnered with the neighboring middle school to organize one- and five-kilometer runs, as well as fun runs. Three- to five-minute dances serve as brain breaks throughout day. Students choose portion-controlled meals based on the ChooseMyPlate.gov program, and the school has received a USDA HealthierUS Schools Challenge Gold Award of Distinction. Coles procures local foods and hosts Fitness and Literacy Nights to highlight connect between the two.

Coles students are learning skills that prepare them to be productive members of the 21st century, and to live in harmony with nature on a daily basis.

### **Crozet Elementary School, Crozet, Va.**

*Saving big and achieving big results by reducing and recycling*

Crozet Elementary is making consistent progress and to reduce environmental impact and costs, to improve the health and wellness of students and staff, and to provide effective environmental and sustainability education. Crozet achieved Exemplary Environmental Enterprise status in the Department of Environmental Quality's Virginia Environmental Excellence Program and first place in 2014 Green Schools Challenge offered by Virginia Board of Education through deployment of an environmental management system, and is striving for continual environmental improvement and evaluation.

Crozet Elementary works toward reducing environmental impact and costs on a daily basis. As a result of building automation and behavioral change, the school avoids \$25,000 in utility costs each year. It received ENERGY STAR certification in 2010 with a score of 86. The school features conservation signage throughout building. Crozet has reduced diesel fuel use by incorporating more efficient buses, along with a Walk and Ride a Bike to School program funded through a Safe Routes to School grant.

Crozet Elementary composts daily, resulting in \$6,000 in annual savings. Waste and recycling costs have been reduced by switching to a mixed-waste recovery





facility that will achieve a 36 percent recycle rate. Additionally, the mixed-waste program eliminates a truck visit to the school each week.

Green efficiencies and environmental health improvements have resulted from the green cleaning program, which has allowed the school to eliminate a number of cleaners and replace them with a Green Seal-certified multipurpose cleaner. The school participates in Farm to School Week and a nature running trail is used by students, teachers, parents and after-school groups to promote wellness.

The school offers many physical features that encourage environmental and outdoor education. These features include the student-created outdoor living science classroom – a biofill converted into a rain garden habitat with a weather station -- that is a state-certified schoolyard habitat. A butterfly garden and student gardens also encourage students to learn about weather, ecosystems, Virginia native plants and animals, and growing vegetables and flowers for culinary benefit. Teachers use these tools to engage students in STEM subjects. The outdoor amphitheater is used by teachers to teach a variety of subjects in a natural environment.

Crozet converted its computer lab into a Wonder Lounge, an open, contemporary learning space that promotes creativity. The Lounge is filled with tablets, digital music players, laptop computers, microscopes, Keva Planks, and similar creative tools. Teachers have access to the district's Renewable Energy Resource Center, which features a 42 kW photovoltaic system, solar thermal panels for heating water, and a wind turbine. With the aid of the NEED curriculum, this facilitates students' early exposure to green technologies and careers. Other teaching tools include Cornell Lab of Ornithology bird lessons and a salt water fish tank for exposure to marine biology. Crozet students collaborate with nearby Western Albemarle High School's environmental studies program in a variety of community projects.

### **Bassett High School, Bassett, Va.**

*Sustainable, career-driven education saves the bay and bottom line*

Bassett High School, with 55 percent of its student body qualifying for free- and reduced- price lunch, believes that all students and staff must be good stewards of the environment and the school division's financial resources. Bassett embraces energy conservation, and recognizes that minimizing energy consumption and related costs will maximize funds available for use in the classroom.

An established energy conservation program with short- and long-range strategies to reduce energy consumption has been in place since 2009. From 2009 to 2014, the



school saved 27 percent on energy costs, including a 30 percent reduction in electric consumption, and achieved a 68 percent domestic water use reduction. It was ENERGY STAR certified in 2014 with a score of 79. Accurate records of energy consumption and cost have been maintained and shared with the community on a monthly and annual basis. The district works with Cenergistic and has an energy specialist on staff. Bassett engages in waste reduction partnerships with EMI Imaging, EMI Recycling, and Coca-Cola and has a Bring Your Own Technology Initiative that allows the school to avoid paper waste.

Landscaping beds have been established in raised planters at the entrance of the school. All beds are mulched seasonally to decrease evaporation. Plant selections for the color beds include water-wise perennials. Shrubbery plantings on the property include locally adapted plant species, and do not require watering beyond normal rainfall. Conversion of athletic fields to warm season Bermuda grass was also a water-wise move. Research has shown that clump-style cool season grasses such as Fescue and Bluegrass require 30.75 gallons of water per square foot per year, whereas warm season plants that spread by runners such as Bermuda and Zoysia require only 19.50 gallons per square foot per year.

In addition to facility improvements and significant savings over the past four years, Bassett recognizes that healthy behaviors of students and staff are vital to the success of the school's instructional program. Bassett has high standards for nutrition and fitness in order to improve student and staff health, attendance, and achievement. Bassett uses Fitnessgram assessments to measure physical fitness levels in all students and chart their progress on the school's fitness trail.

Environmental and sustainability education are an anchor in Bassett's curriculum. In addition to career and technical courses focused on green career pathways and STEM, all students must take Earth Science and Biology, which are rich with environmental and sustainability standards. Bassett has nationally recognized horticulture programs, which have waiting lists each semester. Bassett prepares students, not only for post-secondary education and careers, but to be responsible stewards of their environment.

The Earth Science curriculum emphasizes environmental costs and benefits of renewable and nonrenewable resources, effects of human usage on water quality, economic and public policy issues concerning the Chesapeake Bay, and changes to the atmosphere and climate due to human, biologic, and geologic activity. The biology curriculum includes an entire strand devoted to dynamic equilibria within populations, communities, and ecosystems. In particular, the effects of natural events and human activities on ecosystems are addressed. Environmental science courses emphasize that human survival depends on developing practices that will achieve sustainable systems.



Course offerings that emphasize sustainability include: Earth Science, Biology, Horticulture, Environmental Science, Facilities Maintenance, HVAC, Project Lead the Way, and Architectural Drawing and Design. Teachers receive NEED, Trout in the Classroom, and Streamside Trees in the Classroom training and teaching materials. A JROTC unit participates in Adopt A Highway, and the school's National Honors Society cleans the community's eight-mile trail, with both groups working with math, science, and social studies classes for best practices, marketing, and data analysis on these projects.

### **The Steward School, Richmond, Va.**

#### *Sustainability speakers fuel community cultural shift*

The Steward School's mission is to prepare its students for college and life, in a community defined by robust academics, inspiration, engagement and care. The school's education philosophy is focused on applying a liberal arts perspective to real-world, systems-based thinking and problem solving. To be most effective, learning not only requires the active involvement of students and teachers, but also of parents, families, local professionals, and mentors from the broader community. Steward's students are encouraged to understand world issues through the knowledge of the natural and built environment, health and wellness, and energy and resources. The school applies real-world challenges to the curriculum and also is focused on developing innovators and leaders in resolving environmental and resource challenges. Students study erosion in math, earthquake mechanics in science, and environmental policy change in English. Additionally, students are involved in shaping the environmental policy of the school; they research idling policies, carbon offsets, and compare energy use across the campus.

Steward fearlessly tests new curriculum approaches, and, in doing so, inspires the community with new resources and experts to support this comprehensive approach to learning. Sixth graders design alternative transportation for Richmond and 5th graders test soil quality around campus. Students grow cotton and see how it is made into clothes. While the students and faculty are stretched and pushed, they also have fun. The school draws upon the faculty's expertise, paired with outside industry knowledge. Professional development is offered throughout the year, and is customized based on faculty interests and schoolwide curriculum areas of emphasis. Particular attention is paid to applying technology and nature observation to engineering design using biomimicry. Professional development related to the STEAM curriculum is ongoing, and has expanded to working with leading industry professionals.



The Visiting Innovators program has offered a wealth of knowledge and opened the door to teachers incorporating new ideas into cross-curricular activities related to wellness, sustainability, and the environment. Steward School offers a series of community educational events, and has reached over a thousand people in the community. The school has brought expert speakers from companies including Nike, Ford, The Green Kitchen, Edible Education, Flora of Virginia, Seventh Generation, and the School of Sustainability for the Chinese Language Institute. Steward also has also brought in authors on ecology and nature exploration such as Doug Tallamy, Richard Louv, and Kelly Johnson to inspire students and teachers. These partnerships have produced a wealth of lessons, along with synergy between teachers and the community in building sustainability knowledge. In 2014 psychologist Catherine Steiner-Adair and science educator and YouTube guru Paul Andersen visited Steward to discuss technology and the balance the community must strike in their lives with wellness.

In 2013 Steward School completed the construction of a 6200-square-foot facility called the Bryan Innovation Lab. It stands as a living classroom for students to engage in learning world systems in an innovative way. Its design includes native meadows, diverse natural forest, student gardens, retention ponds, rain gardens, and filtered storm drains. The building itself is made of sustainable materials, and has abundant alternative energy systems such as photovoltaic panels, geothermal wells, radiant heat flooring, rainwater cisterns, and hot-water solar panels. The goal of the Bryan Innovation Lab is to educate about the natural and the built environment with biomimicry lessons, design challenges, nature trails, wildlife reserves, and retention ponds.

Notably, across the campus, composting is up 200 percent in the last two years. The school has partnered with the community to help improve education and outreach. The Virginia Commonwealth University's Rice Center, Greater Virginia Green Building Council, James River Association, Blue Bird Society of Virginia, Wings, Worms and Wonder, Henricoplisis, Sustainable RVA, and Virginia Tech University are just a few of these outside partners. The school educates about health and wellness in yoga, self-defense, nutrition, cooking classes, hydration, nutrition, sleep, and physiology.

Steward's investment in sustainable initiatives encourages a cultural change within the school. The support of professional development, visiting innovators, and the expertise and passions of staff and faculty act as a catalyst in spreading awareness in new initiatives in sustainability connections within the classroom.



## **University of Virginia, Charlottesville, Va.**

*From colonial roots to flourishing green university*

The University of Virginia (UVA), founded by Thomas Jefferson in 1819, is a community of 25,000 students and almost 13,000 faculty and staff. UVA's grounds feature Thomas Jefferson's Rotunda and "Academical Village" (a United Nations Educational, Scientific and Cultural Organization World Heritage site), and a total of 525 buildings encompassing 16.5 million square feet.

The university has set a goal of reducing GHG emissions, as well as reactive nitrogen emissions, to 25 percent below 2009 levels by the year 2025. In fact, UVA is the first American institution of higher education to set a target to reduce its nitrogen footprint. The campus includes some 39 LEED registered or certified constructions.

As a partner in the DOE's Better Buildings Challenge, UVA is committed to reducing building energy use intensity 20 percent by 2020 – below a 2010 baseline. The school reduced total water consumption by six percent in 2014 from the prior year and more than 32 percent since the 1999 peak, despite increases in square footage and population.

In calendar year 2013, UVA diverted 35.1 percent of its municipal solid waste from landfills – that's 4,077 tons of aluminum, paper, cardboard, glass, plastics, and other materials – and recycled more than 4,600 tons of ash, tires, batteries, oil, and chemicals, for a total diversion rate of 53.5 percent. The university participates in the Keep America Beautiful Recycle Mania.

In the school's dining halls and retail dining outlets, reusable to-go container programs provide zero-waste alternatives to compostable to-go containers; and a reusable punch-card incentive program offers benefits like free coffee and meals to participants who use a reusable mug, bag, or to-go container. Composting has diverted over 600 tons of organic matter from landfills to date. During the 2014 football season, UVA launched a pilot zero-waste program in the football stadium, yielding over 15,000 pounds of compost, and an 80 percent diversion rate from the stadium's suites.

The Reusable Office Supply Exchange is open to the whole campus community, and offers a way to dispose of gently used or unused office supplies and an alternative to purchasing new ones. The Medical Equipment Recovery of Clean Inventory Program diverts clean and unused surplus medical supplies and equipment from





UVA Health System's waste stream to local, national, and foreign organizations and humanitarian projects. In 2013, over 50,000 pounds of clean and unused medical supplies, with a value of several million dollars, were kept out of landfills and medical incinerators.

The Transportation Demand Management Program provides multi-modal options for students, faculty, and staff, including a bike-share program, discounts for carpooling, a ZipCar program, a bus network, bike fix-it stations, and free city bus fare. UVA also was named a Bronze-Level Bicycle Friendly University by the League of American Bicyclists.

When it comes to environmental health, UVA achieved Green Seal GS-42 certification, becoming the first university in Virginia and just the third in the country to attain this level of certification for its green cleaning program. A wide range of departments partner across the university to help ensure a safe, healthy, and secure environment, and provide support for air and stormwater permitting, compliance, and planning; erosion and sediment control inspections; environmental impact reviews; petroleum storage management; environmental management systems; and all other regulatory or environmental concerns.

UVA offers a multitude of programs, educational opportunities, and incentives to promote the health of its students, faculty, and staff. The Hoos Well program for employees focuses on six dimensions of wellness (activity, emotional, nutrition, career, social, and spiritual). A range of health and wellness services exist for students via the Department of Student Health and Counseling and Psychological Services, along with several health promotion services: peer education, nutrition, social norms marketing, tobacco cessation, eating disorder support, and substance abuse prevention.

UVA Dining, which seeks to provide local, organic, humanely raised, and fairly traded food options for students, has achieved Marine Stewardship Council certification, as well as the Virginia Environmental Excellence Program's E3 Designation. UVA is the first university to receive this state recognition for its commitment to superior environmental performance.

With regard to effective environmental and sustainability education, UVA offers interdisciplinary learning and civic engagement. The Global Studies-Environments+Sustainability Major, housed within the College of Arts and Sciences, features four tracks, allowing students to address problems associated with human transformations of the earth through the triple lens of environment, equity, and economy. The Global Sustainability Minor allows students to understand the many facets of sustainability and apply this knowledge to their daily lives. Courses focus on systems thinking, engaged citizenship, innovation, research, and interdisciplinary



thinking. UVA's interdisciplinary Department of Environmental Sciences offers courses of study that help students to learn more about global sustainability issues and technology's potential to address global challenges.

The Committee on Sustainability includes faculty, student, and staff members dedicated to fostering and building sustainability across the grounds. At the same time, UVA's educational outreach and behavior-change programs, events, and campaigns led by the Office for Sustainability are helping to build sustainability literacy and awareness across the university, which translates into action. There also are opportunities for students to engage in sustainability-related extracurricular activities through dozens of student organizations. Together, these efforts seek to change social norms by promoting sustainability behavior to reduce consumption.

## Washington

### Discovery Elementary School, Everett, Wash.

*Sustainability education field trips and waste reduction numbers that don't lie*

Discovery Elementary has reduced energy consumption, reduced and recycled waste, and improved school grounds. Their numbers don't lie. In just one month, the school's monthly waste bill decreased by 17 percent. After three months, the trash output decreased 62 percent. At the same time, recycling increased 25 percent after three months. After three months into implementation, composting increased 66 percent. By the end of the second month of Discovery's green initiative, there was an extreme reduction in waste in the cafeteria from 15 44-gallon bins of garbage a day down to less than one 44-gallon bin a day. A whopping 500 percent increase in daily recycling in the cafeteria in three months meant the school could reduce the size of its garbage dumpster from a six-yard dumpster to a three-yard dumpster.

During an energy audit, small personal refrigerators were removed from around the school. In each class, Energy Monitor (with responsibilities for turning off lights, monitors, printers, and computers) was added to the list of classroom roles. The technology department provided flat-screen monitors and removed all tube-style monitors, along with changing settings so the monitors automatically shut down if not used for a short period of time. Missing weather stripping around doors and windows was replaced. The district replaced the school's boiler with a more energy-efficient model. The school now has guidelines for thermostat temperature settings as well as a timer to run the new heating and ventilation system were installed in the fall of 2014.



Staff members avoid using plastic bags and purchasing items with excessive packaging. The school aims to purchase products made from or packaged with recycled materials, recycle all batteries, and ink cartridges. Whenever possible, it uses rechargeable batteries and both sides of paper. Staff members hold each other accountable for not wasting water and turning off lights and electronics when not being used in the classrooms. Staff uses reusable microfiber cloths for cleaning versus disposable wipes. The cafeteria has replaced disposable trays with durable trays.

Students make pledges to protect the environment. They participate in essay contests and write about their dreams to make their school, community, and the world a better place by protecting the environment. Students participate in Earth Day activities, school grounds trash pick-up, and know not to waste water in the drinking fountains. As a result of these steps and others, Discovery is a Level Three Washington Green School.

Discovery formed a Verde Garden Team to organize a place where students and families could come together to experience the joy of gardening. The veggie and fruit garden area also has a cedar worm bin, greenhouse, and herb garden. Students, families, and staff members participated in the 2013 and 2014 Green Apple Day of Service. For its 2013 project, the Discovery community planted 21 fruit trees and moved 120 yards of compost to create vegetable garden beds. The garden was a huge success, and thousand pounds of produce were harvested in 2014. The student-led green team continues to monitor and make adjustments to environmental goals. Ongoing efforts are conserving valuable resources, cutting down the amount of waste generated to save money, and reducing environmental impact by reducing, reusing, recycling, and composting.

The Washington State University Extension Food Sense program is integrated in the third- through fifth-grade classrooms. Topics covered include germs, table manners, MyPlate, the five food groups, sugar, snacks, fiber, calcium, vitamins, and oils. Students take the Apple Cup Challenge which challenges students to taste 40 different fruits and vegetables. Staff members have created a community leadership program, called Food Backpacks to Go, which provides backpacks with food for 20 families in need. The backpacks, filled with food and personal health products, go home with students every Friday.

The school has teamed up with the Washington State University Snohomish County Extension Beach Watchers to educate students about the protection of local natural resources, focusing on Puget Sound. The Beach Watchers have expanded the minds of students by providing a connection to the interpretation of critters at local beaches during low tides. The Surface Water Management Division of Snohomish County Public Works provides classrooms with lessons and grants for teachers to



take students on environmental field trips. Thanks to this partnership, for the past eight years, two fourth grade classrooms have taken their students to a fish hatchery, wetlands, estuary, beach, lighthouse, nursery, and farm.

Fifth-grade students are enrolled in the Sqord fitness program, which monitors and measures their physical activity. Students learn basic motor skills and then apply these skills in individual or large group activities. Every Tuesday and Thursday, the school has Mileage Club. Every student participates at his or her own level, and runs laps around the playfield. Students have opportunities to play kickball, basketball, soccer, jump rope, foursquare, and many other outside movement games. Local fire station personnel have worked with office staff and the school district transportation department to determine safe routes for the children. Intermediate students are offered a bicycle safety workshop called Bicycle Rodeo to help students with riding gear to make sure helmets and other biking gear fit as well as learning the rules of the road. Staff members also challenge each other to log hundreds of miles on their personal bikes instead of driving to work, and participate in Bike to Work and School Month.

### **Hillcrest Elementary School, Oak Harbor, Wash.**

#### *Not chicken about conservation and environmental education*

Hillcrest Elementary, located in Oak Harbor, Washington on Whidbey Island, is the largest elementary school in the Oak Harbor School District, with 640 students in grades kindergarten through five. Sixty percent of the Hillcrest student population are military dependents through Whidbey Naval Air Station. The school's green team was formed to engage students, staff, parents, the central office, and community members in efforts to reduce the environmental impact of Hillcrest's footprint. Schoolwide, it has been imperative to improve the wellness and health for school, students, staff, and parents. The school community provides an integrated environmental education, which is essential for the future. The school is integrating programs in an effort to reduce environmental impact and costs.

The original 1989 design of Hillcrest included two outdoor courtyards within the school. Hillcrest began a collaborative working relationship with the Oak Harbor Garden Club in 2010 to create a courtyard garden to help students and staff focus on the positive effects on growing local crops and the importance of conservation. Students now plant, weed, harvest, study insect anatomy, and learn about the lifecycle of a butterfly, among other garden learning experiences. Hillcrest now has a covered outdoor classroom, complete with white board and seating in the garden area, and, in 2012, added 12 new raised flower and vegetable beds built by staff and



Navy Partners in Education. Harvested vegetables and fruits are donated to a local food bank throughout the summer and fall. School families are invited to get produce from the garden on scheduled days.

In 2014, the green team met to discuss the best use for an additional outdoor courtyard, and determined that raising chickens was the answer. Hillcrest purchased day-old chicks, and rotated them among classrooms for the first two months of their lives. Students named each chicken, and learned and monitored the life cycle of the chickens, graphing chicken growth and weight. They created narratives and expository text and shared their learning with other students. School parents built a chicken coop using donated materials, with windows for students to observe the chickens laying eggs. Students visit the chickens daily, write about chicken behavior, collect the eggs, feed the chickens, and know each by name. The eggs are sold and the money donated to a local food bank.

The school district has supported Hillcrest Elementary in becoming more energy efficient. In the past two years, the school has replaced 25-year-old carpet with tiles and recycled materials, changed to LED lights, replaced the old boiler with a new cast iron condensing boiler, replaced the old water tank with a new condensing style hot water tank, and changed to green cleaning bleach-free products.

The school participates in Washington Green Schools and uses Leave No Trace, Project Bluebird, and FOSS materials to teach outdoor education through experiential learning. It uses National Geographic Kids, Scholastic News, and Time for Kids for expository reading. Many students live throughout the district, and more than half walk or bike. The school participates in Safe Routes to School, Fuel Up to Play 60, Let's Move Active Schools, and Fitnessgram.

The changes at Hillcrest Elementary have affected many. Students discuss how these experiences have changed their family's lives. One student reported, "We now have a garden at home. I want to be a farmer when I grow up. I love this more than anything." Hillcrest has created a community that focuses on making choices that result in positive outcomes for the earth, which is the most powerful learning experience students can have at Hillcrest. It takes the community working together to make this happen -- staff, parents, community resources, district support and students. The Hillcrest community is dedicated to doing what is best for all.



## Image Elementary School, Vancouver, Wash.

*Engaged students at a Washington Green School look to their future green careers*

Image Elementary is committed to doing what it takes to reduce the environmental impacts and costs, working daily to improve the health and wellness of students and staff, and striving to provide effective environmental and sustainability education to students. Image's efforts have helped the school become more mindful about small, consistent efforts that make a collective big difference. Image is a 40-year-old, all-electric school serving 664 kindergarten through 5th grade students, 59 percent of whom are eligible for free and reduced-price lunch.

Since 2009, Image has decreased energy use by 68 percent. Signs around the school remind staff and students to turn off lights and water, use one paper towel, and both sides of classroom paper. Faced with the challenge of getting an older building to EPA ENERGY STAR standards, the Image community has brought the school from the lowest rating to becoming an EPA ENERGY STAR Leader in 2010 and continued to increase its score to 90 by 2014. The school now boasts an energy management plan, with an energy efficiency strategy, energy conservation targets, and a GHG emission reduction plan. Image has reduced energy use by purchasing software to regulate electrical systems, replacing lights, and consolidating appliances. Students and teachers work together to turn off appliances and equipment. As a result, Image has maintained the largest energy reduction rate of any school in the district.

The motivated and passionate students who sign up for the 20-week after-school Conservation Kids Club use project-based learning to investigate opportunities to make positive changes in the world. Students choose areas of study for their own hands-on research. The club members also lead a water conservation effort, have planted native vegetation, and have held Saturday cleanups. Image Conservation Kids report feeling like their efforts matter and make a difference. You can't create any more engaging education than that!

The school has launched a "Save your Paper, Save your Planet" initiative to reduce solid waste, including lunch schedule adjustment that encourage students to finish their lunches, as well as placement of recycling and composting bins. Games, chants, skits, and competitions encourage Image's efforts for compostable accuracy and landfill reductions. The school's paper trays for each classroom include student artwork and a poem stating "If I've got a plain blank side, take me for another ride. Thanks, The Trees."



Lessons include environmental learning through hands-on activities using FOSS Science Kits, Project WET, Project WILD, and Washington Green Schools professional development and teaching materials. In 2013, Solar Cookers International requested designs for solar cookers for African nations. Students helped write a rubric covering the sustainable design components requested.

Teachers report that teaching sustainability topics deepens and personalizes the curriculum, as sustainability integrates math, science, language arts, and social studies as well as economics, diversity, character, music, art, and physical education. Students are especially interested in emerging green careers, which will call for innovation and problem solving skills. Guest speakers have included water assessors, food and waste managers, a conservation resource manager, fish and wildlife managers, transportation experts, a patent attorney, and a solar panel lawyer.

Many classes take weekly morning mindful walks on the school's half-mile track. Students also receive tokens for running or walking around the track at recess, and the class with the most mileage is awarded the Golden Shoe, while students who reach 50 miles during the year get to write their name on a brick in the gym. The school uses Food for Life and Food is Elementary. Taking care of natural resources is a full-time, ongoing responsibility for everyone at Image, where students take care of the earth so it will take care of them.

## **Tahoma School District, Maple Valley, Wash.**

### *Pervasive sustainability all around the Sound*

Environmental sustainability is part of everyday life in the Tahoma School District, from lunchroom recycling to core curriculum. The district's sustainability culture began with simple ideas, such as partnering with King County Green Schools to recycle milk cartons. That partnership led to more complex projects, such as studying the effect of stormwater runoff on the health of Washington's Puget Sound. Small plans have led to the massive payoff of designing core curriculum with a sustainability emphasis. This is daily life for 7,800 students in the suburban district, which is recognized for its academic excellence. Tahoma established the basis for its sustainability emphasis 20 years ago, when it developed a set of learning standards with environmental and sustainability literacy deeply embedded.

The school board and district leadership are committed to sustainability in both the curriculum and operation of the school system. Sustainability concepts provide a thread that runs through social studies and science across all grade levels. While



there is no isolated literacy requirement, economic, environmental, and cultural sustainability experiences extend through students' education, and result in a pervasive and enduring understanding and commitment to stewardship. Students visit Safeco Field, McKinstry Innovation Center, Woodland Park Zoo, and Willow Creek Fish Hatchery to learn locally-applicable sustainability concepts and practices. As Tahoma students advance from elementary school into secondary schools, they bring with them a growing environmental awareness.

Starting with a resource conservation management program, Tahoma has achieved and maintained a 27 percent decrease in energy consumption across its portfolio over five years, even with increasing student enrollment and high community use of aging buildings. In addition to technical energy tracking, audits and recommendations, the district is engaging students, staff, and administrators through the powerED program managed by their Resource Conservation Management partner, McKinstry. This program emphasizes behavior change to bring about facility energy savings and awareness. Energy consumption and savings are tracked and shared with the community. Teams at each school participate in tracking energy performance, conduct student energy audits, and take pledges to encourage sustainable behavior at their schools.

The high-school learning unit called Humans and the Environment challenges students, as complex thinkers, to consider how environmental issues will affect their generation and those that follow. The curriculum covers several grade levels, having seniors circle back and present information to students who are just beginning their studies, as well as to elementary-school students, who are introduced to topics that include sustainability, global warming, deforestation, recycling, energy efficiency, preserving water resources, and dangers associated with plastic waste at sea. High school students use creative methods to engage younger learners, and often use outdoor areas at schools to help bring learning to life. This partnership gives students the tools to make a difference at school, in their homes, and in their community. Adults are part of the partnership as well. Teachers and other staff collaborate with students to save energy, recycle, and compost. Maintenance and custodial staff use green cleaning methods, and bus mechanics regularly maintain engines to reduce emissions.

Each school is actively engaged in recycling, composting, energy conservation, and other sustainable practices. Students get involved in clubs and activities focused on the environment, from green teams at each school, to the efforts of high-school marketing students who refurbish surplus school-district computers for use by families in need. Campus vegetable gardens, volunteer roadside litter collection, and visits to a local peat bog to observe its rare ecosystem are examples of opportunities for students to have real-world experiences in practicing sustainability.



Students keep an electronic health and fitness portfolio to track nutrition, fitness and wellness activities, and engage in weekly personal reflection. Employees choose from a variety of free or low-cost activities, including Zumba, swimming, yoga, strength and agility training, martial arts and creative arts classes. Urban and suburban living, along with the increasingly digital social interactions of children, is balanced by ensuring outdoor learning experiences are included as part of the curriculum. Outdoor learning sites are as close as the door to the classroom. Each school has multiple outdoor learning spaces, including school gardens, greenhouses, native landscape plantings, retention-pond beautification, and nature trails.

Tahoma takes great pride in guiding the environmental conscience of its students, and informing them about the importance of sustainability. At Tahoma High School, daily green team announcements remind students to take small steps to a greener future. For example, students are encouraged to carpool and given data to support why they should, and vehicle idling is discouraged in the parking lot. Students learn to properly recycle and compost, not just for a greener school, but also so they can teach their families. Students are encouraged to bring reusable water bottles to school and refill them at hallway hydration stations. Posters, signs, and classroom discussions encourage sustainability, and students find themselves immersed in information and activities that encourage responsible use of resources. Sustainability is becoming synonymous with life as a Tahoma Bear, and sustainability fits with the school district's Future Ready mission statement: "Together, provide the tools and experiences every student needs to create an individual, viable, and valued path to lifelong personal success."

## West Virginia

### North Elementary School, Morgantown, W.V.

#### *Planting green school prospects in garden based learning*

North Elementary School is a large, ethnically diverse school that initiated garden-based learning (GBL) in 2011. It is also the first school in Monongalia County to adopt a farm-to-school initiative. The school's model includes 24 outdoor raised beds, a composting facility, in-classroom growing facilities, vermicomposting, and project-based learning curricula. A high tunnel with 14 additional beds and a new science lab are in the works. Primary aims of these projects include developing a rainwater harvesting system, increasing school garden and local farm produce in school lunch and after school events, expanding and integrating more nutrition into the GBL curriculum, and educating families and community about healthy food and life choices.



This model builds on strong partnerships with parents, West Virginia University Extension and Teacher Education, the Monongalia County Master Gardener, the West Virginia Department of Education Office of Child Nutrition, AmeriCorps, and the Morgantown Farmers Market. The model includes teacher-leaders who integrate GBL into core subjects, including math, writing, and science. The key means to accomplishing these goals is professional development and onsite support to teachers, administrators, and cafeteria staff.

Twenty-four raised gardens provide extra greenspace and beauty to the North Elementary campus. North is also constructing a natural playground for prekindergarten and kindergarten students. This playground is a natural landscape providing students with opportunities to explore and discover. The school composts food scraps from its kitchen (about 70 pounds a week). Students are responsible for caring for the compost pile, and use the rich soil in school gardens. North works with the city of Morgantown to offer recycling at the school. Students and teachers recycle newspaper and office paper. They also are participating in a countywide energy monitoring program, use IPM practices, and implement the Green Seal-42 cleaning standard.

In addition to the expansive garden, North offers a walking trail and field where students can exercise during recess. North hosts Girls on the Run, which promotes positive social, emotional, and physical health. The GBL program, which encompasses healthy nutrition, goes hand-in-hand with exercise principles. The majority of faculty and staff are involved in a walking wellness program, and the school participates in the nationwide Let's Move! initiative. The school collaborates with Healthworks to provide teachers and students with information about healthy lifestyle choices, as well as to offer a Zumba rewards program for students.

The crown jewel of North's sustainable school efforts is the garden-based learning program that is integrated into all subjects. This program has transformed North's school culture, and engaged the community in meaningful partnerships for learning. Lessons are inquiry-based and driven by state standards in reading, language arts, math, science, social studies, and global competencies. Prekindergarten through fifth-grade teachers use the garden as a tool to develop student curiosity, fostering students' ability to think critically. Garden-related questions are the focus of project-based learning units. Students learn about composting, recycling, growing healthy foods, pollinators, and organic products. North teaches using real-world experiences, such as bundling and selling produce at the Morgantown Farmers' Market.



















infiltration of storm water into the ground, cleansing and cooling the water while recharging aquifers. One school facility uses a locally manufactured geothermal water pump to heat and cool the building, and a reuse system provides water for toilets, landscape irrigation, and firefighting tanker truck refilling.

The Union Market, Western's food service program, uses reusable food containers, offers reusable cups for water, ceramic plates, and silverware. Staff weigh and track preconsumer food waste using a LeanPath system, and donate leftover food to local shelters at the end of the week.

New construction on all campuses must meet or exceed the LEED Silver certification standard. Three of Western's buildings are LEED-certified Silver; two are certified Gold. Among several new buildings under construction, one is expected to meet Platinum standards. Western's Hydro Power Station produces energy through a water turbine, creating a renewable energy source that generates energy credits for the college, which in the future will offset usage at Western's regional locations. The college also has installed a Konvekta heat recovery system in the kitchen facilities that has reduced natural gas consumption by 68 percent.

All staff and students ride regional buses free of charge; in 2013, Western paid for a total of 67,574 rides. The college also reviews course scheduling and consolidates programs to eliminate trips to additional locations.

Working to improve student and staff health and wellness is easy in a community that promotes healthy living. Western works with the greater La Crosse community to encourage staff, students, and faculty to engage in activities like 5-kilometer runs, half-marathons, and campus fitness challenges. The area features hundreds of miles for bike riding, and Western promotes cycling as an alternative form of transportation, making bike racks available and offering free access to showers for commuters. Western partners with nearby Viterbo University to offer an Intramural/Recreational Sports program, giving all students, faculty, and staff the chance to participate, regardless of skill level or experience, and free of charge.

Adopting the Sustainable Culture Policy also has helped transform the school's curriculum. Curriculum programming at Western is driven by seven core abilities, with the seventh being "Make decisions that incorporate the importance of sustainability." Currently, about 40 percent of existing courses have incorporated sustainability. In addition, the college's Sustainability Coordinator is updating the school's sustainability plan to ensure that all courses incorporate the importance of sustainability by 2018, and that new courses focused on sustainability are developed where gaps exist.





## Acknowledgements

The 2015 cohort of U.S. Department of Education Green Ribbon Schools is all about attaining new heights – from the trees and turbines of our schools to the expansion to include military schools overseas and postsecondary institutions. We continue to be amazed at the determination of these incredible institutions to reduce, do more with less, promote good health, and give students real-world learning experiences. Moreover, we are thrilled to watch these promising school sustainability practices spread across the nation with our schools, districts, and now postsecondary institutions teaching others to follow in their footsteps.

Here at ED, the Green Team continues to evolve, as we recruit new members and say goodbye to others who have moved on. Over the past year, current and former ED employees Jeanne Ackerson, Melissa Apostolides, Malissa Coleman, Kyle Flood, Cory Leitao, Brendan Loughran, Eddie Moat, Jennifer Padgett, Lourdes Rivery, Tayyaba Shafique, and Lizbeth Perez, all have pitched in to keep this project running on the very slimmest of budgets. This program would not be sustainable without their invaluable assistance.

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