

U.S. DEPARTMENT OF EDUCATION

# GreenRibbonSchools



## Highlights From the 2021 Honorees



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# U.S. Department of Education Green Ribbon Schools Highlights From the 2021 Honorees

Office of Communications and Outreach

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## Contents

U.S. Department of Education Green Ribbon Schools Highlights From the 2021 Honorees .....	ii
List of Tables .....	v
Abbreviations .....	vi
Introduction .....	1
Director's Award .....	8
2021 U.S. Department of Education Green Ribbon Schools.....	10
Alabama .....	10
California .....	14
District of Columbia .....	31
Florida .....	39
Illinois .....	42
Indiana .....	45
Kentucky .....	53
Louisiana.....	61
Missouri.....	65
Nebraska.....	68
New Jersey .....	72
New York.....	79
North Carolina .....	88
Ohio.....	101



Pennsylvania.....	104
Rhode Island .....	112
Utah.....	118
Virginia .....	121
Washington .....	125
Wisconsin.....	128
Acknowledgments .....	141



## List of Tables

Table 1. Number of U.S. Department of Education Green Ribbon Schools by year and type ..... 3

Table 2. Number of nominating authorities for U.S. Department of Education Green Ribbon Schools by year ..... 3

Table 3. 2021 honorees by type..... 6



## Abbreviations

Abbreviation	Full Term
AC	air conditioning
ADA	Americans with Disabilities Act
AP	Advanced Placement
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
BTU	British thermal unit
CCF	one hundred cubic feet
CO <sub>2</sub>	carbon dioxide
COVID-19	coronavirus disease, 2019
CPR	cardiopulmonary resuscitation
ED-GRS	Department of Education Green Ribbon Schools
EPA	United States Environmental Protection Agency
EV	electronic vehicle
FFA	National FFA Organization
HEPA	high efficiency particulate air
Hgal	one hundred gallons
HID	high-intensity discharge
HVAC	heating, ventilation, and air conditioning
IB	International Baccalaureate
IPM	integrated pest management
K	kindergarten
kW	kilowatt
kWDC	kilowatts direct current
kWh	kilowatt hours
LED	light-emitting diode
LEED	Leadership in Energy and Environmental Design
MERV	Minimum Efficiency Reporting Value

MW	megawatt
MWEE	Meaningful Watershed Educational Experience
NGSS	Next Generation Science Standards
PBIS	Positive Behavioral Intervention and Supports
P.E.	physical education
PEFC	Programme for the Endorsement of Forest Certification
PFC	power factor correction or power factor controller
PK3	Pre-K for 3-year-olds
pre-K	prekindergarten
PTO	parent teacher organization
STEAM	science, technology, engineering, the arts, and math
STEM	science, technology, engineering, and math
VOCs	volatile organic compounds

## Introduction

### *Origins of the U.S. Department of Education Green Ribbon School Program*

In 2011, key leaders from the Campaign for Environmental Literacy, the Center for Green Schools at the U.S. Green Building Council, the National Wildlife Federation, and the Earth Day Network advised some 80 national and state-based nonprofit organizations to request that the U.S. Department of Education (ED) honor schools for their sustainable facilities, health practices, and effective environmental education. The award that evolved from this petition, U.S. Department of Education Green Ribbon Schools (ED-GRS),<sup>1</sup> has had a significant effect on the green school movement and allowed ED a platform to address school facilities, health, and the environment.

These leaders ultimately assisted ED in developing a consensus definition of a green school, featuring what came to be known as the Three Pillars of the award:

**Pillar One:** reducing environmental impacts, such as waste, water, energy, greenhouse gases, and transportation, encompassing the areas of school facilities, grounds, and operations;

**Pillar Two:** improving health and wellness by promoting a healthy physical environment (including aspects such as air quality, contaminant control, moisture control, acoustics, daylighting, pest management, and thermal comfort) and student and staff wellness practices (such as healthy school food and outdoor physical activity); and

**Pillar Three:** offering effective environmental and sustainability education, including civic learning, green careers, and STEM connections.

### *How the ED-Green Ribbon Schools Recognition Award Operates*

Going beyond the award requested by stakeholders, ED-GRS has become the federal communications and outreach tool to focus on specific areas that ED had addressed infrequently until its advent. The award has allowed the agency to use its outreach tools to address matters of school facilities, health, and environment by highlighting innovative practices and sharing useful, free resources in these areas, despite limited authority to run grant programs in these realms.

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<sup>1</sup> ED's award is called "U.S. Department of Education Green Ribbon Schools" and has "District Sustainability Award" and "Postsecondary Sustainability Award" categories. "Green Ribbon Schools" without the "U.S. Department of Education" is not ED's award, but instead is a separate program overseen by another organization.

Annually, state education officials voluntarily participate by nominating their top schools, districts, and postsecondary institutions based on their achievement in ED's Three Pillars. Although ED provides some suggestions to state educational agencies to help them document nominees' work in the Three Pillars, ultimately, states have flexibility in their selection and nomination, so long as they document progress for each nominee in all of the Three Pillars. ED then uses the award to communicate honorees' promising practices and the helpful resources they successfully employ to the nation's schools.

### *Growth of the Initiative's Communications and Engagement Functions*

Over time, ED has added several components to the initial school award, including recognition of school districts and postsecondary institutions, as well as a state educational agency official's award. The program's outreach also has grown, along with its engagement functions, with a resource website, [www.greenstrides.org](http://www.greenstrides.org), and a Green Strides tour spotlighting clusters of honorees around an annual theme. Green Strides, the outreach and engagement arm of the award, includes a website, a newsletter, and social media to get the word out to schools about the Three Pillars, providing information about free resources, programs, grants, and webinars.

### *U.S. Department of Education Green Ribbon Schools by the Numbers*

With the 2021 cohort, some 489 schools, 92 districts, and 54 postsecondary institutions have received an ED-GRS award (see Table 1). In this case, higher numbers do not necessarily indicate broader influence. ED-GRS was never intended to certify thousands of schools. Each year, state educational agencies are invited to nominate up to five early learning through 12th grade school or district candidates and one postsecondary institution. These examples allow ED to highlight many innovative practices throughout the country. Institutions – whether school, district, or postsecondary – are eligible to receive this award only once, and award recipients always must state their designation with the year in which they were honored. Once ED has highlighted an institution's practices, it is useful to move on to highlighting other, diverse examples. Schools nominated from districts that already have won the award should demonstrate achievements above and beyond those previously honored in the district application.

*Table 1. Number of U.S. Department of Education Green Ribbon School honorees by year and type\**

<b>Year</b>	<b>Schools</b>	<b>Districts*</b>	<b>Postsecondary*</b>	<b>Total</b>
2012	78	N/A	N/A	78
2013	64	14	N/A	78
2014	48	9	N/A	57
2015	58	9	14	81
2016	47	15	11	73
2017	45	9	9	63
2018	45	6	6	57
2019	35	14	4	53
2020	39	11	5	55
2021	30	5	5	40
<b>Total</b>	<b>489</b>	<b>92</b>	<b>54</b>	<b>635</b>

\*The District Sustainability Award was added in 2013 and the Postsecondary Award in 2015.

#### *Number of ED-GRS Participating States*

Despite the exciting efforts ED has highlighted with this recognition award, there is still work to be done to improve school facilities, health, and environmental engagement. Typically, approximately 30 states voluntarily nominate candidates annually for this award (see Table 2). That means that ED does not have a mechanism for highlighting the practices of green schools in the remaining 20 or so states where state educational agencies choose not to nominate.

*Table 2. Number of nominating authorities for U.S. Department of Education Green Ribbon Schools by year\**

<b>Year</b>	<b>Number of Participating Nominating Authorities</b>
2012	30
2013	32
2014	30
2015	30
2016	27
2017	29
2018	26
2019	28
2020	27
2021	20

\*All states, territories, the District of Columbia, the Department of Defense Education Activity, and the Bureau of Indian Education are invited to nominate.

### *Contributing to the Development of a More Coherent Definition of a Green School*

A key contribution of the ED-GRS award is believed to be that, to some degree and for at least a time, it has brought various agencies and organizations together around a common definition of a green school. Rather than one organization using the term “green school” to denote an energy-efficient school, another to refer to institutions offering environmental and sustainability learning, and a third to indicate environmental health or wellness practices, there has been a convergence such that a green or sustainable school must encompass all Three Pillars. There continue to be initiatives that focus squarely on one segment of this work; however, it usually is with the stated understanding that they form part of a broader three pillar effort.

### *A Spotlight for School Facilities, Health, and Environment Innovations*

In 2011, the term “green school” was a relatively unknown concept across much of the country. Today, there is a growing understanding of what this work entails, at least in small part because of ED’s efforts annually to illustrate this work with the concrete practices of its honorees and honorees’ boots-on-the-ground practices. ED’s oversight of this award has offered the agency an opportunity to address and engage on such issues as school infrastructure and operational costs; environmental health and school wellness practices; nutritious, local, and student-grown school food; and hands-on, outdoor, project- and place-based, authentic, environmental, civic, and sustainability learning, among other related topics. The award also has allowed ED to highlight unique local, state, and national partnerships and projects where sustainability efforts intersect with equity.

### *A Significant Effect With a Limited Budget and Innovative Collaboration*

Despite the limited availability of funds, the award has facilitated collaborations and connections that have saved resources. For example, both ED-GRS and Green Strides have enabled ED to share the many programs for schools offered by counterparts at the National Oceanic and Atmospheric Administration; EPA; U.S. departments of Agriculture, Interior, and Energy; and collaborators across the for-profit and nonprofit private sectors.

In the same way that ED works more effectively across a broader range of federal agencies as a result of the award, some state educational agencies also are collaborating in exceptional ways with state health, environment, and energy agencies to select their nominees to ED. The private sector, both for-profit and nonprofit, also has gotten involved at the federal, state, local, and school levels, working with schools and governments. Through this collaboration, ED’s recognition

award has become a tool to get various parties working better together for the benefit of students across the nation.

### *Green Schools Are Successfully Serving Disadvantaged Populations*

Annually 30% to 55% of ED-GRS honorees have served majority-disadvantaged student populations, as measured by free and reduced-price lunch. While this is in part due to award criteria design, which asks states to ensure that at least one of their nominees is disadvantaged, state nominations have exceeded this minimum requirement. With ED-GRS designated schools, districts, and postsecondary institutions providing better education to traditionally underserved students, green school practices may be another tool to advance equal access to a quality education for all students.

### *A Green School Does Not Need to Be Newly Constructed*

To ensure that the award highlights diverse examples of sustainability, the competition assesses candidates based on resources available to them, rather than in comparison to each other. In fact, the award has, over the years, highlighted many older school constructions engaged in low-cost, but highly effective, retrofits and behavioral change. All of these are steps that any school community can undertake, without a new construction, that is designed specifically to be resource efficient and environmentally healthy. In this way, the award has helped to educate the public about the broad applicability of green school practices in both old and new buildings.

### *Creating Incentives for Multiple Pipelines for Sustainability Improvements by All Schools*

Another important consequence of the award has been the refinement of various national and state-specific green school programs that the award has spurred. States have realigned preexisting state green school programs, created new ones, and now recognize runners-up beyond those they nominate to ED, in order to create pathways to the national award, broaden recognition within individual states, and provide incentives for more change.

### *The 2021 Cohort*

This year's selectees were confirmed from a pool of candidates voluntarily nominated and exhaustively reviewed by 20 state education authority implementation teams. While selection processes vary from state to state, members of several state agencies, as well as outside experts, often comprise selection committees. At the federal level, we have selected 27 schools, three child care

centers, five districts, and five postsecondary institutions that demonstrate promising practices to cut costs, improve health, and ensure that students learn through the most hands-on, engaging means possible (see Table 3).

*Table 3. 2021 honorees by type*

Total honorees	40
Schools	27
Early learning centers	3
Nonpublic schools	3
Charter schools	5
Magnet schools	1
Districts	5
Institutions of higher education	5
Community and technical colleges	1
Disadvantaged-serving schools	22

The diversity of U.S. Department of Education Green Ribbon Schools, District Sustainability Awardees, and Postsecondary Sustainability Awardees and the range of their work demonstrates that any school, district, or postsecondary institution can take steps to improve the sustainability, health, and safety of school facilities; ensure nutrition and fitness practices for a lifetime of wellness and productivity; and engage students in real-world learning.

Schools use sustainability in context to teach important civic values and skills that encourage students to grow into responsible, compassionate, and contributing citizens. Furthermore, working with dynamic environmental, social, and economic systems from an early age nurtures precisely the type of thinking, collaboration, and problem-solving skills that careers of the future require. This is the case whether these students graduate from green career and technical programs, college preparatory schools, community colleges, or liberal arts colleges.

This is even more true in the face of a global health pandemic, when all schools have been forced to face issues of school air quality, nutrition, and outdoor learning more directly than ever. Not surprisingly, green schools have been among those best equipped to handle the pandemic, at the ready with outdoor classrooms; updated, efficient, and healthy ventilation systems; social-emotional learning curricula; paperless learning mechanisms; and farm-to-school programs that encourage healthy nutrition, whether at home or on campus.

These green schools have still had to get creative during the pandemic, sending “planting packages” home for students to learn horticulture while learning virtually and calling students away from their tablets into their backyard or neighborhood to

observe the elements of nature they might have, under more normal circumstances, observed in the green schoolyard. These green schools have persisted in their efforts and grown more determined, if possible, as the global health crisis underscored how students and educators require healthy, safe learning environments and how the leaders of tomorrow must understand the impact of their individual actions on their community and their planet.

It is with tremendous pleasure that we present the 2021 U.S. Department of Education Green Ribbon Schools, District Sustainability Awardees, and Postsecondary Sustainability Awardees. These honorees are ensuring that their students learn to live, work, and play with sustainability and health in mind – not as an afterthought, but as an integral part of everything they undertake.

The innovative practices of the 2021 Green Ribbon award winners are described in the remainder of this report. We also suggest that you go to the <http://www.greenstrides.org> webpage to learn more about these innovative practices.

## Director's Award

The Director's Award celebrates an individual's exemplary efforts to administer ED-GRS in their state. Specifically, the ED-GRS Director's Award recognizes a state educational agency official who does the most to advance green schools by running a robust competition process; connecting more schools to resources in all three ED-GRS Pillars; amplifying the stories of honorees; helping schools learn from one another; partnering with a variety of entities to bring more resources and expertise into schools; and exhibiting a dedication to exceptional school facilities, health, and environmental education through activities outside of the administration of ED-GRS.



ED is delighted to have named Joseph DaSilva, School Construction Coordinator; Manuel Cordero, Assistant School Construction Coordinator; and Mario Carreno, School Construction Finance Specialist, of the Rhode Island Department of Education as 2021 Director's Award recipients.

For over 10 years, their leadership and dedication have been integral to ED-GRS' success. The "Pep Boys" gave ED-GRS a home in Rhode Island early on, and they hosted an ambitious "Education Built to Last" facilities-themed Green Strides Tour in 2013. They have engaged stakeholders from various agencies and sectors to share sustainable best practices, select ED-GRS nominees, and celebrate honored institutions. They have worked to cultivate applicants in Rhode Island by formalizing the linkages between a school facilities grant program that they manage and green school efforts, encouraging not only exemplary facilities practices, but also efforts to improve environmental literacy and wellness.

In this pandemic year, it is fitting that the Director's Award, for the first time, recognizes three state officials from one state, instead of the customary individual. Together, DaSilva, Cordero, and Carreno have demonstrated how we are "stronger together," particularly in the face of adversity. Their teamwork has paid dividends; by their account, Rhode Island's green schools have been among those in the state best equipped to handle the COVID-19 pandemic. In sum, the "Pep Boys of Rhode Island" have modeled excellence in ED-GRS' implementation for other state education authorities to follow. ED commends Mr. DaSilva, Mr. Cordero, and Mr.



Carreno for their work to promote environmental stewardship, health, and sustainability and for inspiring more schools to aim high.



## 2021 U.S. Department of Education Green Ribbon Schools

### **Alabama**

#### **Tuscaloosa City Schools; Tuscaloosa, Alabama**

*Cultivating optimal learning environments, indoors and out*

Tuscaloosa City Schools (TCS) serves 10,951 students, 65% of whom qualify for free and reduced-price lunch. In 2018, the district's Strategic Plan was updated to focus on curriculum, human resources, and construction. The construction focus is on designing and providing facilities that serve as optimal learning environments. Beginning in 2017, buildings were renovated or rebuilt with design plans to increase the system's energy efficiency and sustainability. The plan allowed for five schools to be completely rebuilt using more environmentally sustainable practices and materials. In total, 11 schools have been renovated, putting more energy-efficient practices into place.

Occupancy-controlled technology for HVAC units, installation of high-efficiency HVAC units, motion sensors on LED lighting, natural flooring, water bottle filler/water fountains to reduce plastic disposable water bottle usage, as well as roof repairs to increase efficiency are all part of the strategic plan that has helped TCS reduce its environmental footprint, while simultaneously improving health. TCS has also worked to use outdoor learning whenever possible, taking advantage of such elements as forests, embankments for amphitheater-type seating, shade trees, gardens, ponds, animal habitats, and bringing in picnic tables and other seating.

Recycling collaboration between TCS and the City of Tuscaloosa Environmental Services is long-standing, and countless tons of trash have been spared from local landfills through recycling efforts. Each school has receptacles to collect cardboard, and nearly all schools and classrooms, as well as the TCS central office, have some recycling program in place. Another way TCS has worked to reduce waste is by instituting "share tables" in cafeterias. Students can place unwanted whole fruits and prepackaged food items on a community table in the cafeteria, and interested students select those items for themselves. This reduces food waste as well as provides extra nutrition for students in need. This practice was halted due to COVID-19, but plans are in place to reinstate it as soon as it is safe to do so.

Water bottle filling stations have replaced at least one traditional water fountain in every school, and, since their installation this year, reduction of disposable water bottles has been documented among students and employees.

TCS is proud to be leading the way in Alabama in alternative fuel use, as the first in the state to convert the majority of its bus fleet to propane. TCS has worked with the bus manufacturer to host districts from throughout Alabama and surrounding states in order to share information about its efforts in converting to propane buses. TCS is currently running 98 propane buses and 27 diesel buses, the latter of which are primarily reserved for long trips. Several TCS schools take part in Walk/Bike to School days to encourage both wellness and energy conservation. Buses and carpool lines practice no-idle zones, and buses load at least 25 feet from building entrances.

Tuscaloosa CAN! is TCS's response to the concern of food insecurity. Through Tuscaloosa CAN!, TCS school teams create large sculptures made from canned food items, putting their STEM learning into action. The event meets 21st century curriculum goals by providing student with opportunities for project-based, hands-on, collaborative, service-learning activities, targeting real-world problems – in this case, regional hunger. After the can sculptures are built, the creations serve to raise public awareness as a giant art exhibition. At the end of the exhibit, all food is donated to the West Alabama Food Bank. To date, Tuscaloosa CAN! has contributed over 80,000 pounds of food to Tuscaloosa and surrounding communities.



*Tuscaloosa City Schools students and families participate in the “Bookin’ It for TCS Libraries 5K” to raise funds for school libraries.*

TCS has always put effort into health and wellness, with partnerships for wellness and flu shot clinics for faculty and students, hearing and vision screenings, and full-

time nurses on-site at each school. TCS participates in the Fresh Fruits and Vegetable program, allowing students to receive fresh fruits and vegetables three times weekly to eat for a snack throughout the day. TCS also partners with Child Abuse Prevention Services to provide Second Step Lessons to students to help prevent cases of abuse, drug use, and neglect.

Physical fitness is emphasized and encouraged through daily outdoor P.E. classes and recess. Special fitness activities include the Kickoff Classic (a fun run celebrating the beginning of the school year), the Mercedes Kids Marathon, the Shamrock Shimmer and Shake (a blacklight event consisting of Zumba and Pound), Field Day, the American Heart Association Kids Heart Challenge, and Jump Rope for Heart. The district partners with the city for the Mayor's Cup 5K Run in support of his pre-K initiative.

TCS has instituted a three-cart system for cleaning. This reduces water consumption, reduces cross contamination, and increases cleaning efficiency. There are separate carts and protocols in place for classrooms, bathrooms, and hazardous materials. Washable microfiber cloths and mop heads are color-coded for different areas of the school for daily use, while the Haz-Cart has disposable flat mop heads for safety. Cleaning chemicals are nontoxic and meet Green Seal requirements. They have an easy-to-use dispensing system that helps to reduce solid waste.

TCS schools use IPM practices to control pest outbreaks in the school gardens. Students learn to identify pest species in their gardens through Bug ID lessons. Students are involved in managing pests by handpicking nonharmful species and placing them in buckets of soapy water, while adults control larger pest outbreaks with organic chemical control methods, such as neem oil, Bt (*Bacillus thuringiensis*) concentrate, and diatomaceous earth. The garden also encourages beneficial insect populations, which prey upon common garden pests, by incorporating flowers and herbs into the crop rotation. TCS works to control pest outbreaks inside as well. Routine pest checks and treatments are performed by a professional pest control company using nontoxic chemicals. If infestations occur, these areas are spot treated after school hours. TCS makes cleanliness a priority to deter infestations. Nontoxic measures are used throughout the schools to eliminate student exposure.

With the introduction of COVID-19, TCS has increased its health and wellness efforts. Air purifiers were placed in every classroom, office, and shared space, and enhanced cleaning procedures were put into place for both custodial staff as well as faculty and students. Special emphasis has been placed on hand washing and virus containment, and efforts have been made to encourage and enforce mask wearing in all facilities. Virtual meetings with a behavioral counselor have been held for employees in response to the increased mental and emotional strain.

TCS cultivates community partnerships. One notable example is the partnership with Schoolyard Roots. This program aims to teach students about organic gardening, composting, rain barrels, and farm-to-table practices. Students grow, harvest, eat, and sell produce grown in their neighborhood, reducing the carbon footprint of growing and shipping produce from afar. Schoolyard Roots works closely with faculty sponsors to ensure curriculum support.

Outdoor learning spaces are used in 94% of TCS sites. Nine TCS schools have an active garden and use a designated garden curriculum such as Schoolyard Roots. Four schools have designated STEM labs and instructors. Each school has its own unique concept of what an outdoor learning space looks like; these spaces include ponds, sensory gardens, nature trails, courtyards, outdoor seating areas, and amphitheaters. Reading curricula in 77% of schools include stories about the environment, nature, climate preservation, or human impact on the environment. Students read many expository texts that focus on the components of environmental and sustainability foundations. Social Studies Weekly, Aquaculture Lab, and Environmental Investigations are resources used to provide environmental instruction. Cross-curricular lessons pull the “green” from science with technology, reading, math, and the arts.

TCS offers students a unique opportunity with the Tuscaloosa Career & Technology Academy (TCTA). TCTA is a specialized facility that provides college and career readiness with a focus on the development of workplace skills for high school students. Students earn high school and community college credit and engage in workplace simulation with community partners. The aquaculture program prepares students for careers in Alabama’s booming aquatic industry. Students gain hands-on experience with aquatic nutrition, fish reproduction, hydroponic design, and management. Students maintain an indoor hydroponics garden that houses approximately 900 plants as well as an 8,000-gallon aquaculture system that holds 400 koi fish, with plans to experiment with fish, such as tilapia and catfish, that can be used as food. The veterinary program prepares students for an exciting career as a veterinarian or veterinary technician. Students gain hands-on experience with animal handling, disease management, and medical practices.

Alabama Wildlife Federation (AWF) has been instrumental in the installment of ponds at two TCS elementary schools. The AWF also has certified five TCS schools as Alabama Outdoor Classroom Program schools. TCS teachers have participated in many professional development opportunities, including Project Wet, Project Wild, Project Learning Tree, Alabama Outdoor Classroom Program, Growing Up Wild, and various other workshops provided by AWF. Eighty-three percent of schools have

teachers who attend at least one environmental professional development opportunity annually.

Eighty percent of TCS schools partner with Alabama Math and Science Instruction (AMSTI). AMSTI science lessons focus on STEM activities, investigations, and projects to extend students' knowledge of environmental and sustainability issues and concerns. Earth Day celebrations are held in almost every school throughout the district. Eighty-nine percent of schools participate in Career Day and/or career fairs where students are provided with opportunities to speak with representatives from green careers, such as Tuscaloosa Environmental Services, Alabama Power, Alabama Forestry, beekeepers, farmers, biologists, conservation groups, environmental engineers, and AWF.

## **California**

### **Fryberger Elementary School; Westminster, California**

*Efficiency upgrades and student projects lead the way for environmental change*

Fryberger Elementary School (Fryberger) leads students, 89% of whom qualify for free and reduced-price lunch, and the surrounding community in environmental education and sustainability practices. In 2018, a committee of the school's stakeholders set forth to bring education on sustainability, mental health, and wellness initiatives to the school and community. These practices are at the forefront in the school's facility and grounds operations, nutrition and health services, and student education.

Sustainability efforts began in 2016 when Fryberger completed a comprehensive energy efficiency and renewable generation program. This plan led to the installation of new energy-efficient HVAC systems, a campuswide upgrade to LED lighting, and the addition of a 45.4 kWDC solar array that produces 90% of the school's energy needs. Fryberger highlights these improvements by educating through a customized STEM program. The program allows students to expand their STEM skills and learn about how the campus changes help combat climate change.

Water efficiency upgrades at the school constitute another method of conservation. Fryberger installed low-flow plumbing fixtures and upgraded irrigation controls. The irrigation system's design helps save water and electricity by using local weather information and moisture sensors to ensure that it only runs at the most optimal watering times.

A strategic no-idling policy during student drop-off and pickup periods helps improve outdoor air quality. During morning drop-off, parents use the drive-through drop-off or park their cars and walk their children to the entrance gate. In the afternoon, parents must park their cars and walk to the student pickup gate upon dismissal. These measures not only ensure the safety of students but also eliminate excessive emissions. The school district purchased two propane-powered school buses in 2018 and two more in 2020. Students and families who walk to and from school do so with the help of a city-employed crossing guard.



*Kindergarten students learn and present information about the positive impact on the environment attributed to farming using organic soil and seeds.*

Fryberger engages in multiple strategies for waste reduction. The school has an 80% diversion rate from recycling and composting. Students clean and sort biodegradable food trays and environmentally friendly milk and juice cartons for recycling after meals. Students also maintain a school compost bin with red worms to break down food waste from meal service. The school started a food share program in 2018 as another way to eliminate food waste. Students add any excess packaged whole fruits and vegetables to the food share table for students in need.

The school promotes healthy and nutritious living for staff and students, providing breakfast and lunch daily; students in the after-school program also receive dinner.

School meals feature organic fruits and vegetables from local farms; at least 25% of food purchased is certified as environmentally preferable. Students participate in a Play First, Eat Second program inspired by a 2018 study completed at Fryberger that determined student behavioral incidents decreased when students had mealtime following playtime. Partnerships with the American Heart Association Kids Heart Challenge and Kaiser Permanente Healthy Eating Active Living programs bring awareness and education to students and their families on eating healthily and the importance of leading an active lifestyle. Every year, students and their families

participate in Heart Month with daily exercise challenges, family dinner recipes to make at home, and positive affirmations.

Teachers and staff take advantage of the school's green space, and students find quiet places outdoors to read a book, work collaboratively with student peers, and explore in the garden. Students look out of classroom windows and see large grass areas, trees, and student-maintained gardens.

Social-emotional learning is a top priority at Fryberger. Many teachers have mindfulness training, enabling them to regularly bring mindfulness activities and practices into their classrooms. The school has also adopted Mind Up, a social-emotional learning curriculum that is taught to students weekly. Students learn about the components of their brain, how to express their emotions, and how to set goals and never give up. For the past two years, students also learn a growth mindset trait of the month. Monthly growth mindset awards recognize students from each class who have demonstrated a specific growth mindset trait. Fryberger's PBIS features a three-tiered system for academics and behavior. Restorative practices are taught in the classroom and on an individual basis. Students learn to reflect on their behavior so that they can take control of their actions.

Environmental literacy is the focal area used to bring resources and standards together into multidisciplinary learning activities. Students have opportunities to lead their learning through projects and experiences. Thematic project-based units center around the California NGSS and Environmental Principles and Concepts (EP&Cs). Unique to California, EP&Cs highlight the profound relationship between humans and the natural world. Teachers do not follow a specific textbook or program, but rather work together to organize grade-level plans that introduce ecological topics through project-based learning units. Implementing learning through project-based learning allows the intertwining of environmental issues across the curriculum. Students learn literacy, math, science, and social studies standards through an environmental lens using the EP&Cs.

Students engage in several real-world ecological activities. For example, transitional kindergarten and kindergarten students participate in organic farming to apply engineering design concepts, mathematical thinking, and scientific principles necessary to grow plants. Students then begin learning about parts of a plant and move into learning about the importance of using organic farming materials. First grade students study natural resources conservation, while second grade students learn how humans can reduce pollution in the ocean. Third grade students study how to combat microplastics in the ocean. A partnership with the Surfrider Foundation teaches students about the "5 gyres." Fourth and fifth graders learn



about energy conservation. These learning activities give a context for students as they develop their skills in all other subject areas.

All field trips focus on the environment and provide fieldwork opportunities that complement what students are learning in the classroom. Students have visited the beach to clean up, explored wetlands, investigated local farms, observed local phenomena on walks, and networked with scientists. Assemblies and experiences from the Eco Heroes, Inside the Outdoors, and the local water department are just a few examples of partnerships that support Fryberger's vision of inspiring and developing successful, productive citizens who are environmentally responsible in a changing world.

A planned Earth Day and Open House celebration ends Fryberger's school year and provides a forum for student culminating activities. All students share their projects and campaigns for protecting the environment and urge the community to take action.

### **May Ranch Elementary School; St. Perris, California**

*AVIDly producing environmentally engaged citizens*

May Ranch's vision is for all students to be empowered and equipped with the knowledge and strategies necessary to become confident and successful global citizens. This aim undergirds the care of the school garden, a sustainable agriculture program that utilizes green technologies; leads to cross-curricular, real-life applications and hands-on learning; and provides the community with healthy, nutritious produce. To realize the school and garden visions, staff commit to reducing environmental impact and costs; improving the health and wellness of students, staff, and the community; and integrating environmental and sustainability learning into the curriculum.

The school's energy management plan encompasses upgraded HVAC units, photovoltaic solar panel structures, occupancy sensors, and centralized thermostat control to reduce environmental impact and costs. These improvements resulted in a 62% reduction of kWh energy usage tracked from 2016 to 2019. The installation of economizers in HVAC units in 2016 and a rigorous maintenance plan consisting of quarterly replacement of filters and regular inspection and replacement of belts have contributed to lower energy usage and improved indoor air quality. Currently, May Ranch generates 80% of the school's energy from four carport and ground-mount photovoltaic solar structures installed as part of a district 7.153 MW solar installation project. May Ranch's cool roofs have a single-ply, white membrane coating to help reduce the heat island effect and insulate buildings.

Outdoor environmental improvements to the May Ranch campus to reduce water use include replacing 14,515 square feet of grass with artificial turf, planting water-efficient indigenous plants supported with bark mulch, and improving irrigation. These projects resulted in a 24% reduction in indoor/garden potable water use and a 68% reduction in outdoor reclaimed, non-potable water use from July 2017 to June 2020. Eighty percent of all plants are California natives. School landscape and garden areas feature new bubblers and drip irrigation, replacing old equipment. Upgraded nozzles in the field's rotating sprinklers better fit the needs of the fields and prevent overwatering. May Ranch students access clean drinking water through a water bottle filling station that has saved 23,844 plastic bottles from the landfill to date.

The school recycles and composts green waste and food scraps to divert waste from the landfill. Eighty percent of green waste turf cuttings are recycled and reused in the field. May Ranch engages in vermicomposting and composting of food scraps to produce fertilizer for its garden. The school works with district buyers to purchase green and recycled materials for administration, instruction, and maintenance whenever possible.



*After-school clubs provide additional opportunities for movement at May Ranch Elementary School*

May Ranch pickup and drop-off policies ensure a reduced environmental impact and safe arrival at school. Parents are encouraged to park legally in the neighborhood and walk to campus to avoid idling in the parking lot. The school employs a visitor "taxi" system for all student pickups, in which

student names are written on cardstock and placed on dashboards to allow staff to call students quickly to their cars. This system speeds up the pickup process and avoids excessive idling. Students walking or rolling to school arrive safely due to well-communicated policies and active supervision in all crosswalks in front of the school and the parking lot.

The school follows California's Healthy Schools Act requirements and the Val Verde Unified School District's IPM practices to ensure long-term pest prevention using the safest methods possible. As the need arises, glue traps and mechanical traps are the preferred methods for pest control. When nonchemical options are ineffective, the district uses pesticides to minimize risks to people, property, and the environment. The school district has eliminated all glyphosate-containing herbicides districtwide and utilizes the natural weed killer Weed Slayer and saltwater for weed abatement. Custodians at May Ranch employ green cleaning practices, by using 81% green cleaning products, feather dusting, and daily vacuuming with vacuums containing HEPA filters.

May Ranch promotes healthy food and nutrition to support students, 81% of whom qualify for free and reduced-price lunch, and the school community. While the school garden curriculum provides a foundation for health and nutrition education, the City of Perris, Eastern Municipal Water District, Nutrition Education and Obesity Prevention Program, and Healthiest City Challenge have provided additional education and resources over the years. May Ranch students participate in Chef in the Classroom, Dairy Council lessons, healthy eating assemblies, the Harvest Festival "Rethink Your Drink" booth, and the City of Perris Health Fair. May Ranch has also hosted parent classes on the topics of healthy eating and wellness.

The 2,737-square-foot outdoor school garden contains 19 beds, 10 fruit trees, and nine aeroponic towers. Vertical farms have been placed in six classrooms. The school garden at May Ranch provides ecological benefits, with 96 square feet devoted to pollinator-friendly plants. Students save seeds from the garden, clone plants, and create compost from food waste and worm castings. Annually, the school garden and garden curriculum provide more than 900 students in all grade levels with hands-on learning in the California NGSS, environmental and sustainability education, and the joys and benefits of gardening.

In partnership with the school district and the City of Perris, the school earned a U.S. Department of Agriculture Farm to School Grant to increase the amount of fresh produce procured locally and at school for student consumption. Now in the second year of implementation, May Ranch has provided students with more than 500 hours of garden and nutrition curriculum. Maintaining and operating the aeroponic towers and vertical farm allowed May Ranch students to offer more than 1,000 heads of lettuce to the cafeteria during the 2019-2020 school year. The May Ranch cafeteria supports farm-to-school programs and purchases lettuce and vegetables from the school garden. Students harvest, weigh, and calculate the retail cost of produce provided to the cafeteria, and staff invoice the district's food services department.

Cafeteria staff have observed that students consume more lettuce on days when “May Ranch lettuce” is served.

At May Ranch, social skills and social-emotional learning are explicitly taught twice a week during morning meetings. The school utilizes PBIS tiered interventions. In the classroom, all teachers employ mindfulness, restorative practices, and trauma-informed practices to ensure student wellness and build a positive classroom community. When more intensive interventions are required, a full-time school psychologist and two mental health therapists support students and provide counseling daily. The school-based health center is staffed by a licensed vocational nurse and a health technician. They maintain necessary health records, assist with health services and medical screening of students, disseminate health information, address and communicate routine health issues, and provide emergency medical care.

May Ranch strives to provide all students with environmental and sustainability education woven into the curriculum, extracurricular activities, and the green schoolyard master plan. As an Advancement Via Individual Determination (AVID) elementary school, the school utilizes elements of writing, inquiry, collaboration, organization, and reading to provide a framework for environmental and sustainability integration with science, mathematics, and the English language arts core curriculum. Each trimester, students in grades three to five participate in engineering design process projects that challenge students to develop solutions to real-world problems. Students’ past projects include designing, building, and writing about irrigation *ollas* for the school garden; hydroponic systems; and plant cloning.

Students in all grade levels participate in field trips, many of which focus on the California NGSS earth and life sciences standards. Most field trips take place outdoors and integrate environmental and sustainability learning to provide experience, knowledge, and context, which lead to cross-curricular opportunities through writing, inquiry, collaboration, organization, and reading. Following the field trips, students draw on their experiences to write, ask questions, participate in discussions, organize notes in graphic organizers, and analyze texts.

From 2017 to 2020, the City of Perris and May Ranch have annually certified approximately 30 students as Junior Master Gardeners. Currently, 90 students are participating in the Junior Master Gardener program through distance learning. Realizing the health, wellness, and learning benefits of the Junior Master Gardener curriculum, May Ranch utilized the program’s Learn, Grow, Eat, and Go curriculum with all students in grades one to five in the 2019-2020 school year, and these lessons integrate physical activity with literacy, gardening, and nutrition during P.E. “FLEX time” physical activity station rotations.

Outdoor learning experiences are purposefully planned in teachers' lessons to provide meaningful hands-on learning experiences in science, math, social studies, and environmental literacy. The indoor hydroponic system and outdoor garden offer opportunities for STEAM integration and problem-solving. Green practices are part of daily garden and life science instruction. Students study, plant, and maintain pollinator-friendly native plants, including indigenous, water-efficient plants in the garden; compost food scraps; and maintain two vermicomposting towers with 1,000 worms. Established in 2014, the Garden Club has grown to nearly 75 students who support the school's garden, aeroponic towers, vertical farm, and campus beautification efforts. The playground, field, and other shaded areas offer additional outdoor spaces for science and math skill application, demonstrations, and project testing.

The garden and school grounds allow student groups to lead civic and community engagement projects. The Associated Student Body promotes and provides campus beautification, such as planting bulbs in ornamental planters, pulling weeds, and picking up trash. Junior Master Gardeners volunteer at events such as the City of Perris' Health and Wellness Fair and lead the Green City Farm, teaching the community gardening tips.

### **Theodore Roosevelt Elementary School; Indio, California**

*Resource tracking leads to sustainable action*

Theodore Roosevelt Elementary School (Roosevelt) is located in California's arid Coachella Valley and serves students in transitional kindergarten through fifth grade. Ninety-seven percent of students are socioeconomically disadvantaged. Through strategic planning and partnerships, Roosevelt provides students with real-world experiences to inspire their future environmental stewardship. Attention to nutritional, physical, and mental health guides students in creating lifelong habits to thrive. Roosevelt's goal is for all students to be environmentally conscious, civic-minded, healthy, and ready for college and careers. In 2020, Roosevelt was chosen as one of five schools internationally to participate in the United States Green Building Council's Building Learners program. The one-year program integrates learning and sustainability action at the school. Students complete standards-aligned, hands-on lessons and participate in on-demand training modules. A local green building professional mentor supports all aspects of the program to ensure its success. Through the program, the school obtains sustainability information about its ecological footprint. Students learn how to collect and input data using the Arc online sustainability benchmarking platform from Green Business Certification Inc., including Arc Essentials and Arc Performance Certificates. The program also provides school personnel with data to identify monthly usage and areas where the

school can become more energy efficient. Students are currently working with the City of Indio's building inspector and the City of Palm Springs' Office of Sustainability to learn about green building efforts around the school. Students take what they have learned from professionals and school usage data to evaluate resource efficiency opportunities. As a culminating event, students will make presentations to the City of Indio and the Desert Sands Unified School Board on sustainability recommendations.



*Theodore Roosevelt Elementary School students work the garden, the school's hub for sustainable learning.*

Roosevelt has reduced its non-transportation energy use by 47% since 2015 and greenhouse gas emissions by 50% since 2014. The school's district partnered with ENGIE Services to modernize older schools and pilot a renewable energy project through funding provided under California's Proposition 39. Roosevelt was one of the schools that received modernization through this funding. The modernization at Roosevelt included seismic repair and upgrades. Sealing cracks in

the infrastructure reduced air leaks throughout the school and decreased energy use, especially during the desert's hottest months.

Student representatives, faculty, and staff are trained to collect the school's recycling and provide feedback to improve the recycling program. Student council members work on creating effective ways to ensure that classrooms, office areas, teacher workrooms, and the school cafeteria participate in the recycling program. Students collaborated with teachers to identify the best collection method and developed a system for proper recycling and pickup of classroom recyclables each week. Students present these recycling protocols at staff meetings and continue to integrate feedback from the staff in an ongoing effort to develop more effective approaches for maintaining an effective, sustainable recycling program. Roosevelt documented a diversion rate of 65% from recycling and composting.

Safe and sustainable alternative transportation is a priority for Roosevelt. Students earn rewards and prizes in the Ram Mile Club, a schoolwide running program to

encourage walking and biking to school. The school's Safe Routes to School Program supports families using human-powered modes of transportation as an alternative to automobile transportation. The school evaluates factors affecting morning and afternoon commutes through the program and enacts measures to encourage alternative transportation. Students and Boys and Girls Club staff conducted a safety survey of the intersections approaching the school in response to parent safety concerns around pedestrian and vehicle interaction. They found most drivers were distracted and failed to make complete stops at intersections. Students presented their findings to the Indio Police Department, and the Department committed to patrolling the area more frequently during dismissal times. Roosevelt stakeholders are also helping the City of Indio develop a Safe Routes to School Master Plan to provide a safe, sustainable, integrated, and efficient transportation system. After evaluating transportation routes, the Desert Sands Unified School District developed a more effective and efficient plan that reduced the number of buses needed to serve Roosevelt from two to one. The district also provides flex-fuel vehicles for traveling on school business.

The school received recognition from the Alliance for a Healthier Generation over the past five years for its participation in the Healthy Schools Program. The school earned bronze (2014), silver (2015, 2017-2019), and gold (2016) awards. School stakeholders worked together to obtain the awards, which motivated the students and school community at Roosevelt to make healthier nutritional choices and be more physically active. Throughout the process, the school made changes to serve more nutritious meals, provide health education at all grade levels, and increase physical education and activity. The school focused on its specific needs, which informed and inspired the Roosevelt Elementary School Wellness Policy. The policy prohibits unhealthy foods on campus, including food served in classrooms for celebrations. The policy also changed discipline procedures to protect physical activity time. Students do not miss recess or physical education classes to make up assignments, take tests, or finish classwork. School staff members make concerted efforts to educate students on the wellness policy's benefits to health, nutrition, agriculture, gardening, school cleanliness, and recycling.

Students at Roosevelt participate in PBIS. All students participate in Positive Action Program lessons, contributing to increased academic achievement levels by focusing on positive behavior and creating an optimal learning environment. Roosevelt has a social-emotional learning room for students to use if they have class or recess behavior issues. It provides a safe place for students to reflect, refocus, and feel better through social-emotional learning activities before returning to class. A full-time counselor leads lessons that support these behavior programs. A school psychologist, speech pathologist, and community organizations, such as the

Smile Factory, Betty Ford Center, Barbara Sinatra Children's Center, and the Boys & Girls Club of the Coachella Valley, offer students services to meet their needs.

Roosevelt's STEM program focuses on renewable energy sources and ecological design to reduce carbon's impact on the environment. Upper grade students experience firsthand how energy is captured by creating wind turbines and passive solar house models. All Roosevelt students explore their effect on the outdoor environment, including where they live and go to school, to create a sustainable environment where their community can thrive. For example, kindergarten students learn how to improve delivery routes to reduce fuel consumption, and second grade students design ecologically responsible parks.

With help from families, community volunteers, and local community grants, the school grew a small garden space into a 1,200-square-foot fenced garden with irrigation and numerous planter boxes. All grade levels contribute to the maintenance and care of the garden. The school uses the vegetables from the garden for classroom taste tests, salads during staff luncheons, and the school's salad bar. Roosevelt also shares crops harvested in the garden with students and the school community to take home.

Every year, students participate in field trips to support their environmental studies. Field trips and programs through the local farmers market teach students about local farming and agriculture. The local public transportation agency provides educational experiences for students to learn about compressed natural gas, alternative fuels, zero emission bus technology, and fueling systems used for local public transportation in Indio. The school provides students with connections in the community, including field trips to Palm Springs Windmill Farms and solar and natural gas facilities, to learn about local renewable energy sources and how resources in the community impact environmental sustainability. The local water utility plans to host a water testing field trip at their treatment center once students return to school. In the meantime, during distance learning, students are using at-home kits to test the water in their community.

## **Los Altos High School; Los Altos, California**

### *Electric vehicle charging champ*

Los Altos High School (LAHS) has been a public school leader in environmental initiatives dating back to the establishment of the Mountain View-Los Altos Union High School District's Sustainability Task Force in 2009. The task force sought to develop policies and plans to decrease the district's environmental footprint and to enhance environmental education. The group developed goals focused on

purchasing policies, energy conservation, recycling, transportation, and a facilities plan to support the solar panels now on the LAHS campus. This effort built upon and strengthened activities at the site level and created momentum for other subsequent efforts around the school.

All stakeholders are invited to lead green school efforts at LAHS. Passionate and well-organized students run the school's green team and work in collaboration with parents, teachers, and administrators on the PTSA Go Green Sustainability Committee (GGSC).



*Los Altos High School students plant trees with community nonprofit Green Town. Partnerships with local nonprofits and the city have enriched sustainability learning and helped the school achieve environmental impact reduction goals.*

In 2017, LAHS built a LEED Gold-certified classroom building to accommodate for enrollment growth and replace portable classrooms. The area is xeriscaped and includes bioswales that limit surface runoff to storm drains and return rainwater to the aquifer. The building features an HVAC automatic shutoff whenever windows and doors are opened. Solar panels on the roof provide all of the building's energy needs. Each year, 180 AP environmental science students tour the LEED

building to learn about the measures the school has taken. In the classroom, students study the U.S. Green Building Council's guidelines for LEED certification. For the last 11 years, LAHS STEAM Week brings over 1,000 students together to learn from industry experts in STEAM fields, with one day dedicated to student choice. Since the opening of the LEED building, tours are conducted for all students during the STEAM Week choice day.

LAHS has been certified as a Santa Clara County Green Business since 2010. This certification reflects the school's ongoing progress in reducing energy use, following sustainable and green purchasing policies, reducing water use, reducing transportation greenhouse gas emissions, preventing water and air pollution,

implementing green health and safety practices, and excelling in the management and disposal of hazardous and electronic waste.

Clean energy is a priority for LAHS. The school receives 100% clean electricity obtained from wind, solar, and hydroelectric sources from Silicon Valley Clean Energy. Solar canopy panels provide approximately 55% of the electric needs of the campus, and rooftop solar panels supply energy to the school's LEED Gold classroom building. LAHS uses on-site battery storage units to balance load and cut peak energy demands during the day. In the first year of operation, the battery storage system saved \$83,000 in reduced utility bills.

LAHS engages in multiple strategies for reducing waste and documents a 60% diversion rate from recycling and composting. The LAHS Green Team brings the school's rolling composter directly to the quad area to collect food scraps from students at lunchtime. LAHS has removed plastic straws and Styrofoam section plates in the cafeteria, applies green practices to fundraisers, and reuses such materials as caps and gowns, prom dresses, and banners for school functions whenever possible. Additionally, the GGSC provides reusable dinnerware to school groups for large events.

Reducing environmental impacts from transportation is a priority for LAHS. The school installed 29 level 2 EV charging stations and a level 3 fast charger. Teachers and staff use the chargers at no cost. The stations are available for public charging after school hours and during school breaks at normal rates. After the successful installation and implementation at LAHS, 10 neighboring schools in Los Altos requested information and installed similar systems.

LAHS reports 26% of their commuting group rolls (i.e., bike, scooter, skateboard) to school every day. The LAHS Green Team, administration, and student government created a policy that helps to limit the number of students who drive to school by limiting parking permits. The school provides eight dedicated carpooling parking stalls, as well as several storage options for bicycles and skateboards around campus. Members of the LAHS Green Team met with the city's Complete Streets Commission to lobby for changes to bike and pedestrian routes to school, which led to the first stage of improvement occurring in the summer of 2020 and plans for additional changes that would prioritize bike and pedestrian routes over cars and parking. Since 2014, these policy changes and programs have led to an 58% increase in students biking to school and a 20% reduction in the number of students receiving parking permits.

The student services coordinator works with student government and other leadership groups, as well as staff committees and student clubs, to implement

programs to increase student and staff wellness. Each quarter, students enjoy such activities as yoga in the quad, service animals on campus during finals week, messaging through social media and on-campus avenues, and support for mindfulness activities during class time. An innovative physical education curriculum emphasizes personal health and fitness that includes options for yoga and jazz dance. The school's weight room and pool are open to teachers before and after school when there are no athletic events. The Green Team emphasizes wellness activities on Earth Day and promotes the cafeteria's Meatless Monday every week.

Several required and elective courses at LAHS focus on environmental issues through the lens of their specific discipline. All science courses at LAHS have units that focus on relevant environmental issues and offer hands-on learning opportunities. The chemistry courses at LAHS have an annual BioDiesel project, in which students learn about resource conservation and renewable fuels. In 2017, biotechnology and AP environmental science students went to Stevens Creek Reservoir/Park in San Jose to study water quality. AP environmental science students analyze and determine plant species on campus, use solar panels to measure solar energy efficiency, and measure outdoor and indoor air quality using air quality monitors. Other science classes have taken field trips to tide pools in San Mateo County. The AP biology class has visited Año Nuevo State Park to learn about elephant seals and Elkhorn Slough National Estuarine Research Reserve, where students analyze and examine microorganisms and learn about efforts to combat eutrophication and silting. Physics students study topics in energy conservation and systems efficiency. In AP human geography, a major theme focuses on current land use patterns as they relate to sustainability. There is a strong emphasis on business transactions that impact the environment within the economics course required of all seniors.

The LAHS Green Team, the school's environmental sustainability club, was founded in 2003 with a mission to promote environmental responsibility and sustainability to all LAHS students and the local community through projects and events. The Green Team works diligently to educate students on how they can make more sustainable choices in school and at home. The educational topics presented to the student body include composting, proper sorting and recycling, using refillable water bottles, and clean transportation. The Green Team has a unique partnership with Green Town Los Altos, a citizens' sustainability group. Recent achievements include a school anti-idling campaign and a community e-waste collection event for residents of Los Altos and Mountain View. The LAHS Green Team has organized and hosted an annual Students for Green High Schools Conference since 2013, bringing together over 100 students from 28 schools to share environmental actions on their campuses, learn from highlighted speakers, and work in small groups to plan future actions. Other student-led clubs, such as Biomimicry Club, Sustainable Living Club,

Bee Club, and Ocean Preservation Club, draw attention to environmental issues during weekly meetings.

The LAHS Green Team and GGSC lead a collaborative effort with district administration to implement a ban on the sale of single use plastic bottles on all Mountain View-Los Altos Union High School District campuses. In the fall of 2020, all incoming LAHS freshmen were given metal reusable water bottles to encourage the change. Members of the LAHS Green Team co-authored a District Climate Action Resolution with Citizens Climate Lobby, which was adopted by the District Board of Trustees in June 2020. The resolution includes the creation of a district-level Climate Action Committee to ensure ongoing sustainability actions. The district has extended efforts in this area by sharing the resolution as a model for others across the state.

## **The Nueva School; Hillsborough and San Mateo, California**

*A tale of two campuses*

Since its founding in 1967, The Nueva School (“Nueva”), an independent preK-12 school serving gifted learners, has emphasized environmental education and awareness. The school has a current enrollment of 955 students; the Hillsborough campus serves lower and middle school divisions, and the San Mateo campus serves the upper school division. The Hillsborough campus offers nearly 34 wooded acres for environmental exploration, gardening, nature immersion, and studies of ecological systems. In contrast, the San Mateo campus reflects a sustainable urban design and features easy access to public transit.

As the school grew, Nueva added new campus facilities of exemplary environmental performance, including the LEED Gold-certified Hillside Learning Center in 2007, the first LEED Gold K-12 building in the country, and the winner of the 2008 American Institute of Architects Award for School Design and Sustainability. The Hillsborough campus recently completed additions, including a LEED Gold Environmental Center and an expanded café. In 2013, Nueva built the upper school campus in San Mateo, which is entirely LEED Gold certified.

Both school campuses feature a view of nature from their classrooms. The Hillsborough campus has a substantial urban forest, and the San Mateo campus has an extensive green meadow, xeriscaping, and trees. Both campuses have several outdoor classroom spaces. As part of the school’s COVID-19 school reopening plans, outdoor spaces have been mapped and emphasized as learning spaces that afford COVID-19 safety and opportunities to be outdoors surrounded by nature. At the Hillsborough campus, outdoor tented spaces and newly designated forested

areas are available. At the San Mateo campus, most classrooms have a retractable wall leading outside. Teachers are encouraged to leave the wall open to allow access to the outdoors and to maximize airflow.

The school's operations team continuously works to reduce its environmental footprint by increasing efficiency, avoiding toxic materials, and using low-carbon technologies. Programmatic sustainability practices include eliminating single-use plastics and creating a three-



*The Nueva School's Hillside Learning Complex was the first LEED Gold K-12 building in the country and the winner of the 2008 American Institute of Architects Award for School Design and Sustainability.*

stream waste disposal system. The school features high-efficiency faucets and toilets, drip irrigation and xeriscaping, green roofs, and solar photovoltaic systems that supply an estimated 22% of Nueva's total electricity needs. Both campuses have EV charging stations — six at Hillsborough and eight at San Mateo.

A healthy campus environment is further supported by avoiding synthetic pesticides, using nontoxic cleaning supplies, ensuring sufficient ventilation and daylighting, and purchasing nontoxic chemicals for chemistry, biology, and other classes. Healthy, nutritious school lunches and daytime snacks are provided on both campuses, using locally sourced, organically grown, and nourishing ingredients.

Students study waste reduction strategies in many contexts, specifically in preK, kindergarten, and sixth and eighth grades. Kindergarteners do a full study on plastic trash, collecting a week's worth of plastic trash on campus, sorting and counting items, and developing a presentation and communication strategy for the entire Hillsborough campus. In 2020, upper division students made their campus free of paper cups by switching to reusable mugs, carried out a waste audit, and piloted several zero-landfill events.

Nueva performs air quality monitoring using four Air Quality Egg sensors. Students use the air monitoring data as the primary data source for a multiweek project that investigates how to interrogate datasets and find statistically significant relationships in environmental data. Students approach this project with substantial choice — one student might study the variation in a pollutant from one part of campus to another, while another might study a different pollutant, or its variation over time, or how it compares indoors versus outdoors. Air quality monitoring is part of regular campus environmental, occupational health, and safety monitoring shared with all constituents. The data gathered supports measures to improve air quality (e.g., no idling, carpooling, active modes of transportation).

Part of Nueva's mission is to share best practices and foster innovation. As such, the school hosts the Innovative Learning Conference (ILC) every other year, most recently in October 2019. The ILC drew more than 1,000 attendees, and 2019 saw the successful addition of an environmental track with presentations and workshops on healthy, sustainable school lunches; environmental curriculum design; and activism on climate change. Every year in January, upper school students further expand their knowledge and pursue their passions during a four-day intersession offering more than 200 "learning and doing" opportunities. These academic year opportunities are complemented by a summer internship program that matches approximately 60 students with workplace learning opportunities in a broad range of fields, including local environmental nonprofit organizations, the City of San Mateo's sustainability group, and a venture capital firm focused on the climate crisis.

The school provides students with a wide variety of experiences to develop pro-environmental dispositions. Nueva's uniquely designed educational travel program — from local trips in San Mateo County to ecological field work in Costa Rica — provides students with extensive opportunities to study environmental systems and their connections to culture, language, history, and local economies. In the classroom, the interdisciplinary preK-12 curriculum emphasizes the many ways that humanity depends on nature. Students hike and maintain trails in P.E. class, study the economics of environmental issues, explore environmental justice and equity issues in political science and government, and apply ecological philosophies in ecological humanities. Students act on their learning by representing environmental arguments at the annual Model United Nations gathering in New York and supporting environmental actions through voluntary and school sponsored community engagement activities. For example, students in the Environmental Club researched the topic of fossil fuel divestment, convened stakeholder group meetings, and presented findings to the school board to engage their support.

Approximately 36 students in the middle and upper grades advocate for environmental issues through several clubs, including the Environmental Society



and the Environmental Club. The Student Council's campus steward, an elected student position charged with advocating for and advancing campus sustainability, works with the Nueva administration and faculty to green the school through project-based efforts, such as eliminating paper cups, encouraging fossil fuel divestment, designing living walls, and providing sustainable food options.

In 2019, Nueva launched a new Environmental Citizenship (EC) Program, recruiting a director and assistant director. The new staff developed an EC definition, formulated the programmatic premises and principles for its work, and created a preK-12 Macro Curriculum Blueprint. The program has developed a three-year strategic plan to advance environmental citizenship and created a campus sustainability document detailing specific opportunities in the areas of energy, water, waste, food, procurement, and campus culture. The program's new home is the Environmental Center at the Hillsborough campus, completed in January 2021. The EC staff have also created courses, including Climate Change Science & Solutions, Environmental Earth Science, and Changing Global Health Dynamics.

In the fall of 2020, the lower school piloted a new Environmental Citizenship Ambassador program, including a new part-time role for a teacher who is skilled and passionate about creating and integrating environmental learning across the curriculum. The EC staff partner with faculty and administrators on curricular additions, refinements, and innovations, while also building regional networks of sustainability educators and coordinators to scale efforts. A first weeklong curriculum design workshop held in summer 2020 convened 17 teachers from all divisions and a variety of disciplines. The EC program also supports curriculum-adjacent activities, particularly the meaningful and consistent integration of ecological learning and performance criteria in Nueva's trip program, student mentoring in clubs, and individual projects.

## ***District of Columbia***

### **D.C. Bilingual Public Charter School; Washington, D.C.**

*Multicultural, multilingual, and sustainable*

Founded in 2004, D.C. Bilingual Public Charter School (DCB) provides an innovative dual immersion Spanish and English learning program for all students, regardless of their home language. Through rigorous academic curricula; comprehensive arts, technology, and athletics programs; and celebration of diverse cultures, DCB students learn the skills and values they need to become influential participants in their community. DCB serves 478 students from PK3 to fifth grade. Eighty-four

percent of students identify as minority, 50% of families are eligible for free and reduced-price lunch meals, and 40% are English language learners.

DCB is unique in establishing a Department of Food and Wellness with the intent to coordinate personal and environmental awareness across every department in the school. Wellness is key to the core elements of the school strategic plan, in particular to building resiliency and life skills for the community. This department uses the ASCD Whole School, Whole Community, Whole Child model to collaborate with the entire school community in supporting holistic wellness. The department oversees the school nutrition program, manages culinary and gardening education, and maintains the 7,000-square-foot school garden.

Additionally, it partners with the Operations Department to ensure sound environmental health practices in building maintenance and operations. The DCB community has adopted new environmental practices, especially since moving to a renovated building in 2016. The building was older and in need of repairs when the school moved in, and DCB raised funds to renovate the building and update technologies to reduce impacts on the environment.

Some of the improvements to the campus include a total renovation of the HVAC system to increase efficiency, updated lighting and electrical work, and an additional permeable surface in the parking lot with receded rain gardens. The new HVAC system is a rooftop unit with MERV filters that continuously and efficiently circulates fresh air into the building. Each space has its own heating and cooling control panel, and motion sensors also help to reduce energy use. New water fountains were installed throughout the building with no-touch bottle filling functions. Sinks in all bathrooms operate with motion sensors. The water filters are checked and changed twice a year. The renovation of the building was significant enough to earn a LEED Gold rating.

DCB's location is ideal for multiple modes of transportation alternatives, including the Fort Totten Metro station (0.5 miles away), which also has a Capital Bikeshare station and four bus stops and is located near the Metropolitan Branch bike trail. The parking lot has been updated to include designated low-emission parking spaces, a bike rack, and ramp.

DCB contracts with outside companies for indoor and outdoor maintenance of the campus, and the scope of work includes several activities for environmental health. The contractors regularly inspect the HVAC system to ensure proper filtering and indoor air quality metrics, as well as inspecting and monitoring areas for mold, moisture, and pests. To minimize indoor air pollution, DCB uses environmentally sustainable cleaning supplies. The grounds of the school are regularly maintained by

an outside landscaping contractor, and pesticides and other chemical treatments are forbidden. In the garden, the school uses IPM practices; it does not apply any insecticides, fungicides, herbicides, or any nonorganic, nonbiodegradable sprays to the space. It also grows specific plants to attract beneficial insects and birds to consume pests such as aphids and mosquitoes.

DCB is fortunate to have abundant outdoor spaces adjacent to the campus, which include a front yard green space, a large school garden, a playground, and a public field. Students, staff, and families regularly use the spaces for recess, outdoor family events, parent-teacher conferences, outdoor learning, and service learning. The Department of Food and Wellness recently partnered with local organization Casey Trees to plant several dozen trees on the school campus and an adjacent field as part of a second grade service learning project to provide shade and habitat for the community.



*Second grade students at D.C. Bilingual Public Charter School plant trees with partners at Casey Trees.*

In the 2019-2020 school year, the cafeteria transitioned to composting all food waste during the preparation and consumption of meals on campus with the Compost Crew company. The school food program, which engages the entire school community, has evolved over time to address waste through plate waste audits, cafeteria and kitchen composting, and the incorporation of recyclable and compostable disposable items. The creation of a kitchen has also reduced reliance on disposable items with the introduction of an energy-efficient dishwasher. Large scale composting is made possible through a contract with a local company that picks up approximately 210 gallons of food waste per week.

Guidance was developed for policies and programming related to environmental health, wellness, health, and nutrition education; staff and family education and engagement is implemented under the D.C. Healthy Schools Act. This legislation provides metrics for each of these areas for every school in the city, and DCB regularly benchmarks, reports on, and sets goals in each area.

DCB is a learning community that ensures high academic achievement for all students in both Spanish and English, fosters leadership skills, and values all cultures. Taking this a step further, DCB offers programming that aims to provide everyone in the school community – students, staff, families, and neighbors – with the tools to succeed and thrive as global leaders. To this end, DCB has, over time, built a comprehensive culture that engages all ages in environmental and sustainability education.

DCB is not just for families and staff; the school shares its building and grounds with the broader community through space access for outside organizations and wellness programming to engage neighbors in culinary and gardening initiatives. Even during the pandemic, when students were learning 100% virtually, DCB served as a key nutrition hub for meals and food distribution, serving over 400 families, and maintained the grounds of the campus for safe outdoor activities for neighbors.

The school garden is a key piece of the success of environmental and sustainability education for everyone at DCB. The 7,000-square-foot garden won the Office of the State Superintendent of Education School Garden Award in 2017. The space is large enough to host a diverse habitat, including a butterfly garden, koi pond, triple-bin compost, vermicompost, herbal sensory garden, 15 raised beds for crops, and 16 fruit and flowering trees. Each year DCB rotates crops that are harvested for culinary and gardening workshops, to be prepared in recipes in the school kitchen and sent home with families at a student-led weekly market.

Students benefit from daily science education in all grades, with hands-on opportunities in the school garden, peripheral rain gardens, and forest. Students cultivate local habitats and develop a deep understanding of human impact on the ecosystem. They also care for a variety of on-campus animals, including a koi pond in the garden, turtles, fish, an indoor observatory beehive, and chickens. Students plant, tend, harvest, and prepare fresh produce through Culinary and Gardening Education classes at every grade level. They also participate in hands-on, exploratory field trips that provide connections between life skills and the environment, including local farms, parks, and nature centers that highlight MWEE.

After-school programming, called “The Hive,” is another opportunity for students to participate in hands-on activities related to the environment and sustainability. Programming prioritizes outdoor education and incorporates nature-based activities. This includes regular field trips to DCB’s local forest, Rock Creek Park; partnerships with outdoor education organizations, such as Urban Adventure Squad; and special guests from the community to teach about caring for the local environment. In the COVID-19 environment, The Hive in-person activities are solely outdoors and mostly



take place as educational hikes through Rock Creek Park with English/Spanish storytelling sessions.

DCB participates in a citywide network of schools working to showcase educational and community engagement ideas. In an average school year, over 100 family members volunteer to sustain the garden, and the school has trained 20 neighbors to use DCB's Department of Parks and Recreation community compost. As the school considers new projects, it remains conscientious of potential partnerships and ways to leverage the strengths of the community into efforts with a greater impact. For that reason, DCB partners with a variety of organizations, including Food Corps, City Blossoms, DC Greens, the U.S. Forestry Service, Casey Trees, Urban Adventures, the Audubon Naturalist Society, Whole Kids Foundation, and The Nature Conservancy.

### **Francis Scott Key Elementary School; Washington, D.C.**

#### *Green gem of the Palisades*

Francis Scott Key Elementary School serves over 350 students in pre-K through fifth grade. The school first opened its doors in 1932 in an area of Washington, D.C., that combines city living with abundant natural resources. Students are within walking distance of the Potomac River, the historic Chesapeake & Ohio Canal, and several national parks. They develop a close relationship with their natural environment.

As one of the first schools to participate in D.C. Farm to School Week in 2011, students started a school garden market for the community that continues today. Partnering with the D.C. Office of the State Superintendent of Education, Key's parent teacher organization, and neighborhood associations, Key expanded the garden to 14 raised beds that support a wide range of vegetables, fruit, and visiting wildlife. In 2013, Key was one of six D.C. public elementary schools chosen to participate in a pilot program for recycling food waste from the cafeteria and garden that became instrumental in shaping the compost pickup program used today.

Key has a well-established Staff & Parent Green Committee tasked with "spearheading all initiatives with healthy eating, recycling in the classrooms, energy efficiency in the building and organization of composting/recycling in the cafeteria during lunch. The committee works to organize a student group to help with these initiatives, as well as provide ongoing education to staff around healthy eating and recycling." Key's Student Green Team members are a visible, dynamic, and active part of school life, composed of approximately 40 third to fifth grade students who meet during lunch and after school to manage the garden and recycling programs.

In the fall of 2020, energy-efficient upgrades were made to Key’s HVAC systems to increase fresh air filtration throughout the school building via an existing dedicated outside air system and the installation of high-efficiency filters. The D.C. Department of General Services (DGS) performs yearly maintenance, such as confirming registers and diffusers are not blocked, cleaning of air handling equipment, and visual inspection of air distribution mechanisms in walls and ceilings to maintain efficiency over time. Daily inspections are performed by the Key custodial foreman. A wireless platform and a demand control ventilation system help to ensure proper operation of equipment, appropriate ventilation rates, and energy efficiency.

Active in the fight to reduce energy consumption, Key was a participant in the first D.C. Sprint to Savings competition that helped decrease energy consumption at 23 schools by an average of 17% over five weeks, saving the city approximately \$20,000 in 2014. Classroom light switch plates have “Switch Off When Not in Use” labels, and the Student Green Team Energy Patrol monitors the hallways during lunch, making sure unused rooms have lights turned off.

Key is deeply committed to the “4 Rs” of reduce, repurpose, recycle, and r(compost). The Green Team takes the lead in recycling paper, plastic, and organics from classrooms, offices, and food service areas. Each classroom has a labeled scrap



*Fifth grade students release newly hatched American shad fry as part of a D.C. fish restoration project.*

paper station for reusable paper scraps that must be exhausted before new paper can be used. During schoolwide back-to-school and end-of-year picnics, the PTO provides compostable utensils and 5-gallon water jugs to eliminate single-use plastic

water bottles. Key was one of six D.C. public elementary schools chosen to participate in a pilot program in 2013 for recycling food waste that shaped the compost pickup program used today.

Students are encouraged to bring refillable water bottles to school and use them throughout the day in order to help conserve water and eliminate plastic bottle waste. Water filters are installed in all faucets and drinking fountains. Water quality is maintained through valve inspections, the flushing and sanitization of the plumbing system, and annual lead testing by DGS.

Rainwater is harvested via three 560-gallon rain barrels. A bioretention dry stream bed, rain garden areas, planter boxes, bioswales, and permeable pavements were put in place to reduce stormwater runoff. In 2020, the student Green Team built a collection method to measure the amount of water removed from the air during the cooling process that drains out from the HVAC condensate line. They found that, over three hours, a 5-gallon jug could be filled and used to water the garden, giving the school an additional source of water that would otherwise be wasted.

Bike racks are accessible at three entrance points to the school and are typically full. Reduced staff parking availability because of school ground renovations and residential parking constraints has led to increased interest in carpooling and biking to school.

With a pollinator garden and woodland forest, the school grounds are a learning laboratory to explore pollinators, plant cycles, composting, soil sampling, erosion, and habitats. Students use math skills to measure seed spacing and plant growth, make scientific observations when comparing root structures to other plant parts, and connect literacy to the school garden through read aloud and poetry activities. In 2016, the PTO raised funds for an environmental specialist to ensure the longevity of the environmental literacy program.

The outdoor classroom shaded by native trees provides fixed and flexible seating and worktables to encourage individual and group work. There is also a lockable shed for garden tools and supplies, signage, an outdoor whiteboard, a hose rack, various planters, and a handwashing station with a sink that uses water harvested from rain barrels or municipal water. Fourteen raised beds filled with organic soil receive six to eight hours of sunlight per day and have direct access to the science room. A demonstration and digging bed are located next to worktables. An ADA-compliant trail connects the raised beds to the greenhouse that is used during cooler months.

The Student Green Team and environmental specialist helped bring the school community together around a proposal for a school greenhouse, with financial support from the Palisades Community Association. The building was completed by students, staff, parents, and community members in a location visible to the street for all to enjoy.

Key partnered with Slow Food USA's Plant a Seed Program to plant endangered seeds. Students did research and learned how to collect, dry, weigh, and package vegetable seeds to plant for the next season. Applying similar techniques in the pollinator garden, students harvest dried milkweed pods to maintain the monarch butterfly habitat and are now hoping to create their own Key School seed varieties. These experiences demonstrate Key's ability to integrate various curriculum areas, such as science, social studies, English and language arts, and math, with environmental learning and service to the greater community.

The custodial team is trained in green cleaning procedures as well as deep cleaning protocols using EPA-approved cleaning supplies in accordance with Centers for Disease Control and Prevention guidance. Dust control mats are placed at all school entrances to minimize dust from the outside. The Environmental Health and Safety Division of DGS surveys D.C. schools every four years for radon. Building renovations in 2002 included lead and asbestos abatement. Indoor air quality sensors monitor levels of particulates, CO<sub>2</sub>, VOCs, ozone, formaldehyde, temperature, and humidity, and Key uses the Senseware wireless platform to collect data and ensure effective operation.

To help keep allergens at a minimum throughout the school, students created eco-cleaning kits for all classrooms. They tested various recipes for environmentally safe homemade cleaning solutions and researched different types of essential oils to determine their disinfecting value and to prevent the possibility of allergic reactions. Each teacher was given a tub containing refillable spray bottles, white vinegar, baking soda, sponges, lemon oil, and a booklet containing approved recipes.

Science experiments are conducted using natural materials, and all art supplies are nontoxic. Chemical pesticide products are not used within the school building for pest control. Instead, the school has adopted an IPM system that focuses on such preventative measures as sealing cracks and openings, fixing leaks, vacuuming carpets daily, mopping floors, and emptying all trash and recycling receptacles into secured outdoor dumpsters.

The annual Strawberries & Salad Greens Day is organized by Green Team students who display strawberry plants grown on campus, nutritional information, and recipes in the cafeteria. When strawberry and greens smoothies are made, food staff contractors collaborate with students during taste tests by supplementing school grown produce with available fruit and vegetables from the kitchen. Key also participates in the annual Growing Healthy Schools Month with class visits by Olympic athletes, nutritionists, and chefs. Soda is not served at any school functions and vending machines are not available.

School ground renovations in 2012 added a nature inspired treehouse structure with boulders for climbing that provides opportunities for interactive play. A custom-made trolley themed structure representing the history of the neighborhood trolley trail provides a music-making apparatus for imaginary play and sensory stimulation. The gym features a climbing wall.

Key offers upper grades the opportunity to conduct in-depth studies grounded in research and inquiry in a MWEE. Key partners with the Chesapeake Bay Foundation Shad Restoration Project to help raise shad fry from eggs in the classroom. Students monitor water quality, experience the hatching process, and study the shad life cycle. Upon completion, students release the shad fry into the Anacostia River with the hope of restoring the shad population. In addition, fourth and fifth grade overnight camping trips to Prince William Forest Park Nature Bridge in Triangle, Virginia, and Hard Bargain Farm Environmental Center in Accokeek, Maryland, enable students to be absorbed in longer term projects, such as comparing the ecosystem from the farm to the schoolyard at Key.

The ability of Key students to use science to solve real-world problems is evident as they stand on the podium at the D.C. Elementary School STEM Fair every year, including placing first in environmental science and second overall for a Key School cafeteria waste study in 2017.

## **Florida**

### **Christ the King Catholic School; Jacksonville, Florida**

#### *Sowing seeds of faith*

Christ the King Catholic School (CTK) is an urban parish school nestled in the heart of Jacksonville, Florida. Built in 1955, it encompasses over 40 acres, including a creek and marsh area. The school serves 280 students from grades pre-K to eighth grade. Over 57% of students attend the school on a tax credit scholarship from the state, 35% identify as minority, and CTK is classified as a Title I school.

CTK has been pursuing the pillars of ED-GRS for over 12 years in conjunction with efforts to become a STEM school. Through hard work, collaboration, professional development, and self-assessment, CTK has developed and sustained a STEM/STREAM (science, technology, religion, engineering, arts, and math) program that led to the school's STEM accreditation. CTK became the first Catholic school in Florida to achieve this honor.

Over the years, CTK has enlarged spaces for STEM collaboration, built outdoor areas for gardening and observation, and developed a comprehensive agricultural program. The school partners with Notre Dame University, local biomedical manufacturing production facilities, the University of Florida extension service, Project Learning Tree, the University of North Florida, and Tree Hill Nature Center. Today, CTK offers mentoring and tours to staff from other schools, who visit to learn how to incorporate hands-on learning into their curriculum.

Through annual Green Apple Day of Service (GADOS) projects and with financial support from the community, CTK has developed a five-acre outdoor classroom with a viewing deck and nature trails, a 700-square-foot raised bed garden, a water recovery system, solar panels, butterfly gardens, a chicken coop, and a blueberry house. Each GADOS project day involves as many as 100 volunteers. In 2014 and 2019, CTK won the Center for Green Schools at the U.S. Green Building Council's Green Apple Day of Service Project of the Year.

Middle school students tackle different challenges each year to improve the school and surrounding community as part of the STREAM curriculum. One recent project involved making improvements to the landscaping around AC systems to help improve AC efficiency. Students considered the proximity to the chicken coop as well as a solution for the water runoff from the AC units. Students removed overgrowth that was hindering the efficiency of the AC system and replaced the area around it with granite to reduce the possibility of overgrowth. After consulting with a landscape architect, they added high water use plants to help with the condensation drainage from the AC that was causing erosion around the water recovery system. They also used saltwater to minimize the growth of plants around the AC units.

Students collect organic matter for composting, manage vermicomposting, and utilize recovered rainwater for agricultural purposes. The school board supported energy savings by switching HID lights to LED lights in the gymnasium as well as replacing all AC thermostats with programmable ones. The school is gradually replacing all of the 1960 windows and 1987 AC units with newer, more efficient models.

CTK installed two solar panels connected to the school's electrical grid. Students monitor energy output on their iPads and do research on the effects of weather and panel placement on energy production. Eighth graders built a water recovery system with the help of University of North Florida students majoring in construction to save rainwater for irrigation use on the school's gardens. Timed well watering for the gardens and landscaping also help to conserve water.

The Family School Association (FSA) supports a student-led initiative to replace old water fountains with new water bottle refilling stations. Middle school students completed research during an oceans and waterways project, prepared a budget, did an analysis of the impact of limiting disposable bottles on campus, and made recommendations to the FSA and the principal. Their fundraising efforts resulted in the replacement of all seven water fountains and led to a significant decrease in the use of disposable plastic on the campus, with plastic water bottles no longer available for sale.



*Christ the King Catholic School fifth grade students are part of the University of Florida Extension Service's Junior Master Gardener program. They meet weekly with two master gardeners to plant, harvest, and maintain the school gardens.*

A grant enabled CTK to employ a full-time guidance counselor. P.E. classes are offered three days a week, up from the two weekly classes in the past, as a result of a change to a longer school day. This is in addition to a daily recess after lunch for elementary school students. Jump Rope for Heart and fun runs promote health while fundraising.

CTK offers a salad bar that serves as an integral part of its agricultural program and developed its own nutrition curriculum. Second grade

students take field trips to a local cooking studio, learn how to follow recipes, and come to appreciate healthy food options. Field trips to the extension service canning facility are planned to support making canned foods from school garden harvests. Several grants have enabled CTK to update aging garden beds from wood to stone, and a new 4-H Club reinforces agricultural learning during the school day.

Using the creek, wetlands, and acreage to its advantage, CTK fosters opportunities for students to test water quality and to learn about natural springs and creeks and how St. Johns River feeds into the Atlantic Ocean. A nearby creek is uniquely spring fed and tidal because of its proximity to the mouth of the St. Johns River, and this provides numerous connections for students to make in their science lessons. Under

the leadership of the St. Johns Riverkeepers, students go weekly to test water salinity, turbidity, and contaminant matter in Strawberry Creek. Students visit the Marine Science Research Institute at Jacksonville University and learn about the ways that several organizations work to protect the ocean and waterways.

The kindergarten program features a yearlong study of butterflies. Students propagate butterfly food and tag the butterflies as part of a national butterfly migration study. The school was designated a Monarch Butterfly Station in 2016. Kindergarten students learn about the life cycle of the Monarch butterfly, the importance of pollinators, and the effects of environmental contaminants on them. They participate in an engineering project in which they create “hand pollinators” for the milkweed plants.

Students learn to advocate for themselves and those less able to do so by interacting with the nearby L’Arche Community of severely disabled adults on the parish campus. Students provide fresh foods from school gardens for the residents. They also plan and execute a nutritionally balanced dinner party for the residents and staff that meets dietary restrictions. The seventh grade Seeds of Faith Program helps to oversee and market school agricultural products benefiting the L’Arche program and the school salad bar.

## Illinois

### Wheaton Christian Grammar School; Winfield, Illinois

#### *Teaching care of all creation*

Wheaton Christian Grammar School (WCGS) features a geothermal energy system that allows 73% of energy needs to be met on-site, funded with help from the Illinois Clean Energy Community Foundation. The building also features energy-efficient glazing and insulation, LED lights in the parking lot, and motion sensors in all interior classroom, office, and bathroom lights. Not satisfied with an efficient building, WCGS continues to track resource use on multiple platforms.

Low-flow toilets and an on-site well that is used to irrigate the community garden and soccer fields conserve water. WCGS has organized a Walk4Water event each of the past five years, sponsored by SMART2bfit, to bring awareness to the need for clean water throughout the world, raising \$8,317 for this initiative. With these funds, SMART2bfit has built three wells in Tanzania and four wells in India.

Forty-one percent of the 34-acre property was set aside for natural wetlands, stormwater management, habitat development, and instructional use. WCGS has

installed two water bottle filling stations, a student-decorated rain barrel that collects water for the 300-square-foot community garden, and a 300-square-foot pollinator garden. The STEAM program maintains an indoor tower garden for instructional purposes.

Student involvement is a critical part of waste management. During 2019-2020, the school's Creation Care Club (C<sup>3</sup>) collected 250 pounds of bottle caps and raised money by selling sustainable products, such as reusable straws, bamboo spoons, and bamboo forks. These funds and caps were used to obtain a blue Bottle Cap Bench for WCGS. During the 2019-2020 school year, the Robotics Team and C<sup>3</sup> worked on limiting landfill contribution by holding zero-waste days. On these days, WCGS saw a 60% decrease in garbage, a 50% increase in compost, and 41% increase in recycling. The Robotics Team created new signage for all the recycling and garbage bins in the school, over 100 bins. They also had a "Limit Landfill Litter" themed month in November 2019 and made daily announcements at lunch about different ways to reduce waste. The Robotics Team presented their research and "Limit Landfill Litter" project at their regional qualifier and state competition.

Repurposing wood pallets, WCGS built four compost bins near the community garden and added a space to share untouched, wanted, or needed food at lunchtime. A worm bin in the STEAM Lab helps lunch scraps to decompose. The School & Community Assistance for Recycling and Composting Education nonprofit organization has conducted two workshops with WCGS faculty and staff.

No-idle signage adorns student pickup locations on campus, and information about this practice is shared with the WCGS community through the school newsletter. Fifty-four percent of families carpool with more than two students per car. HVAC filters are changed quarterly, along with other steps on a comprehensive building maintenance checklist. Green Seal certified cleaning products are used to minimize toxic chemicals. Cleaning and disinfectant concentrates are stored at a no-touch chemical dispensing center for ready-to-use spray making bottles; dispensing is recalibrated to minimize waste, and the solutions are water-based for safe handling. An IPM program is in place. Animals that can trigger asthma are not permitted in the building.

Annual, free flu shots offered by DuPage County are administered to the faculty and staff by two school nurses. The nurses also support teachers by providing information for lessons on personal space, respect of person, diet, exercise, emotions, mood, attitude, hygiene, health, wellness, human growth and development, substance abuse, relationships, and viruses and bacteria. WCGS nurses also started a health week, creating lessons for teachers to use in their classrooms. A school social worker facilitates social and emotional training for staff,

teaches social and emotional lessons across grade levels, and meets regularly with new students and students needing services, including counseling. A Student Health Services Team meets biweekly for student advocacy and care.

Junior high students participate in C<sup>3</sup>, which meets twice a week. Students maintain, plant, and care for the tower, bee, and community gardens. The club also helps plant bulbs near the main entrance of the school, reseeds the prairie, picks up garbage near waterways, helps teach younger students about creation care, and supports the recycling and composting program at WCGS. The Parents Auxillary supports C<sup>3</sup> by providing seeds, plantings, and other materials that are needed to care for the three gardens.

Students in grades three to eight participate on the Project Council, where they collaborate, design, and maintain sustainable projects that benefit the well-being and learning environment at WCGS. The Council has planned and designed an aquaponics garden.

The STEAM Coordinator works with teachers at every grade level by promoting environmental literacy and sustainability. STEAM instruction includes recycling, composting, urban and rural gardening, and growing the aeroponic tower and community

gardens. In sixth and eighth grade, students learn about renewable energy sources, hydroelectric power, solar panels, and wind turbines. C<sup>3</sup> goes on an annual field trip to the school's geothermal supply room to learn about this energy source. Other field trips include Cosley Zoo, The Morton Arboretum, Kuipers Apple Orchard, Brookfield Zoo, Klein Creek Farm, Blackberry Farm, Shedd Aquarium, a three-day outdoor



education program at Camp Timber-lee, Lincoln Marsh, Pottawatomie Park, the City of West Chicago Regional Wastewater Treatment Plant, Whole Foods, Fermi National Accelerator Laboratory, Northside Park, and a two-day outdoor education program at Covenant Harbor Camp.

## Indiana

### Discovery Charter School; Porter, Indiana

#### *Place-based dunes learning*

Discovery Charter School (DCS), a Title I school in Porter, Indiana, which comprises about 60 staff and 475 students in grades K through eight, was founded in 2010 as the result of effort by a group of families who wanted a school that incorporated place-based education for their elementary school-age children. Place-based education is an educational approach that emphasizes engagement with all aspects of the local community, including the ecological, economic, and cultural environment, to make learning relevant to students' lives and experience and to guide students to develop a sense of community and their place in it.



*Discovery Charter School offered a unique opportunity during the first quarter of the 2020-21 school year for students to come to the school grounds one grade level at a time for a one-hour, outdoor-only, on-site experience, with masks and social distancing in place.*

The school community and stakeholders have worked since the founding of DCS to incorporate sustainable practices as well as place-based education. The school's founders were fortunate to find a location to establish the school in an existing office building adjacent to a parcel of the Indiana Dunes National Park. DCS students have easy access into the eastern deciduous forest by means of a trail that links to the National Park Service's more extensive Glenwood Dunes Trail system. The 14,000-year-old dunes, the forest, wetlands, and old home sites provide a natural laboratory for students to make observations; to explore plants,

animal signs, and water quality indicators; and to learn to care for the land. Students develop a sense of place in these natural areas that become familiar to them as they visit throughout the seasons and over the years.

DCS is committed to improving the natural habitat on the school grounds and to using outdoor spaces to advance learning and contribute to students' mental, emotional, and physical health. Students at recess enjoy a nature play area adjacent to a more traditional play area. As often as weather permits, students dine in an outdoor lunch space with picnic tables, sunshades, and native plantings. An outdoor classroom adjacent to the building allows for outdoor seating and includes a rolling table and chalkboard.

Many of the initiatives for improvements on the grounds were student-led or benefited from student involvement. Outdoor spaces on the campus provide opportunities for students to be outside to eat, relax, exercise, explore, learn, and do authentic work. They contribute to the learning environment, to wellness, and to developing the knowledge, skills, and understanding for students to become stewards of their environment and community.

These grounds include a butterfly garden that has been certified as a Monarch Waystation, beehives and pollinator plantings, bat houses, a rain garden, and a re-seeded grassy playing field that was once barren gravel. The grounds are recognized as a Schoolyard Habitat by the National Wildlife Federation, and the native plantings have been recognized with the Shirley Heinze Land Trust's Bringing Nature Home Award.

DCS's curriculum framework is aligned to Indiana's state standards, with the expectation that teachers will create opportunities throughout the curriculum to connect learning to place. DCS has also adopted standards for each grade level based on the Great Lakes Literacy Principles (Center for Great Lakes Literacy), in recognition of their place in the Great Lakes watershed. As educators teach the standards – across all subject areas – they find ways to incorporate the local environment, take learning outdoors, implement related STEM challenges, make learning authentic, create projects that are interdisciplinary, and incorporate service to the school or surrounding community.

Teachers plan at least weekly field experiences in which students reinforce their classroom learning outdoors on a hike or other outdoor activity on the school grounds or during an off-site learning experience. Students are expected to come prepared for outdoor activities every day. Instruction emphasizes local experiences that reinforce seasonal changes, environmental education, and community exploration. To provide students with in-depth, immersive learning experiences, all

students in fourth grade and above participate in overnight excursions tailored to their age and grade level.

Middle school students have examined energy use, biodiversity, consumption and waste, healthy living, and schoolyard habitats through the National Wildlife Federation's Eco-Schools USA program, most recently earning a Silver Award for the school. Several middle school classes have used the Earth Force framework to identify problems in their community and to devise and implement solutions. This interdisciplinary work has led to the installation of beehives and pollinator plantings on school grounds, to improvements to the school's nature play area, and to improvements to a nature trail. Students benefit from taking an active role in choosing and planning a project, from learning from outside experts, and from seeing how their work contributes to the school community. Middle school students also participate in citizen science projects, such as water quality monitoring, and in stewardship projects, such as the removal of invasive plants from surrounding natural areas.

DCS's place-based mission is supported by professional development for teachers, by employing a school naturalist on staff, by maintaining a place-based resource library, and by partnerships with many local education and environmental organizations. The school has offered on-site professional development for all DCS teachers from experts from the Indiana Dunes National Park, the Dunes Learning Center, Illinois-Indiana Sea Grant, The STEM Connection, Chemical Educational Foundation, and others to empower teachers to incorporate STEM, Great Lakes Literacy Principles, the 5E instructional model, and environmental and outdoor learning.

The school naturalist maintains the place-based resource library with field guides, scavenger hunts, picture books, and identification guides for different types of outdoor lessons, as well as tools for outdoor exploration and for authentic work on the grounds. The naturalist also prepares mini-lessons, finds or creates resources for teachers, leads outdoor activities, organizes schoolwide events, serves as a point of contact for community partners, and monitors and maintains garden spaces. Local organizations that specialize in conservation, environmental education, local history, art, and community service are valued partners in providing place-based lessons and in exposing students to potential careers in a variety of fields.

To articulate the guiding principles of care for the environment and the healthy body/healthy mind connection, DCS early on adopted both a culture-of-care policy and a sustainability policy, distributed in the student handbook. The school community – staff, students, families – strives to model sustainable and healthy living throughout the school day and beyond. Healthy eating is promoted for both

students and staff. The school nurse promotes healthy snacks with minimal packaging through a “Nut Safe Snack List” provided each year.

DCS’s water comes from an on-site well that is tested monthly for iron and lead. Furnace air filters are changed regularly to maintain air quality. Pest control is handled by a local company that is “Green Pro” certified. Cleaning products used at the school are reviewed and approved by the school nurse to make sure they meet standards of health and environmental safety.

In recognition of the amount of time students spend outdoors, the school nurse also provides an annual outdoor safety and tick awareness presentation. The school social worker helps maintain a positive school climate where all students know they belong and are a valued part of the community at DCS. Staff wellness is incorporated into DCS’s schoolwide wellness policy, which is reviewed annually. The school principal encourages staff wellness through resources provided in a weekly newsletter, and grade-level team leaders provide regular check-ins with staff on their personal wellness goals.

In the interest of minimizing waste, electronic communication is favored over paper; reusable water bottles, food trays, and utensils are part of daily life; and recycling and composting are a priority. A middle school Recycling Club empties classroom recycling bins, a staff Place-based/Sustainability Committee keeps sustainability in the forefront and proposes improvements in school practices, and a parent-led Sustainability Committee helps implement such things as managing a system to collect and recycle hard-to-recycle items and organizing waste-free lunch contests. The remodeled former office building incorporates motion sensor lights and water bottle refilling stations.

A no-idle policy and signage are in place to protect air quality. Parents are encouraged to carpool through a sign-up on a parent Facebook page. The Parent Advisory Committee has organized occasional “walk to school” events, in which students who live too far away to walk to school meet at the nearby Indiana Dunes Visitor Center and walk to school on a trail from that location to raise awareness of the health benefits of walking and the energy impact of vehicles.

During the last quarter of the 2019-20 school year and the beginning of the 2020-21 school year, the COVID-19 pandemic has necessitated changes to the way DCS operates, as teachers have navigated through virtual and hybrid learning models. Throughout the changes, however, some unique adaptations have helped to preserve DCS’s place-based mission. These have included video “hikes” on the trails near the school, weekly outdoor on-site experiences during the fall semester of virtual learning, virtual environmental lessons through the Dunes Learning Center,

and dedicating Wednesdays to place-based assignments for students to do at home, many of which take them away from their electronic devices to engage with their environment and communities.

## Paramount Brookside School; Indianapolis, Indiana

*A center for urban agriculture and revitalization*

Established in 2010, Paramount Brookside is a Title I K-8 public charter school, founded with the underlying philosophy of offering students an unparalleled academic approach and being a transformative force in its Indianapolis neighborhood. Paramount Brookside's Indianapolis neighborhood is within a Federal Promise Zone, due to a 31% community poverty rate. Currently, the school serves 837 students, of which 80% are from families with household incomes at or below the poverty level, 15% receive special education services, and 8.2% are English language learners. Paramount's student population is 47% African American, 27% Caucasian, 16% Hispanic, and 10% multiracial.

The school's education framework and staff have proven to be a successful combination. State testing consistently ranks Paramount among the top public schools in Indiana. Paramount Brookside is a 2018 U.S. Department of Education Blue Ribbon School. The Indiana

Department of Education designated Brookside as an "A" school for six consecutive years, and the Indianapolis Urban League awarded Brookside the School Excellence Award in 2018 and 2019. Additionally, the Education Equality Index recognizes Paramount for closing the achievement gap regardless of family income.

Since its beginning, Paramount Brookside has aimed to be a catalyst for neighborhood revitalization and a model of urban sustainability. Paramount Brookside received the Thriving Schools Challenge Masters Certificate for its green school efforts, the highest school sustainability designation from the City of Indianapolis' Office of Sustainability. Paramount's involvement is evident in the staff's active participation in the neighborhood association, communitywide summits,



*The Paramount Brookside Farm Bee Team*

and cleanups. Annually, Paramount Brookside presents the East Downtown Indianapolis Neighborhood's annual Eastside Games. The weeklong, Olympic-style games include such events as volleyball, bocce ball, horseshoes, dodgeball, table tennis, corn hole, cooking, frisbee golf, hockey, and track and field for all who live, work, or worship on Indianapolis' Eastside.

Paramount Brookside planned the campus to minimize environmental impact and to serve as an ecological principles learning tool. In 2010, Paramount renovated a masonic lodge to become Paramount Brookside School, incorporating energy-saving components throughout the building. All hallway, classroom, and office lights are occupancy activated and hand dryers are motion controlled. Bathroom faucets automatically shut off to conserve water. The heating and AC system thermostats are WIFI-enabled, allowing for whole school indoor climate regulation and adherence to air quality standards. In 2018, the school received funding from the state of Indiana and Indianapolis Power and Light to retrofit more than 600 lighting fixtures to LED in the 74,166-square-foot building, resulting in 69% energy savings.

Held on the Paramount school farm grounds, the TURN Festival (Transforming Urban Neighborhoods) is a yearly celebration of urban sustainability that focuses on farms, food, health, and the environment. A natural outgrowth of the school's work in agroecology, the free event attracts more than 4,500 visitors for exhibits, workshops, children's activities, and demonstrations. Participants attend presentations on beekeeping, family gardening, healthy and kids' cooking, health and lead screenings, and more than 50 interactive displays. Proceeds from the festival's food booth and farm-to-table dinner are shared with the neighborhood association and Slow Food Indy to fund community outreach efforts.

Over six years, the school transformed a desolate and overgrown portion of the campus into a welcoming pocket park for the Brookside neighborhood. After the site's reformation, a collaboration with Keep Indianapolis Beautiful, Reconnecting to Our Waterways, and Herron School of Art culminated in the installation of seven permanent artworks. The park embodies a unique incorporation of the space's physical assets with thoughtful connectivity to the neighborhood and the belief that art is an active component of "place making." Among the Paramount Peace Park's forestry, visitors can view the sculptures at the street level or from two elevated observation decks accessible to everyone via an ADA-compliant ramp. Representatives of the Mayor's Office of Disability Affairs and a U.S. Paralympic Gold Medalist helped dedicate the park on the 2017 National Barrier Awareness Day.

Paramount Brookside's 5.5-acre site includes a working farm, offering students a multitude of learning opportunities. It serves as an outdoor classroom for students

throughout the school year and during Paramount's summer STEAM (Success Through Education Agriculture and Mentoring) program. The available land enabled the school to develop an extensive environmental education program. A staff of three environmental educators support classes, extracurricular groups, and community initiatives, and maintain farm operations for the 3.5-acre farm.

The Brookside Farm has 90 vegetable and 10 herb beds, a seven-variety orchard, a pollinator and native prairie garden, a hoop greenhouse, and a Big Green learning garden. Farm assets include a 2,200-gallon water cistern system, an outdoor classroom, composting bins, a shipping container barn, a chicken coop housing eight chickens, a goat barn, a run for four dairy goats, a two-hive apiary, and a cheese production kitchen. The licensed dairy operation is the basis for Paramount's artisan cheese enterprise. Rain or shine, students arrive before class to milk and care for the resident goat herd. Next, the milk is filtered, pasteurized, and processed into cheese in the on-site cheese kitchen. From start to finish, Paramount middle school students and staff handcraft the cheese. Two varieties of Paramount cheese are available for purchase at numerous Indianapolis retail outlets.

Paramount's STEAM program provides an in-depth work development and summer employment opportunity for 32 middle school students. Each student worker is assigned to a team that, over eight weeks, rotates between farm staff and function. The rotation schedule includes livestock/cheesemaking, garden/farm market, and infrastructure projects/maintenance. Each concentration aligns with Indiana STEM academic and employability skills standards. Student workers are paid \$8 an hour to help maintain the farm and operate a summer farm share and farm market. The school's more than 400 families allow for a meaningful impact on nutrition, quality, and access to healthier eating options for both students and their families. Annually, the farm's gardens yield 2,022 pounds of vegetables, resulting in 10,289 servings. Neighborhood food pantries receive any surplus harvest. Modeled after the Boston Food Project, STEAM continually connects theory with practical, hands-on activities.

Additionally, extracurricular farm activities include Goat and Bee teams and Recycling and Gardening clubs during the school year. The Recycling Club is responsible for a schoolwide recycling program that averts 86,000 pounds of mixed paper and cardboard waste from the landfill per school year. Inside the school building, an Eco-Discovery Center offers additional on-site learning opportunities. The Center's resources include a butterfly hatchery, observation beehive, and a rooftop butterfly garden planted with Indiana native pollinators. Other campus green resources include five grid-tied wind turbines that provide an energy offset of 11%, two battery-based solar light arrays, and a 60-seat electric bus.

Paramount Brookside exemplifies the community school model by blending a consistent and dedicated focus on the community to grow the academic environment. Cross-curricular, project-based learning activities include partnerships with Purdue University, the Indianapolis Children’s Museum, Indiana University, the Marion County Soil and Water Conservation District, the Earth Discovery Center, the Marion County Farm Bureau, and other community education entities. The use of community fairs, neighborhood cleanups, and farm activities promotes students’ civic engagement and combines experiential activities with academics.

Student wellness, nutrition, and family support services are critical school priorities to ensure that students thrive. All Paramount students receive a free, nutritious breakfast and lunch, with an additional 200 students also getting an after-school meal. A partnership with Gleaners, the local Feeding America affiliate, supplies 180 students with weekend meals during the summer. During the COVID-19 campus shutdown in spring 2020, Paramount staff delivered 62,754 meals to students’ households.

Due to several identified risk factors, Paramount students are potentially at higher risk of lead exposure. Therefore, in partnership with the Marion County Public Health Department, Paramount conducts student and drinking fountain lead screenings. Student testing resulted in a 30% positivity rate. By identifying the students exposed to lead, the school can implement ongoing intervention strategies.

Air quality improvements include an upgrade of the air filtration filters from a MERV of 8 to MERV13, installing sensors to monitor indoor and outdoor air quality levels, and launching Idle Free Zones for student drop-off and pickup.

Paramount further demonstrates a commitment to student wellness by staffing two full-time nurses to respond to 5,500 student visits a year, two full-time counselors, and a partnership with Community Health Network to deliver behavioral and sports health care. A collaboration with Easter Seals Crossroads provides student speech, occupational, and physical therapy services. The school’s Family Allies and Community Team staffs an on-site Parent Resource Center that regularly meets with families and organizes monthly parent meetings. With the onset of online learning due to COVID-19, a Paramount counselor produced a series of videos that focus on mental health supports for students. The school promotes exercise and fitness by having daily recess, weekly physical education classes, and an annual schoolwide field day. The emphasis for physical and health education classes is on developing an awareness and appreciation of lifelong healthful activities. Partnering with the city’s professional sports teams, Paramount hosted the Indiana Pacers’ Get Fit, the Indianapolis Colts’ Play 60, and the Indy Eleven’s Goals for Indy fitness programs.

## ***Kentucky***

### **The Academies of Bryan Station High School; Lexington, Kentucky**

*From plastic bottle caps to benches*

The Academies of Bryan Station High School (The Academies) is situated on the north side of the city where rolling horse farms meet urban communities. While focusing on ways to improve water quality in Lexington, The Academies of Bryan Station High School and surrounding community partnered to create a rain garden and outdoor classroom. The project, which was first conceptualized in 2015, involved the University of Kentucky Sustainable Agriculture Program, the College of Education at the University of Kentucky, Lexington-Fayette Urban County Government, the Lexington-Fayette County Health Department, Greentree Plastics, and Bluegrass Greensource. The final product, funded by a grant acquired through the Lexington-Fayette Urban County Government, resulted in a practical outdoor space that is utilized by The Academies and neighboring Bryan Station Middle School.

The University of Kentucky's College of Education staff worked with students to research ways to improve water quality around the city. Students learned about the EPA consent decree, constructed maps of the local watershed, participated in multiple lessons, and tested water quality at Lexmark and the Kentucky Horse Park. These tests included chemical tests, such as nitrogen, dissolved oxygen, pH, and phosphorus, as well as physical tests, such as turbidity and counting populations of macro-invertebrates in the water.

In 2018, The Academies partnered with the University of Kentucky's College of Education in a water quality study that focused on comparing water quality in Lexington to the water quality in Kolkata, India. Students completed a pretest and a posttest regarding their knowledge of concepts related to water. In addition, they completed a series of assignments that led them to complete a research proposal. Afterward, they conducted water quality tests around the city and compared that data to the data in India. This data was used in their final project that summarized their findings.

Bluegrass Greensource has been one of The Academies' partners since the establishment of the rain garden. Each year, through participation in this outreach program, students learn about several important components of environmental education, including solid waste, water quality, and air quality. Students conducted recycling and solid waste audits and visited the recycling center three times, including a virtual tour during the COVID-19 pandemic.

In 2017, The Academies worked with the University of Kentucky's Office of Sustainability to explore ways to increase fresh food accessibility in urban areas. The Empower Ag Kentucky program is a three-component program focusing on sustainability education, community education, and professional development of participating students. The goal is to make students aware of innovation and for them to experience hands-on applications to an aquaponics system. The grant was designed to expose The Academies students to young leaders and mentoring from the University of Kentucky community. Students attended community field trips, including a trip to Food Chain, a large aquaponics system that produces and provides fish and vegetables to local restaurants and food banks. This experience enabled students to build and manage a classroom system. They worked in teams and competed to see which team could maintain and implement the most efficient system.

Another successful initiative has been the decrease of energy and water consumption within The Academies. Students conduct energy audits each month to increase awareness. Over the past four years, energy consumption has decreased by 17%. From 2015 to 2019, the school reduced water usage by 30%. A storm drain mural completed by art students highlights the fact that pollution goes into the storm drain. Three water bottle refilling stations replaced water fountains.

There is no mandate to recycle in Fayette County Public Schools (FCPS). Students partner with custodial staff to educate, inspire, and build an effective collaboration and protocols. In fall 2019, the municipal recycling center stopped accepting paper, a significant setback to school recycling. Despite the loss of paper recycling, The Academies continued to recycle aluminum, cardboard, and glass from classrooms and offices. When paper recycling resumed, it was no longer accepted with the other recyclable products. Paper had to be placed in specific bins around the city. Despite the inherent challenges associated with gathering, collating, and delivering office paper to an off-site recycling receptacle, The Academies students made it a priority. While 85% of FCPS schools (and all other high schools) chose to terminate their paper recycling until curbside pickup resumed, The Academies procured, designed, and instituted "paper only" bins, sorted paper tossed in other recycling bins, and delivered it to the off-site community paper dumpster at a local public park.

The Academies' Green Team collected 400 pounds of bottle caps, resulting in enough recycled material to make two benches using Green Tree Plastics LLC, which manufactures recycled plastic products using 100% recycled plastics. With additional outreach to the community, they accepted bottle caps from a variety of locally owned businesses and entities, collecting another 2,000 pounds of bottle caps that were made into two picnic tables and four more benches.

The high school's Medical Academy and Wellness Committee work together to bring awareness and increased engagement to improve health and wellness. The Medical Academy hosts a health fair for students and community members, exposes students to careers through health-related field trips, and organizes a series of "Med Talks" from individuals in the medical field. Medical Academy students partner with the University of Kentucky Dance Blue Program, which raises money and awareness for childhood cancer research. A student-led club of future health professionals participates in competitions and attends conferences. Students have taken home accolades in physical therapy, personal assisting, and dental science.

Faculty and staff weight loss challenges are implemented annually. Signage depicting walking distances and routes around the school have been added to promote walking and running, and the cafeteria began using local produce. Mindfulness and social and

emotional learning have been incorporated into the school curriculum. After-school workouts are designed so that people at all fitness levels can participate, with activities such as Zumba, yoga, and running.

The building is inspected monthly to monitor for mold, moisture, and leakages. Classrooms are monitored for carbon dioxide and radon levels. All cleaning products and air fresheners are inspected annually, and any product that is not approved is removed and disposed of properly. Environmental science and biology students participate in data collection on light levels, temperature, plug loads, and carbon dioxide levels within the school. Products purchased for school use must be low or no VOC.

### Adopt a Kentucky Tree Certificate



**Bryan Station High School AP  
Environmental Science Class**

Adopted a Kentucky tree  
on 13 - May - 2019

Your adopted tree will provide the following  
benefits this year:

Intercept 4404 gallons of stormwater  
 Reduce 609 pounds of carbon dioxide  
 Conserve 103 kilowatt hours of energy

Learn more @ [ufi.ca.uky.edu/adopt-a-tree](http://ufi.ca.uky.edu/adopt-a-tree)




*AP environmental science students participate in the Adopt a Tree Program.*

All core science classes have an earth and space component. The Academies offers environmental science and AP environmental science courses. Biology classes focus on the human impact on the environment. All chemistry courses complete a project on alternative energy sources, and physics students design energy-efficient homes. Geography classes complete a project on the interactions between humans and the environment. AP human geography includes such topics as sustainable agriculture, human population dynamics, and the history of agriculture and farming. AP world history includes content related to pollution and land usage. Social studies classes study the impact of policy on the environment and humans. English classes conduct a climate crisis study to strengthen students' research and writing skills in conjunction with data on climate change.

Students in AP environmental science partnered with the Adopt a Tree program in 2017 and 2019. Students explored the surrounding area of the campus and chose a tree that they would like to adopt. As part of the program, they measured the diameter of the tree to calculate how much carbon dioxide it removes from the atmosphere. This data continues to be monitored by current students.

## **West Kentucky Community and Technical College; Paducah, Kentucky**

### *Economic, social, and environmental sustainability*

West Kentucky Community and Technical College (WKCTC) is one of 16 comprehensive two-year, associate degree-granting community colleges comprising the Kentucky Community and Technical College System (KCTCS). The college was created in 2003 when Paducah Community College and West Kentucky Technical College consolidated. The enrollment in fall 2019 was 6,389 (2,992 full-time employees), of which approximately two-thirds were part-time students, 22% nonwhite, 54.5% female, and 80% financial aid recipients (including 1,973 who were eligible for a Pell Grant).

WKCTC's commitment to sustainable development and environmental education is found in its mission to foster "a campus culture advancing diversity and inclusion and promoting equity and global responsibility," and values of "economic, social, and environmental sustainability" and "inclusion, equity, respect, and global diversity." Rooted in its two parent institutions, one of which was a teacher training college for African Americans, WKCTC's diversity, equity, and inclusiveness is recognized for providing opportunities for low-income students. In 2019, WKCTC was named the #1 community college in Kentucky by BestColleges.com. The college received the 2020 Excellence in Community Partnerships award from the Kentucky Association of



Environmental Education for its dedication and commitment to environmental education.

WKCTC leadership encourages collegewide environmental and sustainability education efforts. In 2009, the college formed its first Green Committee (now the Sustainability Committee). In 2013, WKCTC developed its first Sustainability Plan, which was updated in 2019 to cover 2020-2025. Starting in 2014, WKCTC leadership has supported American Association for Sustainability in Higher Education (AASHE) membership. In 2017, a biology faculty member was given release time to fill a newly created sustainability project coordinator position, and the college's 20-member Sustainability Committee added student, external community, and administrative leadership members. The college started a sustainability newsletter and created a public sustainability website (Sustainability at WKCTC), providing information about energy efficiency, recycling, living sustainably tips, and an interactive sustainability pledge. An internal intranet site, WKCTC Sustainability, houses college sustainability news, minutes, plans, and external resource links for the college's community.

WKCTC has made strides in reducing its environmental impact and energy costs. The college has solar panels, improved R-values with new roofing, and, most significantly, engaged in two rounds of energy savings performance contracting (ESPC). In 2008, the first ESPC achieved \$1.7 million (nominal) guaranteed energy and water savings. Building on the momentum of the first ESPC's early payoff, the Sustainability Committee formed an Energy Efficiency Taskforce that provided the college's engineering technology students with hands-on learning opportunities conducting energy audits. The students' work informed, in part, a second ESPC in 2014 that implemented (1) a public facing dashboard that communicates the college's energy efficiency and greenhouse gas emissions and (2) a continuous retro-commissioning system via the Kentucky Commonwealth Energy Management Control System. Using the 2014 baseline, from January 2017 to December 2017, about 3,000 metric tons of carbon release were avoided. Similarly, from January 2019 to December 2019, WKCTC saved 3,886,130 kWh and 6,813 kW of electricity; 68,415 CCF of natural gas; and 8,385 Hgal of water.

Waste management, reduction, and recycling were among the first WKCTC sustainability initiatives. Building recycling leaders determine recycling bin locations, coordinate recycling pickup, and engage the college community in recycling. Waste reduction is achieved by reducing paper use through paperless meetings; printer defaults set to double-sided print; and streamlined or paperless business processes for records, travel, time, payroll, and procurement. The Culinary Arts program composts food waste and contracts farmers to compost food and reuse cooking oil. Hazardous waste management is coordinated by a Chemical Hygiene Committee

that develops a chemical hygiene plan. A chemical audit is conducted annually, and a full chemical inventory is maintained online via the Flinn Scientific Chemventory. Science lab faculty are required to complete annual chemical management training.

Enhancing green space on campus is planned through joint activities of multiple college and community constituencies, WKCTC student groups, and an Environmental Education Leadership (EEL) Corps AmeriCorps member. Since 2018, the college has hosted an EEL Corps AmeriCorps member, who is assisting the college to become a certified Arbor Day Foundation Tree Campus USA. The EEL Corps member and human ecology students identify and map trees on the 210-acre main campus. In addition, the EEL Corps member works with student groups, including the WKCTC Phi Theta Kappa, to revitalize a campus nature trail to connect the east and west sides of the college's main campus.

To reduce the college's transportation footprint, WKCTC installed bicycle racks, designated preferred parking for fuel-efficient vehicles, and purchased a hybrid car for the small college fleet. A mass transit bus stop is centrally located on the main campus. During summer months, the college switches to a four-day work week to reduce energy and transportation costs. To reduce student travel, the nature trail is being revitalized to encourage walking, and courses on a three-day schedule were changed to an extended time two-day schedule. WKCTC also offers a plethora of online courses.



*WKCTC students hike in Shawnee National Forest as part of a human ecology class to observe natural systems in public federal lands.*

To ensure a healthy and safe work and learning environment, the college offers small dining and catering services that employ several WKCTC culinary arts graduates and host culinary interns. The Scholar House program provides low-cost apartments with utilities included and affordable on-site day care adjacent to the main campus for students' dependent children. A greenhouse on the



Paducah School of Art and Design campus provides hands-on learning that can culminate in a “Culinary Arts Farm to Table” certificate. To address student nutrition and food insecurity, WKCTC has a campus food pantry. Student clubs sponsor clothing and family care drives.

Health and Wellness Initiatives for WKCTC employees and students provide resources and educational opportunities across a gamut of physical, mental, and psychological health topics. One component of the employee wellness program is the “Stay Well” health engagement program, which encourages faculty and staff to be proactive with their mental and physical health via webinars, newsletters, and personal challenges. The KCTCS Employee Assistance Program provides free counseling and helps employees and their household members with behavior, psychological, and mental health, as well as financial, work-life, and legal issues. Four Rivers Behavioral Health is a private, nonprofit agency located on the main campus that provides outpatient individual and group therapy services to WKCTC students and the community at large. Services are provided at no charge for individuals without a payer source. Throughout the year, Four Rivers Behavioral Health offers free webinars, lunch and learn seminars, and information sessions open to the college community. Health education also is provided through the college’s academic programs, such as culinary arts, nursing, dental assisting/dental hygiene, and physical therapy. The programs have service components entailing community seminars, lunch and learn seminars, free and reduced-cost health screenings (e.g., blood pressure checks), teeth cleaning, or other public services. A University of Louisville School of Dentistry partnership provides student clinical experience and dental services to the community at a WKCTC campus clinic.

WKCTC maintenance and operations staff are committed to the safety and health of the community and implement integrated environmental health strategies, starting with effective cleaning and maintenance. WKCTC uses a building automation system to ensure ventilation systems are properly circulating indoor air and maintaining humidity levels between 30% and 60% to prevent building mold and moisture and to ensure air ventilation meets or exceeds ASHRAE standards. HVAC settings fit actual use schedules. Staff assess buildings, HVAC, duct work, and building foundations on a monthly basis. Committed to providing students, employees, and visitors with a safe and healthy environment, the college became a tobacco-free institution in 2015.

Environmental and sustainability education has the support of the college president and other executive leaders, some of whom (vice president of operations, vice president of workforce development, director of diversity and inclusion, and coordinator of student life) serve on the 20-member Sustainability Committee. To ensure faculty and staff are growing professionally and personally and to promote

collegiality, sustainability-related professional development is offered via lunch and learn seminars, health walks, all-day in-service sessions, and workshops. In 2019, the sustainability coordinator led a professional development session to educate faculty and staff about environmental and sustainability activities occurring across the KCTCS system and to identify opportunities for WKCTC in the areas of operations, academics, awareness, and planning. Results were compiled and used to develop the college's Sustainability Plan 2020-2025.

Using AASHE protocols, faculty identified approximately 100 WKCTC courses in over 50 subjects that are sustainability-focused or sustainability-related. Some courses, both within and outside the STEM fields, use environmental education assignments as the assessment measure. As a participant in the American Association of American Colleges and Universities Liberal Education and America's Promise initiative, many of the college's general education courses have personal and social responsibility learning outcomes. In 2019, a sustainability module was implemented into the mandatory First Year Experience, allowing students to do career exploration using online geospatial "Story Maps" that describe environmental, economic, and social sustainability. Two pathways have been created in collaboration with Murray State University (MSU) for WKCTC students wanting to transfer to MSU. One pathway is environmental science and the other is sustainability, both in the Earth and Environmental Science Department. Some technical programs incorporating sustainability learning outcomes include business, early childhood education, automotive technology, culinary arts, advanced manufacturing, AC technology, health, occupational therapy, marine technology, and engineering technology.

Many WKCTC classes and activities provide students with opportunities to learn about sustainability. Programs, such as culinary arts, nursing, dental assisting/dental hygiene, and physical therapy, have service components. An ecology course requires students to do water sampling and data evaluation for the Kentucky Division of Water Watershed Watch program. Examples outside the classroom include field trips, nature hikes to study natural systems, and trips to build environments to learn about alternate energy and energy efficiency. Independent studies give individual students semester-long environmental education analytical opportunities using scientific method topics. Student extracurricular opportunities and student groups are instrumental in developing and implementing environmental and sustainability educational opportunities at the college.

Community involvement and family engagement are central to the college's mission. The college invites the community to Earth Week and Campus Sustainability Month initiatives. The annual Earth Week observance culminates in an Earth Day Celebration, where local, state, and federal agencies; nonprofits, and WKCTC

faculty, staff, and students exhibit, engage, and educate attendees about the environment. In October, Sustainability Month activities promote environmental stewardship awareness and engagement.

## ***Louisiana***

### **Southeastern Louisiana University; Hammond, Louisiana**

*Decades of restoring the wetlands with reused Christmas trees*

Southeastern Louisiana University is a public institution that sits on approximately 365 acres and has an enrollment of some 15,000 students. The university's mission is to lead the educational, economic, and cultural development of southeast Louisiana. Southeastern makes a conscious effort to promote sustainable practices. This commitment is evident across campus from the presence of solar panels, water bottle refilling stations, recycling campaigns, and its newest residence halls. These geothermal residence halls have reduced greenhouse gas production by 58% annually and have saved the university \$107,000 since they opened in October 2018.

Physical Plant staff can view and control the HVAC performance in most buildings on campus, thereby reducing energy consumption and generating significant savings. An online dashboard in the facility control system displays energy use and savings information so that visitors can observe the system's benefits firsthand. Physical Plant staff also offer STEM educational outreach programs to nonacademic departments and the local community.

Southeastern constructed a Sustainability Center in 2010 that utilizes a geothermal pond loop system to heat and cool the building. Through its sustainable energy design, the Sustainability Center has generated over 34.88 MW of energy with its photovoltaic panels since 2012. Additionally, Southeastern has five solar thermal systems around campus that have a capacity of 200,000 BTU per day. These renewable energy initiatives are an integral part of Southeastern's plans to be 50% off the power grid by 2030.

In an effort to make recycling as convenient as possible on campus, Southeastern has a single-stream recycling program. Green recycling bins are located on most floors of campus buildings, and there are 60 blue outdoor recycling bins on campus to collect recyclable materials. Southeastern recycled 47 tons of waste in 2018 and increased the amount recycled to 48 tons of waste in 2019. Campaigns initiated by the Sustainability Center, such as "I Choose to Reuse," educate and engage

Southeastern's community to reduce its single-use plastic bottle consumption. As of November 2020, Southeastern had 88 water refilling stations across campus. Southeastern's Lion Traxx shuttle bus service is provided free of charge to all students, faculty, and staff.

One of the most sustainable places in the Sustainability Center is the Environmental Education Development (SEED) Outreach Center, a classroom powered by solar photovoltaic panels and heated and cooled by a geothermal system. The center also has an operational power generating wind turbine, a solar thermal system, and an electrical charging station. This room was designed consistent with LEED certification requirements. Each classroom has displays for the alternative energies utilized in the building, as well as an interactive 3D model of passive solar, called a heliodon.

The Center offers diverse learning opportunities for students of all ages in the areas of renewable energy, recycling and waste reduction measures, plant biology, and other sustainable technologies. The Center has become a popular field trip for students in local K-12 schools, through its STEM outreach programs and the North Shore STEM Coalition. As of 2020, the Center had offered 136 individual and group tours and welcomed over 1,500 student visitors in just two years. The center's staff are actively involved in community outreach programs, such as STEM Cafe, First Lego League Science, and environmental education at local schools.

Another sustainable element and educational tool for Southeastern students and the community is the SEED Center's aquaponics system. Located in its own greenhouse at the Sustainability Center, the aquaponics system has been constructed and is scheduled to open to students in 2021. This project is intended to provide further education in sustainable living and the sciences.

The Recreational Sports and Wellness Center (Rec Center) offers students and community members numerous opportunities to stay physically active. The Rec Center provides free weights; fitness classes such as yoga, Pilates, spin, and tai chi; fitness machines; and intramural sports for students. The University Counseling Center (UCC) provides a multitude of services, including consultation; workshops; counseling for individuals, families, and couples; psychoeducational, support, and therapeutic groups; and 24/7 emergency on-call services. In September 2019, the UCC launched "Lion Up Recovery," which is the state's first Collegiate Recovery Program, designed to help students maintain their recovery from addiction and refocus on academics.

Southeastern's dining facility, The Mane Dish, plays an important part in the health of students. A team of dedicated managers and chefs at The Mane Dish work with

individual students with dietary restrictions, through its True Balance dining station. This dining station serves food without common food allergens, providing safely sourced, healthy meals for those who suffer from allergies. In addition to healthy options, The Mane Dish also provides monthly environmentally sustainable eating and waste reduction campaigns. These campaigns include Weigh the Waste, which demonstrates how much food is wasted on a specific day, and Root to Leaf, which is



*Executive Chef Mason Garcia serves food from the Root to Leaf station at Southeastern Louisiana University's Mane Dish cafeteria.*

a series of meals prepared with edible but often discarded parts of vegetables. The Mane Dish's incentive behind these campaigns is to introduce sustainability practices and reduce waste while also encouraging healthy consumption habits.

Southeastern is home to the only student-run farmers market on a college campus in Louisiana. The student environmental club, Reconnect, organizes several farmers markets each semester, held in the university's student union. The events feature food sales from area farmers, arts and crafts, and vendors. Reconnect participates in the Real Food Challenge, a national effort among college students to promote the use of locally grown, healthy, and sustainable food. The student-run group educates the campus community about environmental and sustainability issues while connecting with other student groups, both internal and external to Southeastern, that share common goals.

The campus community garden is also managed by Reconnect and community participants. The garden is located at the Sustainability Center and was implemented to produce food for the local community as well as to be an educational tool for local youth. An on-campus food pantry has been in operation since 2013, to address the issue of food insecurity. On average, 3,500 food items are taken by some 400 students who visit the pantry each month.

Southeastern avoids campuswide pesticide applications in landscapes and grounds to minimize chemical exposure to students, faculty, staff, and guests. Pest control is localized for specific pest prevention, and chemicals are stored in locked sheds throughout campus to ensure safety. Indoor air quality, ventilation, cooling, and heating measures for all campus buildings are monitored to maintain the comfort and well-being of students, faculty, and staff. The use of tobacco products is prohibited on all university property.

All buildings are equipped with ultraviolet lights and/or air purifier systems to continuously purify air by killing mold, bacteria, and viruses. The ionization process also reduces allergens, smoke, and static electricity, as well as controls odors and other particles in the air without creating ozone or any harmful byproducts. An ongoing surface contaminant sterilization system, vaporized hydrogen peroxide (VHP), is employed to continuously disinfect surface areas in a room, as well as reduce airborne pollutants that bond with the VHP molecules.

Southeastern promotes sustainability education both in and out of the classroom. The Sims Memorial Library hosts such events as the Green Talks environmental series on sustainability, involving students, faculty, and the community in discussion.

Numerous classes in environmental education, energy, and human systems are a part of an array of programs offered on campus that are focused on the environment. One such example is Southeastern's College of Science and Technology, which offers electives that include Environmental Awareness, Conservation Biology, and Pollution Fundamentals and Control Technologies. Also, the university's College of Arts, Humanities, and Social Sciences offers Environmental Sociology, Earth Science, Food Sustainability and Society, and Applied Environmental Sociology in its elective choices for students.

Southeastern's biology program is invested in the ecosystem of Lake Pontchartrain through the Turtle Cove Environmental Research Station. Their mission is to facilitate and support a better understanding of southeast Louisiana's coastal wetland environments through research, education, and public outreach activities and programs.

One such initiative to enhance Louisiana's wetlands is Southeastern's collection of discarded Christmas trees to help build up marshland in areas that have been impacted by erosion and other factors. Local partners collaborate with Southeastern to rally students and volunteers to deploy the trees in the Manchac wetlands, located northwest of New Orleans. This practice provides hands-on environmental opportunities for students and other volunteers. Throughout the program's 26-year history, approximately 40,000 trees have been collected.

## **Missouri**

### **Flance Early Learning Center; St. Louis, Missouri**

*An oasis of sustainable, healthy early learning*

Flance Early Learning Center serves a racially, culturally, developmentally, and socioeconomically diverse population of children between ages 6 weeks and 6 years. Flance was founded with a desire to give all children the best possible start in life, regardless of their families' socioeconomic status. Indeed, 86% of the school population qualifies for free and reduce-priced lunch.

Flance was built with LEED certification in mind, and the building itself contributes to increased environmental literacy and wellness of people and the planet. It was designed to bring the outdoors in — daylighting is used in 90% of the building, every classroom has immediate access visually and physically to the outdoors, and classrooms are named for trees native to Missouri. Seventy-five percent of the school roof is covered with reflective materials, and the HVAC system can be controlled remotely even when the building is unoccupied.

Although certification is not yet offered for preschools because of the dearth of data collected on this type of property nationally, the center uses ENERGY STAR Portfolio Manager to track gas and electricity usage. Flance reports that it has reduced total greenhouse gas emission intensity by 37% over the past two years.



*Students from the River Birch classroom listen to an Urban Harvest educator talk about the life cycle of a pumpkin before they do some hands-on activities with pumpkins.*

Two-thirds of the Flace grounds are planted with water-efficient and regionally appropriate plants. Rainwater collected from the Flace Center roof is captured in two 8-foot covered cisterns, which is then used to water and irrigate the garden and bioswales.

Flace received a donation of three compost bins to divert food waste from landfill. The center also received 30 recycling bins, two recycling carts, and numerous educational materials from

St. Louis City Recycles to help educate young pupils and practice good recycling habits. This inspired the center to develop its own recycling tracking system. A newly established Green Team, comprised of administrative, teaching, and custodial staff, is working to educate all staff about waste reduction and how to incorporate this topic into classroom curriculum and school culture.

In December 2020, the Flace school community held its first annual Drop and Shop. This parent-led initiative gave families the opportunity to donate gently used clothing, toys, and other unused items so that families and community members could come and shop for the holidays from this selection of reused items at no cost.

Flace is strategically located in the middle of a neighborhood and close to downtown to help reduce working families' commute times. Half of families live around this urban area and this proximity encourages families to walk daily. Flace is also located right off the bus route. The center has designated parking for low-emitting and fuel-efficient vehicles.

The Flace custodial staff conducts a thorough cleaning of taps, faucets, and drinking fountains throughout the day and an even deeper clean in the evening. A pest control agency conducts monthly inspections of both interior and exterior spaces. Additionally, the center conducts annual bird inspections to help address unwanted nesting. Roof slope and drainage, door sweeps, annual HVAC inspections, and ongoing maintenance help to prevent air quality and moisture issues.

Flace was named the only Gold Level Healthy Way to Grow Center in the United States by the American Heart Association in October 2020. Every classroom has direct access to a fresh air space. Flance has three playgrounds, each for specific age groups. During inclement weather, an indoor gross motor room is used by different classrooms. There are several informational boards between the playgrounds that show both graphic and textual information about the importance of outdoor experiential learning. The playgrounds and garden are accessible to the community when Flance is not in session.

Flace was recognized for providing healthy environments for children, families, staff, and communities. In partnership with Affinia Healthcare, Flance houses an on-site health clinic to provide a wide range of health services for Flance families. Through community partners, it also offers hearing, vision, and dental screenings.

As a designated EnVision Center by the U.S. Department of Housing and Urban Development since May 2020, the early learning center has provided over 25 tons of free, fresh produce valued at over \$180,000 to families and local community neighbors via a weekly free fresh food box program. The local zip code is one of the poorest zip codes in Missouri, with limited access to affordable and nutritious food.

Health and the environment are embedded in the curriculum, from math lessons that involve making a healthy snack to vocabulary acquisition reflective of the natural world and valuing stewardship. Community partnerships further enhance these efforts. Flance's Urban Garden consists of 20 raised beds in which students grow vegetables, herbs, and fruit. The center's mulch is made from reused materials from tree removals by the regional electric company, Ameren.

Flace partner Urban Harvest helps with nutrition education in the on-site community garden. Urban Harvest's expertise is woven into preschool learning, which includes planting, harvesting, gardening, and natural scavenger hunts. Children learn about fresh fruits and vegetables, and the harvest supplements student and staff meals. In 2020, students harvested 200 pounds of produce. In August 2020, Flance initiated an after-school program that encouraged neighborhood children from ages 8 to 14 to explore and learn about the on-site garden.

A school chef prepares nourishing meals, including organic baby food, incorporating a variety of fruits and vegetables daily. The commercial kitchen is set up to not only prepare food for students and staff, but also to be used as a teaching tool. A display kitchen allows the school chef to conduct cooking demonstrations for families.

In 2021, the early learning center will sponsor an AmeriCorps Member to serve as its first sustainability coordinator, with the aim of continuing to improve school and community health, reduce environmental impact, and incorporate sustainability into all facets of curriculum and instruction. Flance is in the process of establishing a hydroponic garden with engineering students with Engineers Without Borders at Washington University to develop year-round gardening as well as to provide botanic education and sustainability.

## Nebraska

### Gerald Otte-Blair Middle School; Blair, Nebraska

#### *Green collar career ready*

Otte-Blair Middle School (OBMS) partnered with Washington County Recycling to place a single-stream recycling bin on school property. Sixth grade students collect recycled materials from all the classrooms in the school and transport them to the Washington County Recycling center. OBMS participates in the Trex Challenge for the recycling of plastic bags, taking home accolades.

In August 2019, OBMS began composting all cafeteria food scraps using the vermiculture method and composting bins built by environmental science students. OBMS composted over 1,700 pounds of food scraps over the course of the year. During compost lessons, students learn about what composting is and how to do it, as well as why it is an important way to provide quality soil for plants to grow in.

The school garden lets teachers and students incorporate hands-on activities in a diversity of interdisciplinary, standards-based lessons. The garden engages students by providing a dynamic environment in which to observe, discover, experiment, nurture, and learn. Through the garden, students gain an understanding of ecosystems, an appreciation for food origins and nutrition, and knowledge of plant and animal life cycles. At the



*The Gerald Otte-Blair Middle School football team heads out to turn compost.*

same time, they learn practical horticulture skills that last a lifetime.

Blair Community Schools, OBMS' school district, has engaged in a utility incentive rebate program for several years, and this incentive has funded many energy-saving projects at the school. One project included the replacement of all T-12 fluorescent, metal halide, and incandescent lighting with energy-efficient LED lighting and occupancy sensors.

Where landscaping is present, the school uses drought-resistant plants and trees and mulches the areas to conserve the use of water. The school has received multiple tree planting grant awards from Papio-Missouri River Natural Resources District. Inside the building, OBMS has installed automated sensors on all toilets, faucets, and water fountains. Three of four water fountains at OBMS have been upgraded to include water bottle refilling stations.

To improve bus efficiency, OBMS has participated in the Nebraska Diesel Emission Mitigation Program to decommission older school buses and replace them with more efficient buses. OBMS has installed bike racks at each building and has partnered with the city of Blair to provide safe routes to and from school.

OBMS uses traps and eliminates food sources as its first lines of defense to reduce pest populations and prevent pest infiltration. The school is monitored biannually for asbestos by an independent contractor and participates in the Nebraska School Radon Testing Program. HVAC equipment receives regular maintenance, servicing, and air filter changes. The school uses Green Seal certified cleaning products from a mixing station distribution system that reduces the impact of shipping diluted product and plastic waste. OBMS is equipped with a professional cordless electrostatic handheld and backpack sprayer with EPA-registered broad-spectrum disinfectants.

The school nurse promotes participation in the Educators Health Alliance "Elevate" wellness program. OBMS partners with outside entities to provide training, screening, and clinics pertaining to first aid and CPR, diabetes and blood pressure checks, stress reduction, and flu shots. Students at OBMS walk for 15 minutes after lunch three days a week. Nutrition Services provides an app that students and parents can use on their phones that provides menus, nutrition facts, and allergy information for all food that is served in the cafeteria. OBMS provides a "grab and go" breakfast in the mornings and a salad bar during lunch. Blair Community Schools established a food advisory committee that meets quarterly.

The district's curriculum, in alignment with the Nebraska College and Career Ready Standards, includes instruction on weather, climate, and human impacts. This includes topics that range from climate change, renewable versus nonrenewable

resources, alternative energy, overpopulation, deforestation, pollution, biodiversity, and land management. OBMS partners with DeSoto Bend National Wildlife Reserve to provide Outdoor Environmental Science Class at the refuge. A STEM class at OBMS allows students to learn the theory behind several renewable energy and energy efficiency technologies. Learning this theory and hands-on skills prepares students for several entry-level positions in the renewable energy and energy efficiency fields.

## **Newman Grove Public Schools; Newman Grove, Nebraska**

### *Small but mighty*

Newman Grove Public Schools (NGPS) is a small, rural school serving 186 students, elementary through high school, 49% of whom are socioeconomically disadvantaged. NGPS has built strong relationships over the years with several agencies, including Lower Platte North Natural Resources District, Nebraska Game and Parks, and the Nebraska Department of Environment and Energy (NDEE).

To reduce environmental impact and costs, NGPS built a new school featuring efficient HVAC, LED and motion-sensored lighting, energy-efficient doors and windows, and automatic faucets and toilets. This has meant that, instead of heating and cooling three buildings, the district has been reduced to two buildings. During the weekends, devices are unplugged and turned off. Through this project, NGPS moved the elementary school onto the same side of the street as the junior/senior high school. This eliminates having elementary students and staff crossing the highway several times throughout the school day.

The school FFA program oversees paper and aluminum recycling. The agriculture mechanics class partners with a local manufacturing company to collect their metal scrap to use in the welding course throughout the year. The small pieces of steel and aluminum that are discarded by the manufacturing business are used by students to practice welding methods. Once the metal is completely full of welds, the scrap metal is taken to a nearby metal recycling center. Future Business Leaders of America and FFA groups participate in a trash pickup on a local highway.

NGPS partners with a local pest control company to keep buildings safe and clean. Custodial staff use EnvirOx cleaning solutions to disinfect throughout the buildings.

The FFA students maintain a greenhouse where they grow lettuce for the school cafeteria, and they are in the process of setting up a larger herb and produce garden. NGPS participates in “Nebraska Beef in Schools,” where local families donate beef to the school lunch program. “Nebraska Thursdays” is another program

that incorporates Nebraska-sourced foods into meals. The “Backpack Blessing” program provides students who take part in the free and reduced-price lunch program with weekly snacks to take home.

K-6 students receive an hour of exercise time each day in the form of P.E. and recess. All students take part in the FitnessGram testing each year. A full-time counselor offers an hour a week of guidance and attends to the overall mental health of students. A licensed mental health practitioner from the community also serves NGPS students one day each week. A PBIS team focuses on developing character education among the student body. Teachers and students are encouraged to compliment individuals or classes who model “The Bluejay Way,” and, each month, one student who goes above and beyond those guidelines is recognized as the top Bluejay and gets to pick the lunch menu for one school day.

Staff members are encouraged to enroll and participate in Educators Health Alliance (EHA) programs that focus on exercise, nutrition, hydration, sleep, mindfulness, and other various topics. EHA covers the cost for staff members to be part of the Headspace program, focusing on mindfulness, and Weight Watchers. The school nurse provides first aid and CPR training to all staff members. The school organizes the administration of annual flu shots.

NGPS provides project-based and citizen science educational opportunities for students. The Shell Creek runs through the town of Newman Grove. In recent years, farmers and local conservation groups had noticed an increase in flooding, pollution, and erosion. To better understand and potentially reverse these harmful changes in the stream, students from NGPS have volunteered their summers to monitor the water quality for nearly 20 years. The combination of hands-on learning and good old-fashioned playing in the creek has kept students engaged. Monitoring the creek allows conservationists and local farmers to take appropriate measures that help protect the stream.

The project studies the effects of agricultural chemicals on the environment in the local area. They test six sites covering more than 30 miles of the watershed. New technologies have been added to the project, such as drones and geographic information systems. The student scientists also compare the Shell Creek watershed data to nearby Beaver Creek. Approximately one-fourth to one-third of the junior high and high school student population participates in this program annually, providing year-round learning opportunities. A major focus of this program is to study coliform bacteria, focusing on where it comes from in the system and where it goes. They report the results of the project to multiple agencies, including the Lower Platte North Natural Resources District and NDEE. The Shell Creek project has inspired multiple students to follow career paths in natural resources and science education.

Students conduct their own independent science research experiments, collecting and analyzing data and developing scientific conclusions. Both the science teachers and the agricultural education staff facilitate and help students with their research. Many research projects have included the agricultural department, and many have also been in conjunction with the Shell Creek project.



*Newman Grove Public Schools students must complete nine separate tests to determine the Water Quality Index for Shell Creek; these students are evaluating the dissolved oxygen content of the water.*

Several of the science classes participate in the Trout in the Classroom project in cooperation with Nebraska Game and Parks, raising trout eggs to fingerlings, monitoring tank water quality, engaging in stream habitat studies, and learning about ecosystems. Fifth grade students learn about and design a project to transport clean water to an area struck by disaster. The High Ability Learners program incorporates the Lego Education Renewable Energy challenge.

## ***New Jersey***

### **Switlik Elementary School; Jackson, New Jersey**

*A 42% solar offset*

Constructed in 1948, Switlik Elementary School is the oldest building in the Jackson School District. Nevertheless, Switlik was awarded a 2019 Silver Certification through Sustainable Jersey for Schools, one of only 19 schools in New Jersey that have received this recognition. The school's sustainability efforts include a sustainability policy, an energy policy, and an energy plan that is updated and approved annually.

In the fall of 2016, Switlik introduced a behavior-based energy conservation program that has reduced energy consumption by 16% and saved over \$2.5 million in energy budget expenses over the past four years. The school is enrolled in an annual demand response program through PJM, the local grid. In 2017, the school conducted a local government energy audit through the N.J. Clean Energy Program,

which identified areas of the building needing updates for better performance. The recommended improvements are currently being implemented as part of a \$26 million districtwide Energy Savings Improvement Program. The amount of energy savings generated will create a net-zero cost to taxpayers and, to date, the school has installed a new roof, new insulation, plug load controls on large equipment, high-efficiency transformers, new unit ventilators in every classroom, new LED lighting, and a new boiler.

In 2021, a 317kW solar array will be added on the new roof, exceeding the amount of electricity Switlik consumes from the grid by over 42%. This is in addition to the 10% green energy currently purchased from the grid via an electricity supply contract. The array will feature a monitoring device that can be accessed by students and staff so they can see firsthand how much energy is saved. The 2020 ENERGY STAR Portfolio Manager score is 96.

The school is awaiting the result of a grant written to garner electric school buses and refuse trucks. The district has constructed a new transportation facility that has significantly reduced the number of miles buses are on the road. This is extremely important as Jackson is over 100 square miles and busses over 90% of the student population. The school also has a well-publicized No Idling Program and a Safe Routes to School Program that are part of its Sustainability Policy.

Rather than outsource waste pickup, recycled materials are collected by a district truck weekly, and a separate truck collects solid waste twice a week. On average, Switlik recycles about 1,500 pounds monthly, including waste generated from after-school and recreation activities. The school has several grade-level assemblies throughout the year to instruct students and staff on proper single stream recycling. The school also has two filtered water bottle filling stations and recycles electronics. In one school year alone, students collected over 20 pounds of dry erase markers for recycling as part of the Crayola Colorcycle program. Teamed up with two other schools and the township recycling department, the school collected 500 pounds of plastic bags and had the Trex company make those into a park bench.

The Operations and Maintenance Policy ensures that all Switlik students and staff are provided with a safe environment to engage in the teaching and learning process. The Integrated Pest Management Plan is updated on a yearly basis. Switlik uses all Green Seal certified cleaning products, PEFC-certified copy paper, and water instead of stripper to remove wax from floors. The school has a green cleaning and purchasing policy. There is no smoking on school grounds or buses, and no use of pesticides. Construction is conducted at night and is immediately cleaned by staff to ensure minimal exposure to occupants. The staff also performs daily moisture inspection in all classrooms. Unit ventilators are inspected regularly, filters are

changed every three months, and the ventilators adhere to ASHRAE Standard 62.1 by exchanging the air in the room with outside air every 45 minutes at maximum capacity.

The well water has backflow preventers and a filtration system. Every year, the drinking water is tested for lead, and the results are shared publicly. Every year, Switlik enters the Barnegat Bay Rain Barrel competition and has been crowned champion three years in a row. The rain barrels collect water for the gardens, courtyard, and outdoor learning center that serves as home for the school's turtles. Switlik received a \$10,000 grant from Sustainable Jersey for Schools to construct a school greenhouse.

A school climate team meets throughout the year to cover anti-bullying, peer counseling, and school climate measures. A full-time school counselor runs various school groups and activities to promote mental health as well as running anti-bullying programs. Every week, the entire school participates in Mindfulness



*Switlik kindergarteners visit their hatchlings.*

Monday, and some grades participate in a program called Yoga Calm. The school nurse provides students with health lessons several times a year.

Other relevant teams include the school safety team, green team, school wellness committee, and a COVID-19 team. At least 50% of P.E. takes place outdoors, in addition to outdoor recess and structured play. Two gaga ball pits were recently constructed with help from the school's Parent Teacher Network.

Participation in the Department of Defense Local Farms food program ensures that as much locally grown food reaches Switlik as possible. Students are provided with breakfast and encouraged to consume it in class, even after the bell rings. Through the Food Service Department's Choose My Plate program, students are encouraged to make healthy choices beyond the cafeteria, throughout the day at school and at home.

Switlik's teaching staff meets on a regular basis to share lessons on sustainability, and the green team has presented at events such as the N.J. School Boards Association's convention on several occasions. Students in K-5 engage in a science curriculum centered around STEM principles and environmental design.

Starting in kindergarten, students learn about the life cycle of a chicken by observing a classroom incubation chamber for eggs, and the students look forward to holding the chicks once hatched. The green team organizes assemblies on recycling and energy. Fourth grade students give presentations on different types of energy to the district energy specialist, discussing actions taken by the district to lower its carbon footprint in a session recorded and later shown on the community's local TV channel.

All students attend the Barnegat Bay Watershed Festival and participate in outdoor lessons in the school's courtyard. The art teacher demonstrates upcycling with wood chopped at a local karate school and has all grade levels create artwork from repurposed materials. Teachers take students on field trips that focus on the environment, including trips to Jenkinson's Aquarium, Insectropolis (an interactive insect museum), and the Philadelphia Zoo.

## **Winslow Township Middle School; Atco, New Jersey**

*EmPowering students with an environmental STEM focus*

Winslow Township Middle School (WTMS), which serves a student body that is 57% socioeconomically disadvantaged and 79% minority, established a green team during the 2016-17 school year to plan and implement sustainability initiatives. The green team then expanded its membership and established subcommittees focused on specific areas. It has worked diligently over five years to achieve Sustainable Jersey for Schools Bronze, Silver, and Champion's awards.

WTMS has an 820.54 kW solar system with a production of 1.02 MW that is owned and operated by National Energy Partners. The energy generated by the solar panels over the course of one year offsets an average of 34% of the building's monthly energy needs. Winslow Township School District entered into an agreement to purchase renewable energy through the Alliance for Competitive Energy Services program; per the agreement, the school district receives a minimum of 40% of its purchased energy from renewable sources.

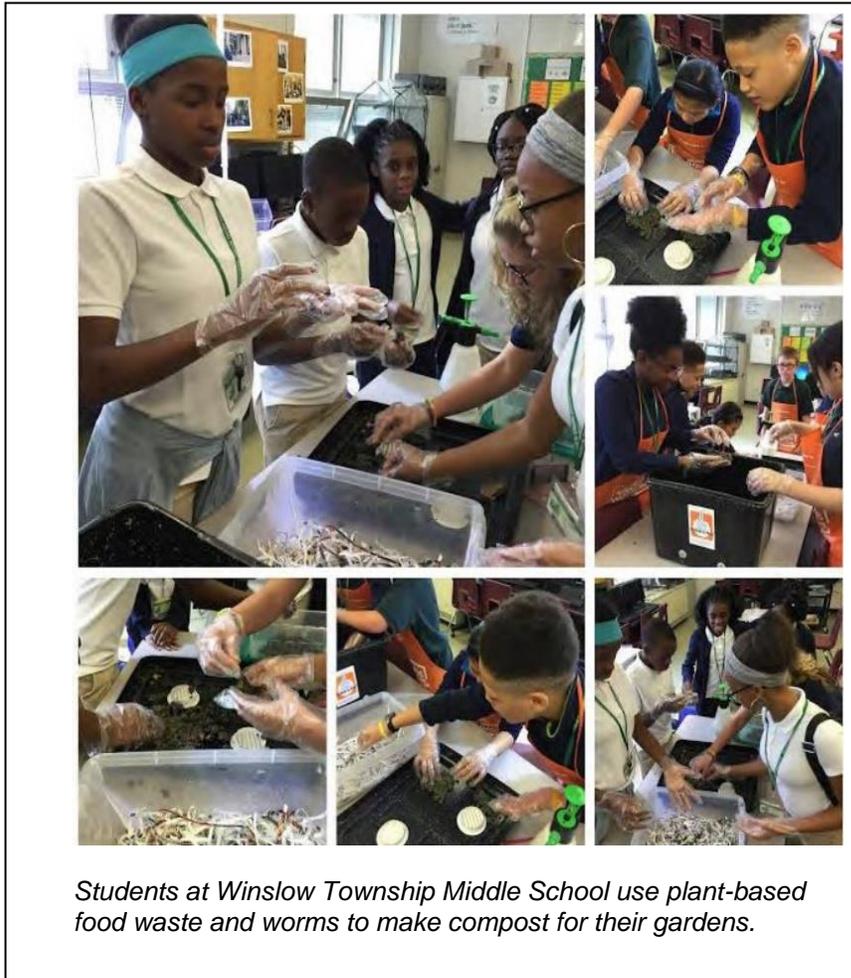
All hallway lights have been replaced with high-efficiency LED lighting, and windows have been replaced with dual glazed windows with built-in blinds to help regulate room temperature and energy usage. In addition, exterior lighting has been replaced with LED lighting. This resulted in a savings of 283,598 kWh of energy and an annual cost savings of \$55,737.

STEM teachers have incorporated the solar panel energy generation into classroom lessons using the New Jersey EmPower Schools program. Led by the environmental STEM teacher, classes train students as energy ambassadors to help promote energy conservation throughout the school. Through this program, staff and students learn about energy-saving measures and sign a pledge to conserve energy. Students create videos to explain the program and its benefits and complete energy audits in classrooms. WTMS won the EmPower Schools competition in the 2019-20 school year and was the first participating school to earn over 1,000 points.

WTMS students and teachers collect used markers for the Crayola ColorCycle recycling program and cartridge toners for Ricoh. Working through Waste Management, WTMS diverted about 30% of the overall waste generated at the school through recycling efforts in 2020.

The green team has been the champion of several student and staff wellness initiatives, including a garden program encompassing courtyard, indoor hydroponic, and vertical tower gardens. Students and staff manually pull weeds and mulch to manage weeds instead of using herbicides. They use plant-based food waste from the cafeteria to make compost. Soil moisture and weather is monitored to determine when to water the plants using water collected from rain barrels.

Food challenges based on the popular cooking show “Chopped” encourage students to create healthy plant-based dishes based on the foods in the garden. The recipes are shared with the students’ families to promote healthy eating habits. WTMS is in



*Students at Winslow Township Middle School use plant-based food waste and worms to make compost for their gardens.*

the process of constructing a large greenhouse to introduce more students to the art and science of growing fruits, vegetables, and herbs, as well as topics related to healthy eating, cooking, and nutrition for overall well-being.

WTMS has instituted a social and emotional learning program. Teachers participated in social and emotional learning professional development at the start of the 2019-20 school year, and social and emotional learning lessons

were incorporated in classes throughout the year. WTMS implemented a new student advising period beginning in the 2018-19 school year. Students are assigned to a small group with a staff member as an adviser to meet twice monthly to discuss social and emotional learning topics and cover issues such as coping with stress and general well-being. This program helps students navigate the challenges that many young people face during the formative middle school years. The small group setting permits students to form bonds within the group and talk about topics that they might not feel comfortable discussing in a larger classroom setting.

Each week, students participate in Mindful Monday and Wellness Wednesday. The guidance department creates messages that tie into ongoing social and emotional learning that the students receive through the student advisory program every Monday. On Wednesdays, students watch videos in their homeroom on topics related to health and wellness. The green team launched a student and staff weight training and stress reduction program in 2020 and purchased kettlebells, exercise balls, weighted resistance bands, and a CrossFit-type weighted rope system, along with signage demonstrating proper use of this equipment.

WTMS is committed to incorporating sustainability and environmental education throughout the school's curriculum. The green team has coordinated several professional development opportunities for staff, including programs related to sustainability, gardens, and greenhouse education. The courtyard garden is available for teachers to augment their classroom lessons.

Students in Environmental STEM classes explore environmental issues facing the world through the study of the campus environment, developing and testing solutions to address those issues. One focus for this course is sustainable agriculture, soil and water health, and food supply. Students design soda bottle hydroponic systems to understand the basic concepts of hydroponics and look at alternative ways to repurpose trash. They grow a variety of crops in their hydroponics systems, including basil, cilantro, parsley, mint, microgreens, kale, tomatoes, spinach, peppers, and lettuce. The goal is to help create the next generation of environmental scientists, engineers, and problem solvers by teaching lessons focused on raising awareness of local and global environmental issues and by challenging students to develop solutions to address these challenges.

A courtyard is also available as an outdoor classroom space where students can learn about ecosystems, native plants, and birds. The area features an elevated platform with benches at one end of a pond. Both outdoor classrooms are used with multiple disciplines. Math classes coordinate grids and learn geometry; science classes explore biology and units of measure; language arts classes practice descriptive writing and use the tranquility of the space for reading novels; social

studies classes examine living off the land during colonial times; art classes create drawings, paintings, and design elements; and health classes use the physical activity of gardening to encourage consuming healthy foods.

Examples of sustainability in classrooms lessons can be found throughout WTMS. Science students monitor the water, pH levels, and growth of the tower garden; make observations; and record data to draw conclusions. Art students are challenged to represent the negative impacts of the plastic problem. Engineering students create a logo that brings awareness to a sustainability topic of their choosing. English language arts students write essays on the plastic problem. A math teacher incorporates principles of healthy eating through a lesson about the sugar content of various popular drinks. Students complete a computer science lesson called Artificial Intelligence for Oceans.

## ***New York***

### **PS90 The Magnet School for Environmental Studies and Community Wellness; Brooklyn, New York**

*An all-vegetarian school combats climate change*

The Magnet School for Environmental Studies and Community Wellness (PS90) is located just blocks away from the iconic Coney Island Wonder Wheel. Since becoming a magnet school in 2016, PS90 has focused its academic instruction on the environmental sciences and climate change. The presence of the nearby Atlantic Ocean reminds PS90 students, all of whom qualify as socioeconomically disadvantaged, that their actions have a direct impact on their immediate environment.

The school tracks resource use in Portfolio Manager and has documented an 8% reduction in energy use and a 27% reduction in greenhouse gas emissions over three years. All lighting is LED. A student green team surveys all classrooms and offices and gives an energy score based on each room's practices. PS90 recently won a grant to install solar panels.

PS90 does not have an irrigation system. The school gardens are watered through a rain barrel collection system. PS90 plants marigolds, rose bushes, and other perennials. In the warmer months, the school plants an edible garden and pollinator attracting plants. Initial lead testing of 127 school water fixtures found that 14 fixtures were contaminated with lead, and there was a full remediation of the 14 fixtures. The green team performs water quality assessments to test for all types of water

contaminants. Fountains and taps are cleaned twice annually to reduce contamination, and screens and aerators are cleaned annually.

An exterminator approved by the New York Department of Education examines the premises of PS90 monthly and uses only nontoxic materials when needed. No chemical pesticides are used on the school garden. Each classroom has an efficient air ventilation system and a local exhaust system to control major airborne contaminant sources. PS90 uses cleaning products and practices that have been approved by the state Department of Education green cleaning program.

Staff and students adhere to an impressive 11-stream waste system, in which building occupants sort paper, metals/plastics, electronic waste, landfill trash, plastic bags, snack wrappers, oral hygiene packaging, Crayola markers, plastic cups, organic waste compost, and clothing.

PS90 is the second school in Brooklyn to adopt a plant-based menu, endeavoring to demonstrate a commitment to consuming a healthy diet of fruits, vegetables, and whole grains and to doing the school's part to reduce its carbon footprint by demanding less energy output from the food program. A group called "Garden to Café" works with PS90 to incorporate school garden produce into school meals and snacks. Through a nutrition education program called CookShop, students and their parents participate in workshops and learn about how to properly nourish their minds and bodies. Through a partnership with Coalition for Healthy School Foods, PS90 offers family food nights, providing vegan meals to educate the school community on healthy and low impact choices.

PS90 is a designated Move-to-Improve school. All staff have been trained in using classroom-based physical activity to enhance academic lessons. Eighty percent of students walk or bike to school as a result of school outreach about the health and environmental benefits.

PS90 participates in the New York City Department of Education's Comfort Dog program, aiming to help children who feel distressed during the day. Students engage in social and emotional learning using the Cloud9World curriculum for one period every day, and students are welcome to share any experiences they need assistance with. A course on digital citizenship and anti-bullying is offered annually by the school's Respect for All liaison. PS90 runs a peer mediation program.

The school customizes science curricula to incorporate environmental studies so that every unit and every subject has a connection to climate change and human impact. Students analyze a real-world problem and develop solutions. Students deepen their learning by researching, collaborating, writing, analyzing, and

presenting to an audience beyond their classroom, often at the school's annual expo, to display their understanding of the effects of climate change.

PS90 partners with Grow NYC to maintain three hydroponic gardens indoors, as well as a greenhouse and outdoor garden. In 2020-21, PS90 formed a partnership with Whole Kids Foundation, The Bee Cause, and City Growers to install a beehive to aid in teaching about the importance of bees as pollinators.

Through the One Billion Oyster Project, students go on field trips to PS90's oyster reef in Sheepshead Bay. Students help with research and data collection. The Brooklyn Botanic Gardens has provided live plants and professional development to teachers. Other partners have offered teacher training on climate science, plant-based diets, energy conservation, and other sustainability topics.

Other PS90 partnerships, including those with the Alliance for Climate Education, the Department of Sanitation of New York City, Eco-Schools USA, the Wildlife Conservation Society (New York City Aquarium), the New York City Office of Sustainability Pilot Program, the New York City Department of Education Health Pilot Program, and Pepsi Co. Funds Recycle Rally, have offered professional development and resources, allowing PS90 to expand its sustainability, health, and wellness offerings.

Morning announcements are dedicated to delivering a schoolwide lesson on sustainability practices, wellness, and nutrition. Additionally, PS90 introduces students to one environmentally focused career each week and highlights a college or university that can prepare students for that career. During the COVID-19 pandemic, students have taken STEM-related virtual field trips.



*Third grade students present their yearlong culminating research, "Asia's Climate Change: A Farming Fear Factor," to peers and community members at PS90's From Climate Change to Climate Action – A Technology Expo. The students analyzed the harmful effects of climate change on Asia's farming systems and offered their solutions.*

## **New Roots Charter School; Ithaca, New York**

*Integrating best practices in green schools*

New Roots Charter School is a public charter high school authorized by the State University of New York in 2008 to create a learning environment that empowers young people as citizens and entrepreneurs to create just, democratic communities and thriving green economies that restore the natural world. New Roots attracts a regionally diverse population of students in grades nine to 12, bringing together young people from rural, urban, and suburban backgrounds.

In 2017, the Green Schools National Network designated New Roots as a Catalyst Network Accelerator School, positioning it as a national leader among schools preparing students to help create a sustainable future while increasing student achievement, improving the health and well-being of students and staff, and decreasing operational costs and the school's and district's ecological footprint. New Roots was recognized with a Green Schools National Network's Best of Green Schools Award in 2019. In 2016, New Roots was the first school in the nation to receive recognition as a Human Rights Friendly School by the Dorothy Cotton Institute and Human Rights Educators USA.

The school integrates core environmental, sustainability, green technology, and civics studies into a four-year college preparatory curriculum. Students engage in interdisciplinary exploration of core academic subjects within a framework of sustainability and environmental stewardship, focusing on college, career, and life readiness. STEM courses, such as Earth Systems Science, Contemporary Science and Technology (applied physics and chemistry), Global Environmental Science, Biomimicry, and Mathematical Modeling for Sustainability, provide conceptual understanding and skills that are applied in fieldwork and community-based projects.

Inspired by the Cloud Institute's Education for Sustainability (EfS) Standards, the New Roots curriculum prepares students with the full spectrum of thinking skills, content, and big ideas necessary to envision and create a more just and sustainable future, firmly grounded in a "sense of place" through direct experience of the natural places and community spaces that they call home. Students examine the complex relationship between human and natural systems and how they can serve as ecological stewards and agents of ecosystems restoration, developing their capacity as "solutionaries."

Culminating portfolios and capstone projects require that students demonstrate schoolwide outcomes as healthy persons, lifelong learners, communicators, community members, citizens, members of ecosystems, and visionaries committed

to a just and sustainable future for people and the planet. Students earn college credit for upper-level coursework through Tompkins Cortland Community College's College Now program.

The Cayuga Lake watershed is a focus of study each year, beginning with a foundational two-year study of earth systems science. Students conduct scientific field studies, learn directly from community environmental organizations and local agencies, and share their research with their wider community through symposium presentations. They build on this foundation by participating in ongoing ecological restoration work through the Cayuga Wetlands Project in such courses as Contemporary Science and Technology (an applied physics and chemistry class) and Global Environmental Studies.



*Students participating in the New Roots Youth Ecological Restoration Corps canoe to their work site.*

Students petitioned the Ithaca City Common Council, the Department of Public Works, and the Ithaca City Mayor's Office to establish wetlands restoration plots to test the hypothesis that native wetlands species would improve water quality and bird habitat on Cayuga Lake. In 2018, the project was awarded a four-year grant from the New York Department of Environmental Conservation to establish a summer Youth Ecological Restoration Corps employing 10 youth each summer.

In their senior year, students address a sustainability issue in the community through research and action in self-designed capstone projects. Projects have included studies of how urban gardening and farming can increase access to fresh produce, the impacts of local agriculture on improving the lives of low-income people living in food deserts, the causes of toxic algae bloom on Cayuga Lake, development of rainwater catchment systems, establishing eco-friendly “upcycling” businesses, raising funds for a local artist to create a sustainability mural on the school building, and raising awareness about the impacts of global climate change.

All students participate in the New Roots crew advisory curriculum, designed to cultivate a powerful school culture by engaging students in school governance, community development, and service learning. Restorative justice practices turn disciplinary infractions into learning experiences that strengthen individual well-being and community bonds. The crew curriculum also includes exploration of college and career paths, with an emphasis on green careers and technology. In 2020-21, New Roots added a pilot career and technical education program emphasizing green careers and entrepreneurship.

New Roots teachers engage in professional development to learn the content and skills necessary to design and teach curriculum and assessments aligned with the EfS standards and to develop meaningful projects in collaboration with community partners. Since the school’s inception in 2009, teachers have engaged in professional development offered by such organizations as the Cloud Institute for Sustainability Education, the State Environmental Education Roundtable, the Green Schools National Network, and an EPA-funded project called Teaching Our Cities, a consortium of schools with a place-based, environmental focus.

Located in the heart of downtown Ithaca, New Roots maximizes opportunities for outdoor fieldwork and community engagement, facilitated by the proximity of urban spaces, natural places, and the public transportation system. Students engage in a wide range of meaningful outdoor activities at each grade level, including hiking, gardening, stewardship of local parks, outdoor recreation and sports, fieldwork for science topics (such as water quality monitoring), growing food in containers and in an urban farm demonstration plot, supervised tree climbing, ski club, and urban history walks.

The school takes full advantage of opportunities for collaboration with community partners from institutions of higher education to small nonprofits and the local library, including Ithaca College, Cornell University, Cornell Cooperative Extension, and EcoVillage at Ithaca.

The New Roots school facility, a repurposed historic hotel over 200 years old, is an example of adaptive use of existing infrastructure by making minimal upgrades. Every aspect of school facility operations is managed to reduce impact and enhance student and staff well-being. All operations vendors are evaluated for green options using the New York State Department of Education's Green Preferred Products Listing. The school limits purchases to essential items and purchases used or reconditioned items when possible. Student transportation arrangements include carpooling, public buses, walking, and cycling.

One hundred percent of the available school grounds are dedicated to an urban farm demonstration plot, a sustainably managed demonstration of small-scale diversified vegetable production that also serves as a habitat for wildlife and native plant species and as an outdoor educational space.

New Roots Charter School is a member of the Ithaca 2030 District, a public-private collaboration working to create a high-performance building district in downtown Ithaca to reduce building emissions by 80% by 2030. New Roots monitors its resource conservation and efficiency using ENERGY STAR Portfolio Manager. The school reduced its energy use by 28% over a two-year period by being responsive to this data and through green practices, such as installing compact fluorescent lighting in every light fixture. The school features water bottle filling stations and low-flow toilets.

All students take Personal Wellness in their first two years, a course integrating health and physical education. All students learn mind-body techniques to improve focus and reduce stress as part of their physical education coursework. Such practices as "Take 30," a 30-second quiet pause, are integrated into the beginning of every class meeting. The school uses HEPA air filters in every classroom. No pesticides are used on school facilities.

Physical education often means a trip to local parks and sports facilities or immersion into student-selected projects focusing on "fitness for life" interests. During the fall season, New Roots has a coed Soccer Club. During the winter season, New Roots has a Ski and Snowboard Club, and club members travel to Greek Peak Mountain Resort. The cafeteria is a block away from the main school facility, encouraging all students to get out into the fresh air for a daily walk.

The farm to school program provides a free, healthy breakfast and lunch for every student and staff member through the community eligibility program that emphasizes regional and organic whole foods, including daily soups and a salad bar. New Roots uses local dairy and whole foods with no added sugar or additives. The school makes its own sauces and dressings, uses only pure meat (no fillers or breading),



and serves an abundance of fruits and vegetables. New Roots offers vegan, vegetarian, nut-free, and gluten-free options daily. The program sources 100% of its food regionally, and uses real plates, silverware, and glasses instead of disposables. Cafeteria waste is composted, and recycling is maximized.

## **Scarsdale Middle School; Scarsdale, New York**

*Making environmental education professional development a priority*

Scarsdale Middle School (SMS) is emblematic of its district's plan for an interdisciplinary approach in instruction, overall health and wellness, and facilities management. The plan includes a series of goals that emphasize sustainability and equity. Students and teachers lead in developing and introducing innovative practices in energy production, conservation, lifestyle modification, food production, and building technology. A 2007 board resolution specifically addresses curriculum and instruction, behavioral change, and institutional operations. Actions include professional development, units of study with a focus on issues of sustainability, print and digital resources added to libraries and classrooms, student activities supported with sustainability materials, and a sustainable facilities plan. This has cultivated a culture of responsibility to educate students about sustainability, of operating the facility sustainably, and of maintaining a healthy environment for the whole child.

SMS faculty and staff have developed relationships with organizations, such as the Children's Environmental Literacy Foundation, Kaleidoscope Landscape & Garden Design, and neighboring schools. Over the past two years, 75% of SMS teachers have participated in approximately 30 professional development courses related to the integration of environmental studies, sustainability, STEM, green technology, and civics into curricula. As a result, while the global pandemic created obstacles this past year, SMS continued education practices that cultivate students' deep understanding of the world around them.

The SMS sustainability curriculum is interdisciplinary and asks students to connect what they learn about science, math, economics, politics, and justice to climate change issues. Students are challenged to examine their own carbon footprint (and "food print") and to reflect on their habits. Students participate in environmental stewardship opportunities, such as garden maintenance, cleanups, compost workshops, recycling assemblies, and interact with guest speakers and other community partners.

In many classes and across disciplines, students explore the natural world and local outdoor spaces. They are asked to journal daily nature observations, caption nature

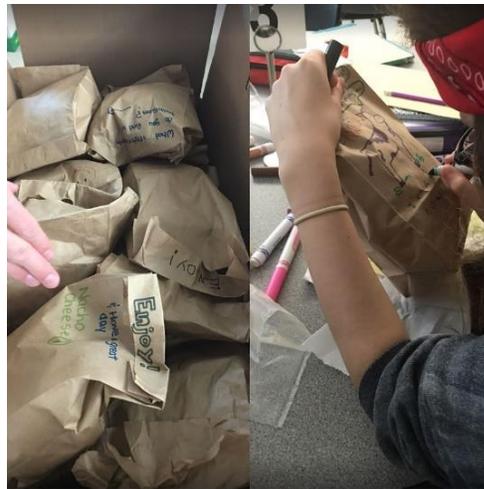
photography, and develop poetry focused on a sustainability topic. Other coursework centers around the United Nations' Sustainable Development Goals, Earth Day, ecosystems, solar energy, and farm practices. The school celebrates Human Rights Day, and students participate in the Daffodil Project.

SMS has implemented a composting program. After becoming well versed in the sorting of their waste at school, students participate and continue their education with their families as part of SMS' at-home composting program. The program in the community offers weekly curbside pickup of food waste. This was established by community members, one of whom now serves on the board of education and continues to champion sustainability efforts.

There has been a concerted effort to use environmentally and human safe cleaning products and advanced water and air purification systems and to conserve energy. Over two years, SMS has documented a 57% reduction in greenhouse gas emissions and a 45% reduction in energy use in ENERGY STAR Portfolio Manager. A relationship with the local utility's solar energy division has been explored and plans laid out for future development.

Ninety percent of plantings are typically water efficient, regionally appropriate, and perennial. SMS recently completed lead testing of the school water system. All potable drinking faucets that came back with elevated levels had lead filters installed. The building's water system is flushed completely once a week. Water bottle filling stations have been installed throughout the building.

All HVAC equipment is controlled by a building management system that maintains healthy and comfortable humidity levels in the building. These units have dampers that adjust the amount of fresh air brought in depending upon outside temperatures. All HVAC units have filters that are checked regularly and changed quarterly to maintain air cleanliness. Staff perform daily building checks for leaks. All paint



*Students put together bagged meals, including some with personal messages, for Midnight Run, an organization that delivers food and other necessities to those in need. This took place on the school's annual Human Rights Day.*

used is low VOC, and all cleaning products are certified green. Pesticides are not used on school property.

SMS's curriculum and service learning emphasize food systems, and students grow their own food using conventional and innovative practices. They plan and develop space for seasonal growing, harvest and donate food, and prepare ingredients for cooking. The enclosed courtyard houses 10 raised beds of approximately 1,000 square feet.

The school food program's dietitian provides advice about menu preparation, wellness committees offer guidance, and physical spaces are designed with a particular emphasis on the health and wellness of the entire school community and environmental impacts. SMS is home to four house counselors, two psychologists, two nurses, three youth outreach workers, one speech/language specialist, an occupational and physical therapy provider, and a counseling coordination committee.

SMS grounds include an outdoor challenge course, used by P.E. and professional development classes. Students participate in yoga, mindfulness, and team building. Outdoor lunch and recess are available daily, and all P.E. takes place outside. There are continuing efforts in place to reduce screen time both on-site and in virtual settings, including screen breaks, to provide education about brain development, and to offer challenges to turn off phones for 24 hours.

## **North Carolina**

### **Wrightsville Beach Elementary School; Wrightsville Beach, North Carolina**

#### *Marine science on the island*

Nestled on a barrier island surrounded by a tidal estuary, Wrightsville Beach Elementary School (WBS), has served Wrightsville Beach since 1954. As part of a 2014 New Hanover County School bond, the once antiquated facility was renovated into a modern structure that brings in natural light, highlights the surrounding environment, and provides ample opportunity for students to take advantage of a variety of outdoor spaces.

The renovation of WBS is the result of planning to not only incorporate stunning views of the local setting but to reduce impact on the environment and utility costs. The 31,695-square-foot building has been upgraded with occupancy sensors for lighting and sensors for exhaust fans, as well as circular pump controls for the water heater to reduce energy consumption. The second floor was positioned strategically

and large windows throughout are made with specialized glass to maximize daylight without heat gain.

Intentional efforts were made with the new construction to reduce stormwater runoff and erosion of adjacent local waterways by directing the stormwater from the building to two new subsurface drain systems. Low-flow fixtures and waterless urinals throughout the school have reduced domestic water consumption and costs. The landscaping around WBS is designed to include native plants and vegetation that do not require irrigation.

Through a grant from the New Hanover County Extension Master Gardener Volunteer Association, the parent-led WBS “Green Team” is reinstalling raised garden beds and, for the first time, installing a rain garden on school grounds. The rain garden is designed as an outdoor, hands-on learning area for students, teachers, staff, parents, and the community to learn about water runoff, sustainable garden design, native plants, and rain barrels. No pesticides or chemicals are used, which protects wildlife, landscaping, and waterways, drastically reducing the impact on the environment.



*As part of its marine and environmental sciences program, Wrightsville Beach Elementary School students participate in hands-on learning about their local ecosystem.*

The students of WBS use various modes of transportation for their daily commute to school. Thirty-four percent of students ride the bus, 12% to 15% walk or ride their bikes to school, and a significant number of car riders choose to carpool. WBS has separate pickup areas for walkers/bikers and car riders to reduce wait time and idling. WBS is implementing an online technology to more efficiently line students up and load cars.

The fourth grade leads a schoolwide recycling initiative.

Although some of it looks different due to the COVID-19 pandemic, many initiatives have continued. Students learn how long various items take to decompose and produce educational videos to reinforce the importance of recycling. Through participation in the Crayola ColorCycle and the PepsiCo Recycle Rally, WBS receives lesson plans, supplies, and incentives to inspire students to recycle.

Multiple outdoor covered areas are used for classes, small group lessons, and presentations throughout the year. The second-floor addition is oriented parallel to the adjacent marsh, forming a large, covered outdoor space underneath that is used for outdoor classes, recess play space, and school gatherings.

Students are welcomed into a clean, well-ventilated, and nurturing environment that fosters learning and exploration as well as social-emotional learning. The school system has a policy that requires the use of IPM to prevent and control pest problems in school buildings and grounds and minimize pesticide use. The WBS team ensures that heating and cooling systems are properly maintained; classrooms are effectively cleaned; and all cleaning products are safe for students, staff, and visitors.

Days begin with deep breathing exercises. During the day, students engage in movement breaks to help them maintain focus. The school social worker provides social-emotional learning opportunities to all classes, small groups, and individual students, as well as professional development to staff. A full-time school nurse is available to students for acute and emergent needs as well as providing information on health and wellness. The school counselor uses Sunny Days Healthy Ways, an evidence-based sun safety curriculum, to teach sun protection.

The certified physical education teacher provides skill-based lessons that integrate health and wellness for students. Students regularly use the outdoor playground facilities; the paved track around the playground, funded by the WBS Foundation; and kayaks. Additional opportunities for organized physical activity include afternoon running clubs for boys and girls, an annual bike to school event, and yoga in the classroom.

The WBS marine science program, established in the 2000-2001 school year, is a schoolwide program facilitated by the school counselor. Over the past 20 years, the program has grown to encompass outdoor marine science and environmental education, classroom education, community outreach, interdisciplinary learning, and citizen science projects. All activities are designed to support the Standard Course of Study for each grade as established by the North Carolina Department of Public Instruction. It is strategically integrated into the academic curriculum in every class and grade level.

It provides authentic learning experiences and plays a significant role in the culture of the school, embedding lessons of citizenship, team building, problem-solving, and responsibility. Each week, students have class out on the school dock to learn about the marsh ecosystem and local wildlife. All classes regularly conduct sand, beach, and dune investigations and collect seashells.

With the help of parent volunteers, students collect and record data on water quality, tide levels, and the number of fish and crabs caught during each class for cross-curricular lessons. Reading assignments focus on marine life and the environment. Studies about ecosystems come to life through field trips and hands-on explorations of the salt marsh flora and fauna as well as tidal islands.

WBS has a large outdoor area that contains soil material from a phosphate mine, material rich with marine fossils that date to the Eocene Epoch. Students regularly visit the “Shark Tooth Pile” to learn about fossils, shark teeth variations, and the marine vertebrates and invertebrates that inhabited the ocean.

WBS holds an annual fifth grade kayak race in tandem kayaks. A racecourse is set up using motorboats that are manned with parents and teachers. While navigating the racecourse and passing each motorboat, students are required, as a team, to answer academic questions. This event teaches paddling skills, promotes teamwork, and is an end-of-year academic review.

During the 2000-2001 school year, WBS became a designated Using the Outdoors to Teach Experiential Science (UTOTES) School. The North Carolina Museum of Natural Sciences UTOTES program provides teachers with knowledge and resources to use school grounds to teach environmental education. Through this program, WBS teachers attended six workshops to foster a culture of outdoor awareness and environmental stewardship.

Collaborative programs with the community include participating in beach sweeps, hosting an annual college student environmental science intern, planting sea oats, and creating signage for the local nature sanctuaries. Partnerships with numerous organizations, such as the University of North Carolina – Wilmington, Audubon North Carolina, a local garden club, and the towns of Wrightsville Beach and Masonboro, provide students with lessons and hands-on activities for marine biology, ecology, and conservation. An annual Marine Science Festival with experts and professionals from a wide array of disciplines and local businesses includes presentations and activities with students.

## **D.C. Virgo Preparatory Academy; Wilmington, North Carolina**

*Flourishing with a little help from friends*

The goal for instruction at D.C. Virgo Preparatory Academy (DCVPA) is to be guided by the acronym PIER (personalized, inquiry-based, experiential, and reflective), and the school emphasizes interdisciplinary STEM education, sustainability, and environmental literacy. Collaborative learning permeates the school community and has empowered a focus on sustainability for K-8 students. Ninety-nine percent of students are socioeconomically disadvantaged, and 94% identify as minority.

DCVPA created a baseline greenhouse gas emission and water inventory for the 2018-2019 academic year. The emission inventory includes purchased energy, natural gas, transportation, refrigerants, and waste. The inventories are updated yearly to assess trends and identify needs for improvement.

DCVPA has transitioned to using energy-efficient light bulbs and natural light through blinds to conserve energy. Instead of irrigation, the school uses two rain barrels to water the garden and landscaping, conserving many thousands of gallons of municipal water in recent years.

Outdoor classrooms provide the opportunity to engage all students in outdoor learning, and they have been used extensively during the period of phased COVID-19 learning, enabling students to continue learning while benefiting from fresh air. Over 90% of students use some form of alternative transportation to commute to school. Those who ride the bus account for 80% of students, and the others either walk, bike, or take a vanpool. The neighborhoods surrounding DCVPA are equipped with sidewalks, and the speed limit is generally 25 miles per hour. This creates an environment where walking and biking are viable options.

A student-led fourth and fifth grade recycling initiative at DCVPA involves collaboration with the University of North Carolina – Wilmington (UNCW). Each week, students empty the recycling bins around the school and prepare the recycling for pickup.

The assistant principal provides weekly composting instruction to fourth grade students; the program allows cafeteria food waste to be redirected to a collaborative composting facility. Once processed, the material is purposed for reuse in gardening and, thus, reduces the landfill load generated by the school. The DCVPS vegetable gardens have already benefitted by utilizing compost. This program teaches students the full cycle of food composting and growing.

DCVPA collaborates with the county and a contractor to ensure environmental health. The UNCW Public Health Department collaborates to produce a school health fair. Air purifiers were added to classrooms to assist with filtration and to promote health and wellness for students and staff. The school is home to an on-site health clinic that provides medical services for students and parents, such as primary care, well-child checks, physicals, diabetes care, and immunizations. As a part of the health curriculum, DCVPA students engage in healthy meal planning, keeping a nutrition journal to monitor healthy habits.



*D.C. Virgo Preparatory Academy students explore pond life.*

The DCVPA learning community is focused on addressing both the physical health and social-emotional needs of students and uses a “kinship model” to facilitate relationship building among staff, families, and students. Staff have been trained in the Community Resilience Model and how to implement restorative circles. Classrooms participate in daily morning meetings using a curriculum prepared by the Social and Emotional Learning Pillar. Schoolwide daily morning meetings are focused on social-emotional learning and highlight student and staff achievements, set goals, and encourage the learning community to succeed in all areas.

In addition to physical education and recess, an Action-Based Learning (ABL) Lab for K-3 students integrates sensory experiences, movement, and academics. Gains noted from ABL work include improved on-task behavior, improved academic retention skills, and growth in visual processing skills such as handwriting. Teachers integrate movement breaks throughout academic instruction to allow students to recenter their brains and bodies for learning. Students voted on a preferred playground design, resulting in a playground that provides elementary students with a place to play near the learning gardens.

The K-8 school and university partnership provides mutual learning opportunities. UNCW undergraduate students and DCPVA students alike benefit from UNCW student teaching opportunities in STEM and special education. DCVPA has access to STEM resources and tools that support sustainability learning. UNCW

sustainability peer educators provide DCVPA students with weekly presentations on various topics on sustainability. The assistant principal, the College of Education, and the Office of Sustainability collaborate to offer middle school gardening.

The assistant principal teaches middle grade students gardening basics, such as how to grow plants from seeds using a greenhouse and grow lights. Students are provided with weekly presentations on various topics on sustainability, such as plants and air quality, the importance of water, and how to recycle at home. Students learn to transfer their plants to raised beds and observe developments in the garden. The school works with a local volunteer (and UNCW doctoral student) to introduce mycology lab lessons and to revamp the learning garden; this effort has engaged additional community volunteers. Students are learning how to read and understand Blum's Farmer's and Planter's Almanac to become familiar with how astronomy, the weather, and planting seasons impact the growth of plants. Students took home "plant packages" during the pandemic to observe plant growth progress and then transferred their plants to the school's raised beds.

All students engage in field trips in the local area that are focused on outdoor education or interdisciplinary learning experiences. DCVPA is a partner in a National Science Foundation Research Experiences for Undergraduates grant to support DCVPA K-8 students learning about marine sciences through authentic interdisciplinary learning experiences; this effort is designed to spark interest about career pathways related to the environmental sciences.

DCVPA middle grade teachers have partnered with UNCW's MarineQuest program to construct three specialized programs for middle grade students. These programs are focused on ecology, meteorology, and biotechnology through the contextual lens of marine science.

## **Wake County Public School System; Cary, North Carolina**

*Cultivating conservation values and community in the research triangle*

Located in Research Triangle Park, Wake County Public School System's (WCPSS) student experiences are influenced by regional organizations that are innovative, environmentally sustainable, and focused on scientific research. With 191 schools, WCPSS is the 15th largest district in the nation, serving over 161,000 students, 51% of whom identify as minority, and employing over 19,000 people. Teachers facilitate learning through project-based learning and understanding by design. School and community projects focus on maintaining a healthy campus, reducing food insecurity, and tackling global topics that encourage learners to be empathetic and culturally literate.

WCPSS facilities include over 26 million square feet and are benchmarked for energy, water, and greenhouse gas emissions in Portfolio Manager, resulting in annual ENERGY STAR certification. WCPSS partnered with the Wake County government to develop the “Guidelines for Design and Construction of Energy-Efficient County Government Facilities and Schools,” a framework that has been used by other school districts as a model for sustainable design and construction. Occupancy sensors, LED lighting, and programmable HVAC system setbacks reduce energy consumption.

Landscaping for new schools includes native plants that do not require irrigation. Many of WCPSS’s older schools have partnered with the North Carolina Department of Soil and Water Conservation to install rain barrels and cisterns, engaging students in these conservation projects. A dedicated water quality management team monitors wastewater collection, treatment, and disposal from individual sites. Five schools within the district have been designated as Watershed Stewardship Schools. In 2019, four WCPSS schools were selected for the expansion of the Bionomic Education Training Centers, which provided them with weeklong rain garden training and certification.

Students are engaged in clubs, such as Feed the Bin (recycling) and Student Water Audit Teams, to embolden learners to be leaders in these efforts. In 2018, nutrition services staff implemented a districtwide plan to replace all Styrofoam trays with compostable ones. A number of schools then partnered with local organizations to both appropriately dispose of the compostable trays and create food waste diversion programs through on-site composting. Even in the shortened 2019-20 school year, over 83,000 pounds of food waste were diverted from landfills and over 19,000 pounds of compost were created for local farms.

Schools plan efficient carpool loading to reduce car idling and encourage walking and biking to school. The district works collaboratively with the North Carolina Department of Environmental Quality and uses the nationally recognized EPA Indoor Air Quality Tools for Schools to identify and address potential air quality challenges and educate the school community. For the last 10 years, WCPSS has concentrated on removing pest habitats from schools rather than using pesticides as part of an IPM policy.

Prior to students returning to classrooms, the WCPSS Board of Education partnered with the ABC Science Collaborative. Coordinated by the Duke University School of Medicine and the Duke Clinical Research Institute, the collaborative pairs scientists and physicians with school and community leaders to help communicate the most current and relevant data about COVID-19. WCPSS put together a series of return-

to-campus guidelines and resources to help staff and students understand the safety protocols for returning to campus. Enhanced cleaning procedures, air filter replacements/upgrades, protective equipment for both staff and students, and social distancing protocols were all part of the return-to-campus guidelines.

WCPSS takes advantage of programs designed with community partners to promote healthy lifestyles. Through such events as First in Fitness and Jump Rope/Hoops for Heart with the American Heart Association, students in grades K-8 engage in exercise outside of the daily 30 minutes facilitated by teachers. Partnerships have also been forged with First Tee golf, Girls on the Run, and the Carolina Hurricanes to provide avenues for students to develop lifelong wellness habits. Working with the Alice Aycock Poe Center for Health Education, over 21,000 K-12 students learn about healthy lifestyle choices with a certified health professional.

Meaningful engagements with such organizations as the Interfaith Food Shuttle and local faith-based groups have helped in efforts to provide students with healthy meal options outside of school hours. WCPSS distributed over 1 million meals to students from strategically located hubs during all-remote COVID-19 classes. Many schools have transitioned lunch and class time to outside natural space areas. WCPSS students are given the opportunity to take “green” breaks during remote learning. Each high school has a Student Assistance Program counselor who works closely with the most at-risk students, such as teenage parents or expectant parents, those experiencing homelessness, and students with chronic attendance issues. Many of WCPSS schools use PBIS programs and other curricula, such as the Positivity Project, to support mental health and well-being. WCPSS uses restorative practices to create healthy relationships and foster student connection. WCPSS has added a director of Equitable Discipline Practices, who monitors fairness, equity, and consistency of student suspension recommendations across the district.

Meaningful learning experiences that focus on the environmental sciences and sustainability are mapped out for students. Citizen Science projects – such as Nestwatch, CoCoRaHS, Critter Cams, Tomatosphere, Shad in the Classroom, the Lost Ladybug, Purple Air Monitoring, and Ants Picnic – are incorporated at all levels. These engagements also lead to student connections with scientists in the region.

WCPSS has 39 dedicated elementary science specialists who ensure the environmental lens is integrated into the K-5 school day. Instructional frameworks that support content integration, authentic student outcomes, and soft skills development are essential to the curriculum and professional development for all elementary and secondary educators.

WCPSS values authentic teacher field experiences to support professional growth in the areas of environmental science and sustainability. Working with Wake Ed Partnership, K-12 teachers attend the professional development SummerSTEM, which focuses on project-based learning and real-world engagement. One hundred five of 191 schools have sent teachers to SummerSTEM, where teachers have field immersions with organizations that include the National Institute of Environmental Health Sciences, Duke Energy, the EPA, and the North Carolina Department of Environmental Quality. They create learning units that focus on such topics as water quality, reducing the carbon footprint, and relating scientific research to personal and global health. Additional professional development experiences include working with the North Carolina Museum of Natural Sciences and the Kenan Fellows program, and these have led to learning units focused on renewable energy sources, air pollution, and healthy ecosystems.

WCPSS offers innovative school choices for families. Two elementary schools share the designation of Center for Environmental Connections, where all K-5 learning has an environmental emphasis. Athens Drive Magnet High School Center for Medical Science and Global Health Initiatives and Wake STEM Early College High School use engineering to tackle such topics as food insecurity, sustainable energy sources, and access to clean water. Athens Drive has a grades 9-12 STEM Academy where students attend integrated high school courses with an engineering emphasis. Other career academies at 17 other high schools feature such themes as biomedical sciences, sustainable energy engineering, environmental studies, and agribusiness leaders.



*Wake County Public School System students participate in the "Shad in the Classroom" conservation project. This class is releasing their fry into the local watershed to boost the population of this native fish.*

Southeast Raleigh Elementary School is a collaboration between WCPSS and the YMCA in which one building serves as both a school and a YMCA. Community service, food insecurity, and unique elementary courses, such as swimming, are all provided to students in partnership with the YMCA. The school partners with a



FoodCorp Service member to maintain two on-site gardens with over 40 garden beds, including a rooftop garden for growing healthy foods. Students sow, maintain, harvest, and prepare the produce grown at the school.

Outside of the classroom, schools provide opportunities for students to become involved in projects, such as student green teams, Envirothon, Big Sweep participation, STEM nights, zoology clubs, family environmental events, garden clubs, and many other opportunities for students to connect with the natural world.

In 2020, the Wake Green Schools Partnership hosted its first conference for WCPSS. Guest speakers from North Carolina State University; Wake County Solid Waste; the Center for Human-Earth Restoration; Audubon North Carolina; North Carolina Cooperative Extension, Wake County; Farm Bureau North Carolina Agriculture in the Classroom; and other community environmental entities frequent WCPSS classrooms to offer learning opportunities for students and teachers. To further promote environmental career connections, WCPSS students participate in the Skype a Scientist program.

## **University of North Carolina – Wilmington; Wilmington, North Carolina**

*Engineering the solutions to coastal challenges*

As North Carolina's coastal university, the University of North Carolina – Wilmington (UNCW) takes great pride in maintaining the local community's natural allure and resources. Enrolling nearly 18,000 undergraduate and graduate students, UNCW has been elevated to an R2 doctoral university. The university has 55 undergraduate degree programs, 35 master's degree programs, and four doctoral programs in seven colleges.

Accolades awarded to UNCW for sustainable practices and actions are not the work of one department or organization but the entire community. UNCW has been listed on the Princeton Review Green Colleges, Sierra Club Cool Schools, UI GreenMetric, and the Association for the Advancement of Sustainability in Higher Education Sustainability, Tracking, Assessment & Rating System. The Lower Cape Fear Stewardship Development Coalition awarded several projects to UNCW that incorporate measures to reduce environmental impact, including new construction, major renovations, and outdoor built space.

In 2009, the UNC system created a sustainability policy. The policy states that new construction and significant innovations should consider sustainability and life cycle cost. This policy builds upon the code that all state-funded buildings must build to at least an LEED Silver standard. Every three years, UNCW develops a greenhouse

gas inventory for emissions. In 2014, various stakeholders and sustainability champions drafted the first Sustainability Action Plan. In 2020, the Office of Sustainability began a campuswide collaboration to create a Climate Resiliency and Action Plan to be researched, written, and edited by students. The plan is an interdisciplinary project open to students from all disciplines to work together collaboratively by leveraging online platforms.

UNCW was the first university in the North Carolina system to reduce the campus' energy use by 30%, based on 2002 baseline numbers. Incandescent light bulbs across the campus have been replaced with LED upgrades. Over 95% of outdoor lighting uses LED bulbs. Across campus, boilers have been replaced with more efficient units.

UNCW has partnered with the North Carolina Coastal Federation to work on stormwater projects, funded by an EPA grant. Four rain gardens have been installed to manage over a million gallons of water a year in the past three years. The university's Landscape Services has an aggressive goal of removing all irrigation from city water and utilizing reclaimed stormwater pumped from retention ponds within the next few years. Over 70% of the irrigation is currently on this system, reusing 760,000 gallons of stormwater instead of potable water each week. Low-flow bathroom fixtures and motion-sensor sinks are common across campus. Small changes, such as going "trayless" at the main dining facility, have saved 8,782 gallons of water each day since 2007.

UNCW has an in-house recycling program. This means that recyclable materials are collected by university staff and hand sorted. Those materials are sold directly to vendors who purchase them to be recycled. The Recycling Department not only accepts traditional recycling, such as paper, plastic, glass, metals, but also collects batteries and electronics recycling. UNCW even has a special Styrofoam recycling program. UNCW also participates in Campus Race to Zero Waste, formally known as RecycleMania, and has hosted several zero-waste basketball games. UNCW diverts about 4,000 pounds of compostable material every month to the New Hanover County composting facility from the main dining hall and was an integral player in getting this county program initiated. All of the fryer oil used in the dining halls is converted to biofuel by an outside vendor.

UNCW encourages alternative transportation through education, incentives, and master planning. One of the City of Wilmington's two extensive multimodal paths cuts through the campus, and the other is adjacent to the campus. Both routes connect Wrightsville Beach to other areas of interest in town. In 2016, UNCW implemented a bike share program on campus. The university was named a silver level Bicycle Friendly University by the League of American Bicyclists. All UNCW

community members have free, unlimited bus access to the campus Point-to-Point shuttle and to the city's bus system with university identification.

Healthy Hawks is a cross-campus campaign promoting programs and educational opportunities that support a nine-pillar spectrum of wellness. Sixty-seven different departments and organizations hosted Healthy Hawk programming over the last school year. There are several programs and departments within the university that have a more specific focus on key elements of health promotion, including outdoor adventures; counseling; drug, alcohol, and violence prevention; and recreational and competitive athletics.



*First-year University of North Carolina – Wilmington students tour the campus using the school's bikeshare program.*

Bluethenthal Wildlife Preserve is a unique space located in the center of campus. This preserve provides just over a mile of trails that meander through longleaf pines, pocosin, a lake, carnivorous plants, hardwoods, and outdoor learning spaces. Other outdoor activities include a 1.65-mile walking loop around the campus with signage featuring sustainability facts about the area. Solar-powered umbrellas in front of the library allow visitors to enjoy the outdoors while charging a phone or other device.

From general maintenance to post-hurricane recovery, UNCW Landscape Services works diligently to create, protect, and preserve beautiful areas using innovation and best management practices to ensure the health and integrity of the environment and people. An IPM plan is in place to eliminate the use of pesticides. Other chemicals, such as fertilizer and herbicides, are used minimally. The Office of Environmental Health and Safety responds to the community-at-large to ensure that such safety measures as indoor air quality and hazardous waste are handled with the highest standard of care.

A 250-gallon aquaponics system is located in one dining hall. A joint project among UNCW's departments of sociology and criminology, marine biology and biology, and environmental studies, the tank combines aquaculture and hydroponic technology, allowing plants and fish to coexist. Campus dining utilizes the vegetables and herbs grown. Students are able to conduct activities involving chemistry, physics, biology, and sustainability to solidify their understanding of scientific theories.

The Sustainability Committee is the grassroots organization that provides recommendations for improvements and new projects to the Chancellor's Sustainability Council. The Office of Sustainability hires student Sustainability Peer Educators and Sustainability Interns to promote sustainable habits and act as a liaison with the student body. The Green Initiative Fund is a student fee used to fund minigrants for research, programs, and initiatives that support environmental stewardship at UNCW and in the community. Each year, at least \$20,000 is allocated to students and faculty for projects that align with the fund's mission.

A nine-credit hour Sustainability Minor was created to enrich any course of study with sustainability values that can be incorporated in any career. In 2020, the first Sustainability Learning Community was established for first-year students at UNCW. This learning community provides the opportunity for first-year students to live in the same residence hall and take three classes as a group that examine the dynamics among people, planet, and profit. The Coastal Engineering program teaches students to address issues affecting coastal communities around the world through the application of geological and physical oceanography, coastal management curricula, applied physics, and civil and ocean engineering fundamentals. The University Center for Marine Science promotes basic and applied research in the fields of oceanography, coastal and wetland studies, marine biomedical and environmental physiology, and marine biotechnology and aquaculture. UNCW has a long history of providing STEM learning opportunities for the community, such teacher professional development, Science Olympiad, and MarineQuest. It also supports the K-12 green school efforts of its lab school, the D.C. Virgo Preparatory Academy.

## **Ohio**

### **James N. Gamble Montessori High School; Cincinnati, Ohio**

*Montessori intersessions inject real-life sustainability*

James N. Gamble Montessori is one of the first public high schools in the nation to be accredited by the American Montessori Society. It is located in the heart of Cincinnati on a 14-acre campus. All students qualify for free and reduced-price lunch, and 77% identify as minority. Gamble Montessori began with two seventh grade classes in the basement of a dilapidated building under another name. Over time, it was renamed and moved to its current building in 2019.

Cincinnati Public Schools spent nearly \$16 million dollars to fully renovate what was an all-girls private school and turn it into a first-place winner of the ASHRAE

technology award for energy-efficient buildings. Gamble Montessori boasts a state-of-the-art building automation system to ensure fresh air circulation. These green school features have become essential during the COVID-19 pandemic; the school is able to execute two complete air flush outs before students enter the building every day and about six air exchanges per hour per space. Occupancy sensors and LED lighting help to save energy.

Gamble Montessori provides a water bottle made from 100% recycled plastic to each of its 608 students. Students oversee an organics recycling program. Cleaning and paper supplies are nontoxic green products. Low-flow toilets and faucet sensors reduce water waste. A facilities manager, a building engineer, and an environmental safety manager work together to conduct quarterly water audits and to ensure water is safe. The school participates in a Safe Routes to School program.

A health and wellness committee has organized organic food options and runs employee wellness programming. Gamble Montessori received a Bronze Level Ohio Breakfast Challenge Award in the 2019-2020 school year. In 2019, Gamble adopted the Good Food Purchasing Program, a coordinated local-national initiative that harnesses the power of procurement to create a transparent and equitable food system. Student dining services partners with local growers, sourcing 90% of milk and 30% of produce from local farmers. Started in 2018, the Gamble Montessori Market has grown into a full-scale collaboration with local business, restaurants, and neighboring schools. The Montessori Market festival engages over 600 students and attracts over 30 local businesses to participate; it raises over \$5,000 annually.

The campus includes four outdoor classrooms and an extensive land lab with a maple grove, arboretum, spring bulb garden, permaculture orchard, raised beds for edible plantings, and kitchen herb garden. Every aspect of the school garden and orchard is maintained by students in all grade levels. Students plan, build, plant, cultivate, maintain, and harvest. The Agriculture Career and Technology program is preparing the campus for a pollinator garden, a high tunnel hoop house, and an aeroponic tower garden.

The environmental science curriculum covers a wide range of topics from biodiversity and ecological relationships; food production; water, air quality, and pollution; climate change; and human impacts on environmental systems to politics, ethics, and social justice. Students are involved in biodiversity labs, tree phenology studies, water quality tests, mock climate summits, and seminar discussions. Students invite local speakers to talk about environmental practices and their careers in the field of environmental conservation. High school students enrolled in an environmental science elective develop projects that require them to research environmental issues in the community and develop solutions. Students write letters

to politicians, make videos and digital presentations, and design logos, magnets, and T-shirts to raise awareness.

One signature Gamble Montessori program are Intersessions, which get students out into the world to connect community service to their in-class learning. Students are offered a wide variety of focus areas to choose from, including, but not limited to, practical life skills, hiking in the Smoky Mountains, whitewater rafting, urban farming and sustainability, animal rescue, and conservation. During high school intersessions, students keep journals, discuss challenging issues relating to social justice and environmental sustainability, perform acts of community service, and synthesize their experiences into professional-grade presentations.



*Gamble Montessori students harvest fresh greens in early spring. Using row cover and germinating indoors, the school has extended its growing season for a full harvest of cool season crops.*

Students engage in a variety of forms of community service throughout their career at Gamble Montessori. Middle school students help remove invasive species growing along the Mill Creek in partnership with local community guides. High school students serve their community during fall and spring intersessions as they volunteer at a local educational farm, prepare the neighborhood community garden for planting, and assist animal adoption and rescue teams. Seniors spend months preparing their senior projects, each of which includes a community service component, and these projects have ranged from food and clothing drives to prenatal nutrition education to planting annual flowers in public spaces.

Middle school students attend fall camp, a four-day, three-night primitive camping experience, where they engage with the natural world by participating in pioneering activities, canoeing on the Little Miami River, and conducting service work at the campsite. Students work together to set up and take down their tents, prepare daily meals for the entire group, and haul water. Science, math, language arts, and social studies lessons are also embedded into the experience. In collaboration with the

Pigeon Key Foundation, eighth grade students participate in six days of immersive study on-site at the Pigeon Key Marine Science Center in Florida.

Annually, before the beginning of the school year, staff gather for a half-day retreat in a natural setting that has featured such activities as canoe trips down the Little Miami River and invasive species removal at Mt. Airy forest. Staff are encouraged to take group lunches outside and hold team meetings in the outdoor classrooms located around the 14-acre campus.

The agriculture education program focuses on project-based learning that teaches 21st century skills to reach collaborative solutions related to the natural world. Students engage in horticulture and culinary labs to learn about plant and food science as well as create and sell products for the school's student-run microeconomy, the Montessori Market. In high school, students can elect to continue their exploration in agriculture education by taking additional courses that focus on animal and plant biotechnology, applications of food science and safety, business management for agricultural and environmental systems, and food marketing and research.

The advisory committee for Gamble Montessori's agriculture career and technical education program is a collaboration among 24 individuals who represent a diverse cross section of industry professionals, production agriculturalists, community advocates, and school district staff. All students benefit from access to cutting-edge practices in agriculture and opportunities to learn from local experts. The Gamble Montessori agriculture program has received generous donations of supplies, tools, and expertise. Students also develop leadership skills through participation in FFA.

## ***Pennsylvania***

### **Hance Elementary School; Gibsonia, Pennsylvania**

*A "Fab Lab" enhances environmental learning*

Hance Elementary School (Hance) sits on approximately 10-15 acres of land and features a plant wall in the entryway and skylights throughout the building. Hance created an outdoor classroom with the support of the Hance PTO, Pine-Richland Opportunities Fund, students, and staff during the 2019-2020 school year. The outdoor space features an amphitheater, picnic tables with umbrellas, and a covered shelter where teachers can facilitate class, brain breaks, or mask breaks during the COVID-19 pandemic. An outdoor walking path was also installed that year to promote the health and wellness of students, staff, and the community.

Hance has tracked consumption of all utilities to determine where conservation efforts can be made and participates in the local utility's programs to conserve energy. Water is tested periodically in all buildings for lead exposure, and all toilets are low flow. Aerators and faucet screens are cleaned on a regular basis, and water use is monitored. Gifted and talented students created a rain garden to reduce stormwater runoff. Rain gauges and barrels were installed in the back of the school near the outdoor classroom so that students can learn about the water cycle.

The Pine-Richland School Board instituted a policy requiring all schools in the district to establish an IPM plan to reduce or eliminate pesticide use that addresses needs specific to the school. Routine testing is conducted to monitor radon levels and air quality in the building. Custodians at Hance use Green Seal certified cleaning products for 90% of their cleaning applications, ensuring that the products in use are friendly to humans and the environment by eliminating dangerous VOCs and toxic chemicals.

The school district has contracted with a transportation provider that predominantly uses propane fuel, and Hance has implemented and expanded their efforts. No-idling signs are posted at all entrances to Hance facilities, and the loading and drop-off area is at least 25 feet away from the building.

All light bulbs, batteries, glass, chemicals, and electronics are recycled or neutralized for disposal. Old computers, monitors, and TVs are recycled as well, along with printer cartridges and cell phones. Hance installed a "buddy bench" made from 540 recycled milk jugs, purchased three water bottle filling stations, and funded water bottles for each student. Waste-free lunch days are sponsored throughout the school year. The Hance PTO hosts a book swap every spring, and Hance participates in Crayola ColorCycle.

Led by third grade students, Hance has participated in Healthy Schools PA, sponsored by Women for a Healthy Environment. This Pennsylvania initiative allows schools to submit a report card with various levels of achievement to be considered for an award. The report card provides criteria in the areas of curriculum integration, community engagement, professional development, sharing success, school philosophy and culture, air quality, water, waste and recycling, energy, health and well-being, transportation, and school grounds.

Hance has developed a Wellness Committee that includes support from the PTO and members of the Hance Elementary Instructional Leadership Team. The Wellness Committee created before- and after-school programs, such as Girls on the Run, Kids of Steel, and yoga, to encourage physical activity. Friday Focus lessons offer social and emotional learning activities. The school counselor and

principal conduct “Minute Meetings” three times per year with students to ensure they are connected with the school and peers and are having a positive experience during their time at Hance.



*Hance Elementary School students participate in a brain break on the indoor sensory path.*

Two sensory paths were installed in the building for students to use during the school day. The Hance PTO created a relaxation station for teachers during the pandemic, featuring massage chairs, as well as new curtains, seating, and paint in the teachers’ lounge. Students in grades K-3 are engaged in a schoolwide positive behavior support system that allows them to earn tickets for positive behaviors to earn healthy rewards, such as extra recess, a nature walk, or a read aloud by a guest reader in the outdoor classroom area.

New science resources focus on the environment and sustainability. Students in kindergarten learn about the needs of plants and animals, while first grade lessons expand upon those concepts by focusing on animal and plant defenses. Second grade and third grade students continue to learn about the environment by studying how landforms change as well as weather and climate. These environmental concepts are tied into social studies and English language arts classes. Students are able to study these concepts while being immersed in the outdoor classroom, making direct connections to the environment surrounding them. The Hance library has an extensive collection of books regarding environmental and sustainable topics, and a new STEM lab facilitates students’ learning about the environment.

## **Commonwealth Charter Academy; Harrisburg, Pennsylvania**

*All virtual, but completely hands-on, agriculture*

Commonwealth Charter Academy (CCA) is a Title I public, cyber charter school serving K-12 students across Pennsylvania. Students, 55% of whom are socioeconomically disadvantaged, do not report to a physical location, accessing their work at home, but buildings are maintained to provide a resource for hands-on experiences that would not be accessible in a home setting. CCA started the school

year with approximately 10,000 students, which increased to 19,000 during the COVID-19 pandemic.

CCA reaches students through virtual instruction and provides face-to-face opportunities at 11 Family Service Centers. Five of these facilities include drop-in centers or areas where students can choose to report daily or weekly for assistance with their courses, tutoring, field trips, and other programming. Students can participate in field trip opportunities in their area. CCA invested in three mobile classrooms to enhance regional field trips. Each mobile lab specializes in certain activities, with one specifically catering to sustainable learning through aquaponics.



*Students record aeroponic data at AgWorks, Commonwealth Charter Academy's aquaponics facility.*

As a cyber school, CCA is uniquely suited to address sustainability. For example, there is no daily bus commute for students. When a student requests to attend a drop-in center, they are encouraged to take mass transportation, with CCA offering to provide bus passes free of charge. Students bring their lunches if they plan to stay for the day. From home, they submit their work through an online learning management system, reducing paper waste. Many science

experiments include items that are typically found in the home, reducing shipping costs for curriculum kits.

In December 2018, a CCA Works Initiative was begun to introduce and guide students through the career planning process, with assistance from some of the largest employers in Pennsylvania. One of its Works centers, AgWorks, at the Capital Campus building, is the largest K-12 school-based aquaponic facility in the country. Aquaponics allow the operator to grow fresh, organic produce and raise fish. At CCA, this produce is provided to local restaurants or donated to the Central Pennsylvania Food Bank.

The facility includes fish tanks, grow beds, clarifiers, LED lights, and technology to bring learning alive to students. AgWorks is 100% powered by 1,050 solar panels, located on the roof of the building. The remaining energy is used to supplement power to the rest of Capital Campus. Students use an online dashboard to learn about energy production and how to reduce energy usage and costs.

Students learn about composting, embryology, and animal husbandry and hatch chickens. AgWorks staff craft lessons, videos (prerecorded or livestreamed), photos, and time-lapse videos for staff who are teaching virtually. A virtual Down on the Farm series included visits to local farms, highlighting the work those farmers were doing during the COVID-19 pandemic. In addition, students have learned about and participated in field trips to wastewater treatment plants and have studied ecosystems, lake ecology, mine impacts, waste management, and alternative energy,

CCA partners with Harrisburg University to have students analyze and report their water usage and carbon footprint, using that information as a key discussion point on how they can reduce their environmental impact. The Harrisburg Family Service Center was able to reduce energy usage by one-third through a grant to install solar panels on the roof with a learning dashboard for students to track energy generation. The mobile aquaponic classroom also has small panels and a dashboard.

Capital Campus strives to reduce water usage and provide additional tie-ins with the grow lab. CCA installed water filling stations to reduce the use of plastic and encourage healthy lifestyle choices. The aquaponics lab uses 90% to 95% less water than a soil-based agricultural system. Students are trained to mitigate food waste, and any unused food or dead leaves are donated to two staff members who feed it to their chickens. CCA does not use pesticides; instead, it implements an IPM approach. Students are researching the installation of a compost system.

A robust wellness program, including reimbursement for gym memberships and continuing education, inspires staff to live a healthier lifestyle. All K-12 students receive a physical education kit with a variety of items to encourage them to stay healthy. A Community Class Reimbursement helps to offset the cost of extracurricular community classes, such as sports leagues, karate lessons, swimming lessons, and other fitness classes. Students have access to a Student Assistance Program, which provides support and guidance to students and families. A counseling team offers monthly lessons on a variety of mental health topics. CCA offers an Adventure Club and field trips that include archery, canoeing, white water rafting, zip lining, hiking, snow tubing, ice skating, horseback riding, outdoor rope courses, orienteering, kayaking, stand-up paddleboarding, golfing, fishing, and paintball.

## **Lehigh University; Lehigh, Pennsylvania**

### *The campus as a living lab*

Lehigh University has made tremendous strides as an institution to create a campus that merges environmentally responsible solutions with equitable community practices. One of the Lehigh's visions is a commitment to social, environmental, and economic sustainability. Over the years, Lehigh has been recognized nationally for its sustainability efforts through various national rankings. Lehigh is consistently ranked in the Sierra Club's Coolest Schools list and in The Princeton Review's Guide to Green Schools. Additionally, since 2015, Lehigh has submitted a Sustainability Tracking, Assessment and Rating System report annually to the Association for the Advancement of Sustainability in Higher Education.

In 2020, Lehigh adopted its Sustainability Strategic Plan 2030, which provides a long-term vision for sustainability and will improve operational efficiencies and promote cost savings. It encompasses six focus areas and 113 goals, with each goal aligning with one or more of the United Nations Sustainable Development Goals. This 10-year plan is intended to inspire ecologically sound, socially just, and financially prudent actions that improve the well-being of people and the environment and positions Lehigh as a local and global collaborator and leader.

This process included numerous meetings with administrative departments and colleges to establish goals and obtain buy-in. It also included a two-part series of campus workshops open to all faculty, staff, and students, as well as engagement with the City of Bethlehem and Bethlehem community. Additionally, an Alumni Advisory Council made up of nine alumni offered their expertise to shape the plan. Throughout the process, the Lehigh Sustainability Council (faculty, staff, students, and senior administrators) provided crucial oversight and support.

Lehigh has begun the process of creating a bold Climate Action Strategy and is currently assisting the local Bethlehem community with climate action. Lehigh uses the results of its annual greenhouse gas inventory to guide decisions and has implemented numerous measures to conserve energy and increase efficiency. This includes LED lighting projects and HVAC upgrades. Lehigh will soon be offsetting 100% of its electricity emissions through a combination of off-site and on-site projects, energy conservation, and renewable energy credits and is mapping out a plan to transition its vehicle and bus fleet to run exclusively on renewable energy.

Lehigh continues to make progress to reduce universitywide water usage, including process, irrigation, and potable water usage, as well as waste generated on campus. One prime example of a water reduction strategy that Lehigh has incorporated into

the design of its new Health, Science, Technology building, the home of the new College of Health, is a rainwater reclamation system that will irrigate the green roof and indoor planters and be used for flush fixtures.

Lehigh is beginning to plant more native plants, shrubs, and trees in the areas around residence halls to improve soil regeneration and reduce excess runoff. Several lawn landscapes on Mountaintop Campus will be transitioned to native meadow landscapes in 2021.



*Lehigh University students participate in the annual Eco-Rep Leadership Program Trashion Show in spring 2019.*

Lehigh eliminated the use of plastic straws and Styrofoam on campus. Additionally, the Community Service Office holds an annual move out collection drive. This sale raises approximately \$20,000 per year for the South Bethlehem community and diverts 20 tons of goods, including 1.5 tons of food, from going to waste. The Sustainability Strategic Plan 2030 outlines

specific near-term, intermediate-term, and long-term goals for water and waste at Lehigh, including developing a broader campus zero-waste strategy that outlines a roadmap to a zero-waste campus by 2030.

In 2018, Lehigh University and the Lehigh and Northampton Transportation Authority partnered to offer free bus rides to students, faculty, and staff with a Lehigh ID. In 2020, Lehigh joined the EV Purchasing Collaborative to leverage the buying power of fleets to make electrification more simple, affordable, and accessible. In addition, Lehigh kicked off the development of an Alternative Fuel Study to develop a plan to fully transition the campus bus and vehicle fleet to run exclusively on renewable energy. Over the last several years, Lehigh has purchased an all-electric bus and eight hybrid/all-electric vehicles for its fleet. Lehigh's Office of Sustainability applied for, and was awarded, a grant from the Pennsylvania Department of Environmental Protection in 2020 to add two all-electric vehicles to the fleet. Additionally, four electric vehicle charging stations with two ports each have been installed across two of Lehigh's campuses.

Lehigh has a strong commitment to health and wellness, as evidenced by the creation of the new College of Health and the inclusion of a “Health and Wellness” focus area in the Sustainability Strategic Plan 2030. Programs such as the Employee Wellness Program, which encourages the entire community to commit to a healthy and active lifestyle; dietician/nutrition services that include nutrition counseling and helping students create meal plans; and mental health services provide ongoing support for faculty, staff, and students.

Through Lehigh Dining and the Real Food Challenge, Lehigh students, faculty, and staff have access to food on campus that is local, organic, humane, and fair trade. Lehigh Dining is in the process of expanding its commitment by collaborating with the Office of Sustainability and Purchasing Services to develop the Lehigh University Sustainable and Healthful Food Purchasing Policy.

Lehigh University has an Environmental Health and Safety (EH&S) office that promotes a safe and healthful environment through the development and implementation of health, safety, and regulatory compliance programs and procedures. This includes hazardous waste management, inspections, training sessions, and emergency response action. EH&S staff conduct regular trainings to raise awareness of potential issues, and they work closely with Lehigh faculty in research labs to ensure all safety procedures are followed. Lehigh’s cleaning vendor uses green cleaning products in alignment with Lehigh’s Sustainable Purchasing Policy.

Lehigh students are engaged in sustainability research, internships, and opportunities to use the campus as a living lab. Some of the examples include an app to help direct leftover food from campus events to hungry students, smarter trash and recycling bins to eliminate recycling contamination, and a food carbon footprint calculator for Lehigh Dining to display how carbon intensive the menu item is and to motivate sustainable food selections. Students present this work annually at the Lehigh Expo, a universitywide showcase of project work. Graduate students have worked with state and local governments to support greenhouse emissions inventories and farm to school efforts. Student sustainability competencies are assessed twice a year through a Sustainability Literacy Assessment. The results are reviewed, knowledge gaps are identified, and solutions to narrow those gaps are then implemented.

Each year, the Office of Sustainability and the Lehigh Sustainability Council host a sustainability curricular integration workshop. Additionally, in 2020, the Office of Sustainability and the Lehigh Sustainability Council developed a College Level Sustainability Framework to guide colleges in incorporating sustainability into

academics, experiential learning, and research. In working with Library and Technology Services, a Teaching Sustainability Library Guide was also developed to assist faculty in incorporating sustainability into their classes. As part of Lehigh's Climate Action Strategy development process, the Office of Sustainability, in collaboration with faculty, developed a class toolkit to assist faculty from all five colleges at Lehigh in integrating climate action into their classes. Lehigh also incorporated education and research opportunities into both of its off-site and on-site solar agreements.

As a premier research institution, Lehigh's Energy Research Center finds solutions to national and global energy and energy-related problems by collaborating with federal, state, and local agencies, energy businesses, technology developers and suppliers, the research community, and academic institutions. Lehigh engineers are making cutting edge breakthroughs in technologies to produce green hydrogen. Lehigh's Design lab team also took on an essential role early on during the COVID-19 pandemic in printing 3D face shields.

## ***Rhode Island***

### **Barrington Middle School; Barrington, Rhode Island**

*Deep learning for global citizenship*

Barrington Middle School (BMS) participates in the Barrington School Departments' plan to manage energy use through the EPA Energy Star Portfolio Manager, and BMS achieves a 40% energy savings above International Energy Efficiency Certificate 2009 baseline requirements. The school uses high-efficiency fixtures. In addition, appliances are ENERGY STAR label. Landscaping was developed using durable native plantings that flourish without heavy maintenance or irrigation. Stormwater runoff from the school site was reduced by using low impact development best management practices that include rain gardens and sand filters.

The BMS recycling program has continued through the pandemic; composting, managed by volunteers, was temporarily put on hold. All paper is made from wood that came from a certified managed forest. All potentially hazardous materials are either kept in locked metal cabinets or in the locked maintenance shop. Maintenance staff use Green Seal cleaning products and practices. BMS has had an IPM plan in place since 2002, in accordance with EPA guidelines. The building has carbon monoxide, humidity, and ventilation detection devices in every classroom that monitor levels and adjust the amount of outside air being delivered to each space.

The building has an active radon mitigation system and is inspected for radon levels regularly.

Bike signage, bike parking, lighting, and wide bike paths were designed to encourage students to bike to school in all seasons. The school building committee conducted a post construction traffic study to further evaluate improvements to enhance pedestrian and bicycle access. The Town of Barrington continues to expand its Safe Routes to School and has taken on projects that make impactful connections from the school property to local bikeways. BMS also provides reserved parking for electric vehicles. No-idling signs are posted at the loading area in front of the main entrance to the building.

BMS works closely with Chartwells, the contractor that provides school breakfast and lunch. Throughout the school year, Chartwells works with local farms to purchase and incorporate farm-to-table food options when available. Chartwells creates campaigns so that families, staff, and students are aware of and celebrate these local foods.

All students and staff are provided with opportunities to take daily walking breaks outdoors. In addition, the Health and Wellness Committee provides staff with information about wellness and physical activity best practices. All staff are trained in mindfulness and emotional intelligence. Working with Rhode Island Interlocal Trust, Barrington provides staff with a monthly calendar of events, activities, and challenges that range from walking challenges, water challenges, yoga, group and individual exercise, to courses on nutrition, cooking, and mental health. BMS has a full-time nurse, psychologist, and social worker on staff, in addition to a counselor for each grade level.

BMS has empowered students to take an active role in environmental literacy. BMS developed a Youth for Climate Action Group, whose student members codesign lessons with faculty. The group also reminds students and staff of climate change and what they can do to lower their environmental impact as a school community. Parents with expertise in climate and the environment visit and work with BMS students on environmental and sustainability issues.

With the adoption of the U.N. Sustainable Development Goals (UNSDG) and Deep Learning Competencies, students engage in project-based learning that involves positive environmental impact or helps the community. Some examples of Deep Learning projects include building earthquake-proof structures, evaluating objects that are made from synthetic materials, developing ways to use sustainable materials, and learning about environmental impacts.

Sustainability and environmental concepts are woven throughout the three years of middle school science. They are also evident in interdisciplinary lessons that focus on students' deep understanding of the environment from a current events and scientific lens. In math, students use underwater mapping tools to measure the impact of use and climate change on the floor bottom of local water systems.

The global classroom is used to communicate and livestream with environmental agencies and experts across the globe. The entrepreneurship teacher leads a UNSDG project in which students learn about upcycling and environmental impact; students then "sell" their upcycled product and explain the reasons why it helps the environment. Students also annually take tours of the nearby landfill and recycling center to see the impact of waste on the environment.



*This device was created and used by BMS students to check soil composition and activate a water pump.*

BMS installed outdoor classrooms, and the campus abuts wetlands that classes use for learning spaces. BMS uses the Rhode Island Department of Education School Building Authority's School as Tool program to communicate to students, finding learning opportunities related to construction, energy efficiency, and sustainability. BMS partners with the Barrington Community Farm as one way to promote and participate in environmental and sustainable education.

To a great extent, the school promotes and encourages students to conduct civic and community engagement projects. Each grade conducts projects and uses them to inform others. Some outcomes are removal of plastic trays and straws from school, composting at BMS, increased recycling, decreased paper consumption, the provision of socks and coats to homeless shelters, the donation of food products to local agencies, and the incorporation of speed monitors throughout town. In addition, BMS partners with New Pedagogies for Deep Learning: A Global Partnership, which focuses on global citizenship education and works on annual human impact projects.

## Portsmouth School Department; Portsmouth, Rhode Island

### *Outdoor learning across the school district*

Portsmouth School Department (PSD) is a suburban school district located on the north end of Aquidneck Island in Rhode Island. The Navy base makes up a large part of the island, and the district welcomes military families whose children attend school in the district for one to three years at a time. With a total of 2,600 students, PSD is comprised of two elementary schools, one middle school, and one high school.

Since 2011, PSD has had an energy plan in place that covers the conservation of energy, from printing materials and lights to heating and cooling. PSD adheres to standards outlined in the Northeast Collaborative for High-Performance Schools; ASHRAE Standard No. 90.1, the energy standard for buildings; and the Rhode Island Building Energy Code. New equipment purchased must carry the ENERGY STAR label as often as practical. PSD prohibits the purchase of low-efficiency products, including incandescent task lights, halogen torch lamps, and portable electrical resistance heaters.

Portsmouth High School (PHS) is home to the district's wind turbine, erected in 2009 and a large producer of electricity in town. The district receives energy credits, which reduces its electricity bill. Hathaway Elementary School received a new energy-efficient white roof in 2018. Melville Elementary School and PHS both received partial new roofs as well. The boilers have been replaced with ENERGY STAR high-efficiency natural gas boilers at the two elementary schools and at PHS. In 2018, PHS underwent a \$425,000 auditorium renovation, which included installing LED lights and PFC power supplies with auto standby to reduce power used.

The district's water is monitored annually, as are radon and lead levels. All cleaning products are Green Seal certified. Cleaning products are dispensed through dosing machines that predilute the products, preventing overexposure while also assisting in water saving methods. A no-idling policy is in place districtwide. Pest mitigation is primarily accomplished through nonpesticide traps and cleaning. Natural products are used for the playground or athletic fields. Each classroom has an air purifier with H13 filters, and the building has HVAC systems that have new MERV13 filters. Since 2012, PSD has implemented an Indoor Air Quality Management Plan using through EPA's Tools for Schools.

School gardens provide the ideal site for applied environmental education at the schools. Both elementary schools have been improving their outdoor learning spaces for the last five years. Melville Elementary students, working with Eastern

Rhode Island Conservation District and high school seniors, installed a rain garden to help to control stormwater runoff and increase pollinator habitats. Teachers received a year of professional development from THRIVE Outside on how to use the outdoor spaces to teach all content. Hathaway Elementary, working with the Audubon Society, created an outdoor habitat, pavilion, and outdoor learning lab.

Prompted by a high school student, PSD initiated recycling in 2011. In 2019, Hathaway Elementary School started a composting program. Then both elementary schools and the middle school began with one grade of composting, gradually building to the entire school. Each school has designated student ambassadors who help navigate ways to compost even during the COVID-19 pandemic. At all schools, water bottle filling stations have been installed since 2012. The PHS Green Club constructed waste stations for all district schools to help improve the sorting of recycling and landfill garbage.



*Both Portsmouth School Department elementary schools have outdoor learning centers where they teach all content classes as well as some of the specials like music and art.*

At the high school, the Green Club has been in place for nine years. Students lead beach cleanups, tree plantings, electronic waste collection drives, an annual Earth Day festival, and, more recently, helping to plan for Aquidneck Island Earth Week. The president of the Green Club designed an outdoor classroom for her senior project. Other PHS offerings include an on-site “orchard” with many species of trees offering opportunities for species identification and the use of the nearby town park “Ft. Butts” as a place for ecological research conducted by environmental science students. At PHS, there are a number of gardens planted in areas of high drainage from the school roof to reduce runoff.

PSD works with several local agencies, both during and after school. Audubon Society, Clean Ocean Access, Save the Bay, Thrive Outside, ERICD, and Portsmouth Historical Society are a few. The high school conducts an “Energy RI” field trip where students visit the wind turbines at the Narragansett Bay Commission, the Rhode Island Nuclear Science Center at the University of Rhode Island, and Newport Biodiesel. Outreach visitors from Clean Ocean Access and Aquidneck Land Trust visit annually to conduct presentations. During the Earth Day Fest, many local

companies and nonprofits set up exhibits, including Aquidneck Land Trust, Norman Bird Sanctuary, Clean Ocean Access, Sailors for the Sea, and Newport Biodiesel.

The district received the Multi-Tiered System of Supports program to train administrators, faculty, and staff to support the academic and behavioral needs of all students. In addition, the schools adopted Choose Love, a social and emotional learning and character education program. At the elementary schools, common behavior expectations, Whale Done, and Golden Apple certificates highlight classrooms that are following the expectations. Students participate in Pennies for Patients and Jump Rope for Heart.

The PSD is an active participant in the Rhode Island Interlocal Trust's Health Matters Program, which is designed to promote innovative approaches to total worker health. Comprehensive on-site programming is available free of charge for all staff and includes physical activity classes; educational sessions on such topics as nutrition, well-being, and fitness; behavior change interventions; self-directed challenges; and awareness campaigns. One example is the Nourished! Six-week Weight Loss Challenge, which is offered in partnership with Rhode Island Nutrition Therapy and is designed to provide learning opportunities and activities on how to feed and fuel the body with wholesome, sustainably sourced nutritious foods. During the COVID-19 pandemic, PSD has continued to offer these wellness opportunities to all staff virtually.

PSD's food contractor, Chartwells, has a robust farm-to-school program that features local produce such as apples, corn, potatoes, and squash. Chartwells obtains bread from a local company and collaborates with Farm Fresh Rhode Island on various events such as harvest meals and food tastings. The middle school is home to a farm that, after its first harvest in 2021, intends to show students how to prepare nutritious food and donate one-third of the harvest to the food bank. The elementary schools have installed edible gardens as well.

PSD's science curriculum incorporates environmental education aligned with NGSS. In kindergarten, students learn about what plants need in order to survive. At the high school, courses such as environmental science (both academic and AP), renewable energy, and oceanography are offered regularly. A nearby park is used for environmental science students to apply their knowledge to a real environmental setting.

Portsmouth Middle School created an after-school club called Portsmouth Ag (Agriculture) Innovation where students planned and designed farmland on five acres, featuring solar energy, composting, pollinator pathways, an outdoor pavilion, and a high tunnel. During the COVID-19 pandemic, elementary students were given

two recesses and an allotted time for outdoor learning every day, a schedule PSD plans to continue.

Both elementary schools have an outdoor learning center where they teach all content classes and some of the specials, such as music and art. At the middle school, students get out to the farm, where they learn about sustainable farming, financial literacy to maintain a farm, and how applied math works when planning a farm. Students have worked with many environmental organizations. For example, Save the Bay hosts third grade students at their aquarium, and students then go on a seal watch. They learn about the structure and function of seals and how fishermen work with environmental organizations to maintain an equal food web.

Both elementary schools and the middle school have a Makerspace. In that space, students are engaged in STEM learning. At the end of each unit, students are given an engineering design challenge to solve using the content that they have been learning. For example, in second grade, students learn about erosion and the Earth's surfaces. They are then tasked with ways to prevent landslides. In third and fifth grade, students learn about ecosystems and the food web and then try to see if they could grow food on Mars. In seventh grade, students learn about the ecosystem and then do a wetlands project. In eighth grade, students try to find ways to help reduce the amount of pollution in the world during a climate change engineering week.

## **Utah**

### **Shadow Valley Elementary School; Ogden, Utah**

#### *Project-based learning about air quality*

Shadow Valley Elementary School is nestled on the east bench of the Wasatch Front. The building was constructed in 2009 with the local community's vision of an environmental science magnet school that teaches sustainable living, along with a strong science curriculum. The campus was built to LEED standards. The school exceeds energy code requirements by over 14%, due to design and layout factors of minimizing west-facing windows, reducing internal electrical loads, installing energy-efficient lighting, harvesting both sun and wind energy on-site, and employing highly efficient heating and cooling systems.

Shadow Valley was designed to maximize water efficiency and uses 45% less water than schools constructed to normal standards. More than 28% of the school was constructed of recycled materials, such as structural metal, metal studs, concrete, acoustic ceiling tile, carpet, and ceramic tile. Over 44% of the materials used to build

Shadow Valley were manufactured within 500 miles of the school site, reducing environmental impact.

When the local municipal recycling program was suspended, students asked questions about the rationale for the service discontinuation and learned that there is a recycling crisis on national and global levels. They have since created projects to bring awareness to the issue and show the community ways to repurpose or reuse materials before recycling or disposing of them. They work to oversee and revamp the school's recycling and composting programs. With the closure of water fountains due to COVID-19, Shadow Valley installed touchless water bottle refilling stations to improve water quality, protect students and staff from surface germs, and reduce the consumption of single-use plastics.

Shadow Valley partners with senior Weber State University engineering students to design and build an electric green car to race in the Mountain West Grand Prix. This project, part of the United Kingdom's Greenpower Education Trust global initiative, is part of the Utah Department of Energy's program to educate Utah students and the community about alternative transportation solutions. Approximately 51% of Shadow Valley students ride the bus to school, and roughly 22% walk, bike, or carpool with other families. The school encourages alternative transportation by dedicating specific parking spaces to low emission vehicles, partnering with Bike Utah to educate and encourage students to ride their bikes to school and other destinations, and holding walk and bike to school events each year.

For a full week in late winter, Shadow Valley works to educate students and parents about the importance of reducing emissions, especially in months when air quality declines in Utah. In the COVID-19 environment, this began with a virtual assembly and continued with signs outside in drop-off and pickup zones to remind parents to be idle free. If parents turn off their engines, their student receives a small prize as they enter the school. In previous years, Shadow Valley's Green Ambassadors conducted research to learn the impact of the idle-free initiative. They found that more than half of the cars avoided idling before the initiative but more than 75% of cars avoided idling two weeks after the initiative.

The student news group announces air quality each day. One sixth grade class is working on monitoring to test the air within the school and then research and test ways to improve the air quality. Pest management education includes students selecting animals and plants that naturally control and minimize pests without using harmful pesticides, as part of outdoor classrooms design.

The school campus is located in a city park; the park was designed to slope into three tiers so stormwater would run down each tier and less irrigation would be

needed to maintain the lawn. The trees and plants on the school campus and park have been selected because they are native to the area and require minimal watering. The park features an outdoor classroom that was not clearly defined by the school or city, so that, in the first year the school and park opened, the outdoor classroom was not maintained, invasive plants grew, and the space became unusable. Subsequently, the STEM and environmental science teachers created a schoolwide multiyear problem-based learning project to improve the campus. Shadow Valley has been awarded grants to help assist in the design and renovation of the outdoor classroom. The teachers have also established relationships with community partners that include Ogden City, the Weber Basin Water Conservancy District, and Weber State University for assistance with this project. Students redesigned the outdoor classroom into four distinct areas.



*Kindergarten students compare and contrast their experiences hatching chicken and trout eggs and growing seeds.*

Teachers, supported by a school counselor and a behavior specialist, have adopted the Second Steps curriculum to support students' social and emotional learning. It focuses on teaching mindfulness, compassion, empathy, and resiliency practices. Three times a year, students and faculty take a panorama survey to assess social, emotional, and learning needs in the school.

Shadow Valley uses Let's Move and Alliance for a Healthier Generation to assess physical activity and school lunch programs. The P.E. teacher offers yoga and meditation classes, designed for students and teachers who need healthy ways to cope with stress. A staff wellness representative leads teachers in monthly wellness challenges, with such themes as steps, stress, and nutrition. Staff yoga and walking groups are offered after school.

Operating for over 11 years, the school has maintained its environmental focus through administration, faculty, and staff changes, by creating a curriculum that is

based on environmental studies. Every subject covers some aspect of the environment and ways to solve environmental issues.

In addition, every student at Shadow Valley attends environmental science classes. The environmental science program focuses on educating students about the environment, as well as providing large and small project-based learning activities that attempt to solve environmental issues. Students in upper grades created science fair projects that focused on a topic that falls under the three green school pillars. Sixth grade students design acceptable composting procedures, indoor air quality initiatives, and alternative energy powered structure design. First through fifth graders create sustainable ecosystems and a habitat area for learning about native organisms. Kindergarten and special education students learn about the importance of recycling. They also “become” biologists to compare and contrast the growth and needs of different living organisms.

Annually, kindergarten students participate in the adopt a tree program, deepening their awareness of individual trees over time and encouraging a greater understanding and appreciation of their local environment. Fourth grade students learn about the science of energy and the importance of alternative energy. They study how wind turbines work and have been investigating ways to fix the school’s own wind turbine, recently broken in a storm.

During the COVID-19 shutdown, Shadow Valley used the opportunity to offer staff environmental science professional development with the theme “Getting Back to Going Green.” Each teacher completed a weekly online class that led them through such topics as the pillars of a green school, plans for the redesign and building of the outdoor classroom, and how to plan problem-based environmental science lessons aligned with state standards.

## **Virginia**

### **Prince William County Public Schools; Manassas, Virginia**

*Challenging an entire division to make sustainability a priority*

Prince William County Public Schools (PWCS), the second largest school division in Virginia, serves over 89,000 students in 96 schools. The 347-square-mile district comprised of urban and suburban areas serves a diverse population that includes 72% minority students and 25% limited English proficient students. Forty-eight percent of the district’s students qualify for free and reduced-price lunch.



In June 2020, the PWCS School Board passed a new Sustainability Initiative that brings the tenets of U.S. Department of Education Green Ribbon Schools to the forefront within the school division. Objectives include: 1) establishing standards for net-zero buildings; 2) establishing standards for procurement, installation, and operation of solar power systems; 3) recommending a standard for high performance building design specifications; 4) determining the feasibility of replacing all fossil fuel buses with electric; 5) establishing a sustainability advisory committee; 6) participating with Prince William County in the creation of a countywide sustainability task force; 7) creating measurable standards for environmental literacy; and 8) increasing site-based participation in waste reduction.

Established in 2012, the PWCS energy management program generates savings based on behavioral changes and operational strategic planning. EnergyCAP software is used to track energy, water, and greenhouse gas data; benchmark buildings; measure and verify savings; create budgets and forecasts; and submit building data to the ENERGY STAR Portfolio Manager. PWCS has approved, and is currently procuring, building automation analytics and continuous commissioning for 95 sites. PWCS is the first district in the nation partnered with the Lawrence Berkley National Labs to use a public-access, data-driven benchmarking tool.

Since 2011, PWCS has built eight new elementary schools that earned LEED certification and is pursuing LEED certification for two schools currently under construction. Sixty PWCS sites have earned ENERGY STAR certification. PWCS is currently replacing the 30,000 existing fluorescent light fixtures with LED interior and exterior lighting in all schools, with an estimated \$2 million in utility savings and a decrease in 3,600 metric tons of carbon. These energy conservation efforts have resulted in an average 24% decrease in utility costs, while the total square feet of the buildings have increased by 15%, for a total cost avoidance estimated at \$48 million.

PWCS has replaced all sinks and toilets with low-flow and flush devices. All high schools have artificial turf fields to reduce water required, maximize playing time on the fields, and reduce the footprint of practice fields. Since 2012, all remodeled buildings have been provided with irrigation systems that limit water usage and overwatering. Since 2012, all eight of the newly constructed elementary schools have included installation of underground cisterns. These cisterns collect water from the roof and then store the water for use as irrigation, reducing the use of potable water for irrigation, along with the associated cost.

The division sponsors recycling events and assemblies to raise awareness. In September 2020, the school division was awarded a U.S. Department of Agriculture Community Composting and Food Waste Reduction grant, facilitating the initiation of

a pilot composting program. PWCS annually participates in two Safe Routes to School days. These activities bring schools and communities together as they enjoy sustainable transportation and physical activity.

An aquatic center, recently constructed at one district school, is home to the PWCS Water Safety School. This program provides free swimming instruction to PWCS second grade students and utilizes the American Red Cross Learn-To-Swim curriculum. Approximately 10,000 students have participated in the program since the facility opened.



*Native plant gardens at Prince William County Public Schools are maintained by student green clubs, provide native species for a semi-annual plant sale, and are designed to provide food and shelter for pollinators and birds.*

The PWCS program, BeWell, strives to provide world-class well-being to all PWCS staff through holistic wellness focused on physical, emotional, social, occupational, and financial health. Some supportive resources that BeWell offers are webinars, online challenges, health fairs, all focusing on the five pillars of the district's well-being program.

PWCS purchases seasonal fruits and vegetables from Virginia farm-to-school vendors. As part of the Farm-to-School initiative, second grade students participate in an annual corn-shucking contest every September.

To promote a safe, healthy learning environment, each campus annually reviews and adheres to the preventive maintenance and monitoring plan administered by the PWCS Facilities Services department, for HVAC, building envelope, water quality and conservation, chemical safety, and moisture management.

PWCS has an IPM program that begins with maintaining clean buildings. The entire staff is involved with a goal of pest control without pesticides. If pest management is required, a work order is sent from the specific school and tracked. The IPM team uses such methods as trapping, screening, and caulking to control and eliminate pests. Steam cleaning and power washing are also often used to ensure the health and safety of the students and staff of PWCS. If the use of chemicals is necessary, they are EPA-approved and are applied after school hours.

In 2017, PWCS changed the cleaning strategy in all schools, using only four cleaning products – a hard surface disinfectant, odor eliminator, degreaser, and floor cleaner. As the products were distributed, each custodial station was equipped with a product mixing station, and staff were trained in the proper usage of the four products. Color-coded microfiber cloths are used, washed, and reused to reduce waste. In the cafeterias, kitchens, or wherever food is eaten, a food contact surface sanitizer is used. The implementation of these products has led to a reduction in water and chemical usage and resulted in a cleaner school environment.

Annually, since 2013, the division has hosted a sustainability summit to celebrate accomplishments and share best practices among PWCS schools. Led by the sustainability coordinators in each school, staff members and students from all schools collaborate, share activities, and explore new opportunities with community partners. The August 2020 summit was held virtually, due to COVID-19 limitations.

Every year since 2015, PWCS has hosted an annual Energy and Sustainability Challenge to support the activities of the Sustainability Coordinators, encourage student-led activities, and provide rebates for school sustainability programs. The Challenge guidelines require activities in a minimum of three curriculum areas, including energy conservation, waste reduction and recycling, and water conservation. The primary curriculum for the Challenge is based on Project Learning Tree (PLT) GreenSchools. Since inception, more than 280,000 students have participated.

In fall 2019, the PWCS Energy Management and Sustainability Team began developing environmental science activity books for elementary students in grades K-5. The first book of the five-part sustainability activity book series was published in the fall of 2019. The books are available to PWCS students, free of charge, either as digital flipbooks or as paper booklets. Students can learn about and engage in activities that explore conservation of resources and sustainability.

At the elementary, middle, and high school levels, a required minimum of one MWEE enables students to participate in hands-on environmental learning about the Chesapeake Bay watershed. The goal is for every student to graduate with the knowledge and skills to act responsibly to protect and restore their local watershed. MWEE is organized into three phases, encompassing research and discussion, observation and data collection, and reflection and analysis.

For the past 30 years, the Prince William Soil and Conservation District annually hosts Farm Field Days for PWCS at the Prince William Fairgrounds. Fourth grade

students rotate through seven barns, learning aspects of life on a farm, with hands-on lessons geared to meet Virginia Standards of Learning for science.

Environmental science is taught at the ninth grade level at all county high schools. Students may take earth science, advanced earth science, AP environmental science, and IB environmental systems. Specialty programs include an environmental engineering career program; a Center for Environmental and Natural Sciences; and an Agriculture Program that encompasses horticulture, turf maintenance, and landscaping, among other subjects.

To support and engage students in STEM activities, PWCS has funded a robotics program for all grade levels since 2009. The FIRST LEGO League Challenge introduces scientific and real-world tasks for students to problem solve as a collaborative team every year. Environmental and sustainability challenge topics have included Climate Connections, Trash Trek, Animal Allies, and Hydrodynamics.

## **Washington**

### **Anderson Island Elementary; Anderson, Washington**

*No individual is an island – especially on an island*

Anderson Island Elementary (AIE) is small, rural school within Steilacoom Historical School District, serving 22 students pre-K to third grade, 41% of whom qualify for free and reduced-price lunch. AIE strives to offer all students an equitable, hands-on, well-rounded education.

AIE has implemented experiential and project-based learning for students. In just a few years, AIE transformed parts of the forest to an outdoor classroom, which was built with sustainable infrastructure and remains an interactive green space. Students access the outdoor classroom via a 1-mile walking path. The AIE school community also worked to restore the local creek, building up the ecosystem by raising and releasing salmon each year. The school transformed a former bicycle racing track into an outdoor amphitheater. A school garden is integrated into life and earth science, math, and nutrition education aligned with NGSS and Washington's Environmental and Sustainability Education standards. In the 2018-2019 school year, AIE was Bronze certified with Washington Green Schools.

The school focuses on educating staff and students on ways they can conserve energy within the school building and at their homes. They practice turning off lights and equipment when not in use and utilize daylight as a main source of light. AIE recently replaced all lighting ballasts with high-efficiency bulbs to help reduce energy

consumption and eye strain. Recently installed exhaust fans help to properly circulate air, resulting in a reduced strain on heating and cooling systems and improving air quality and ventilation.

An annual water quality report is used to help educate staff and students on water quality and conservation methods. Students are taught to rub soap on their hands, turn on the water to rinse, and immediately turn the water off again. As part of the school's partnership with Pierce County's Environmental Education Department, AIE received a water bottle filling station and fountain. Maintenance staff perform daily inspections on water faucets and toilets to ensure leaks are not causing damage to the building or wasting water. Low-flow water fixtures are installed throughout the campus. Because of its location in a community park, AIE collaborates with the island's parks division on landscape design, use of natural resources, and preservation of materials. AIE and parks staff are working on a native plant garden.

AIE eliminated all nonreusable food service items, introducing reusable lunch trays, water bottles, condiment dispensers, utensils, to decrease the amount of waste sent to the landfill. Students developed a program for collecting and sorting recycling products to minimize recycling contamination. AIE began saving, donating, and composting food remains.

Anderson Island is a rural community without sidewalks. While there are safety concerns about walking and biking, students are encouraged to ride the bus and carpool. The loading and unloading area is at least 25 feet from building air intakes, doors, and windows to ensure that staff and students have clean air to breathe in the building.

At AIE and districtwide, there is a strong focus on social and emotional health. Staff receive training in neural education, Zones of Regulation, mindfulness, and restorative and inclusive practices. The school uses a Green Seal certified cleaning product called Envirox and has put plans into place for chemical management, air quality, asthma triggers, and pest management.

AIE has also worked hard to ensure that there are safe, healthy, sustainable grounds, creating new play areas, a walking track, and a large green space for multipurpose play. Embracing the weather, students go outside every day, rain or shine. P.E. is always outside. Students are active members of the AIE Mileage Club, setting and meeting goals of physical fitness.

AIE aims to have students and staff spend as much time outside as possible – in the garden, at the beach, visiting the outdoor classroom, or walking through the woods. Students participate in annual field trips to beaches for water quality testing and

habitat exploration and to a nearby hands-on science museum. As a micro school, AIE students can undertake environmental and sustainability related projects that interest them through project-based learning opportunities and designated “genius hours.”



*Anderson Island Elementary students participate in investigations, including benthic and shore crab surveys, a lesson on invertebrates, and a sound map.*

The school garden provides food for students seasonally. Students are active contributors to the garden’s success, preparing and testing the soil, maintaining its quality, starting seeds, planting the starts, and maintaining the perfect environment for them as they grow. Students then also harvest the crops and prepare the soil for the next season. AIE partners with the local community to educate students about healthy foods and gardening. A representative from the Pierce County Environmental Education Department visits AIE to copresent lessons to students and provide teachers with materials and lesson plans to guide them in the study of compost, worms, and gardens.

AIE educators teach math in the form of direction finding, calculating tree age, and looking for geometric shapes within plants. Nature provides a great medium for art – students craft bird houses, create natural ornaments, and discuss texture and shape in plants. On Anderson Island, students learn science as they experience it, discussing habitats, ecosystems, earth systems, plants, clouds, weather, seasons, native species, and forests.

AIE is in the process of adopting a new science curriculum, Amplify, that aligns with the K-12 NGSS. Each unit engages students in relevant, real-world problems in which they investigate scientific phenomena, engage in collaboration and discussion, and develop models and explanations to arrive at solutions. AIE also aims to provide students with hands-on exposure outside of the curriculum. For example, an AIE teacher adopted a cow for her classroom and, in partnership with the American Dairy Association and Discover Dairy, she and her students do math, science, and reading related to their dairy cow; they were able to take a virtual farm tour and meet farmers who live on a dairy farm in Minnesota. In the school's engineering lab, students are challenged to build structures that serve an environmental purpose.

## ***Wisconsin***

### **Helen R. Godfrey University Child Learning and Care Center; Stevens Point, Wisconsin**

#### *Nature-based and Reggio-inspired*

The Helen R. Godfrey-University Child Learning and Care Center (UCLCC) is a community location for 4- and 5-year-old kindergarteners in the Stevens Point Area School District, in addition to providing child care for children from birth to age four. UCLCC is a nature-based and Reggio-inspired educational and training site that collaborates with partners throughout the University of Wisconsin – Stevens Point and the community. Forty percent of students are socioeconomically disadvantaged.

A UCLCC partnership with the university's Office of Sustainability has resulted in an aggressive effort to conduct composting and waste management practices. UCLCC has two vermicomposting units that allow children to learn about food waste and what they can feed the worms. Children then use the worm castings in the school garden during the spring and summer months. UCLCC recycles paper, glass, metals, plastic containers, ink cartridges, cell phones, milk and juice cartons, batteries, and food waste. UCLCC uses paper that is 30% post-consumer waste, and 90% of paper used for art projects is donated by companies that would have otherwise destroyed it.

Clothing and toy swaps provide needed items for families, while keeping these out of landfills. Materials, such as paper towels rolls and baby food jars, are reused for classroom projects or recycled. UCLCC is also a drop-off site for small electronic recycling and ink cartridges and participates in the "SoleMate" shoe recycling program. A certified Breastfeeding Friendly Childcare Program, UCLCC supports and encourages breastfeeding, which reduces the environmental impact of formula



use. UCLCC also supports families that choose to use cloth diapers. Each family brings in a reusable water bottle for their child, and staff keep them clean and filled. When possible, staff utilize reusable washcloths and towels in lieu of paper.

UCLCC has installed and upgraded to efficient and sustainable lighting, flooring, and appliances. A recent bathroom remodel provided new sinks, as well as soap, towel, and toilet paper dispensers that encourage the conservation of resources. UCLCC conducts annual audits of the facility and irrigation systems to ensure they are free of water leaks and to identify opportunities for conservation. Taps, faucets, and fountains at UCLCC are cleaned at least twice annually to reduce contamination, and screens and aerators are cleaned at least annually to remove particulate lead deposits.

In each room, there is a child whose designated job is to turn off the lights when everyone leaves the classroom. Rather than always having the fluorescent overhead lights on, teachers utilize natural light that comes in through the windows as much as possible. In addition, all lamps in the classroom use energy-efficient light bulbs.

UCLCC has an IPM program and does not use pesticides. It employs a comprehensive indoor air quality management program that is consistent with the EPA's Indoor Air Quality Tools for Schools. During hours of operation, dish soap and sanitizing and disinfecting bleach solutions are the only cleaning supplies utilized.

UCLCC conducts walking field trips, both on and off campus. To encourage walking and rolling drop-offs, the center offers bike racks and daytime stroller storage. As a result, many UCLCC children bike or walk to school with their families, and nearly all student aides walk or ride their bikes to work. Children also participate in the "Babblers Bike Fest," a fun local event highlighting the community impact of riding bikes, including the social, environmental, and health benefits. Teachers utilize play-based, experiential learning to teach and discuss transportation with the children.

Children are offered time to walk over to the campus gym every week. At the gym, they are given toys, tools, and a safe space to develop their gross motor skills. Physical education majors from the university work with three- and four-year-old students; the college students practice simple lesson plans and teaching while the UCLCC students develop important cognitive and physical skills. All students spend at least one hour at a time on the playground at least twice per day. In the summer months, the children spend as much time outdoors as possible.

Teachers use the conscious discipline strategy of "Brain Start Smart" as a way to foster wellness. This evidence-based tool encourages both adults and children to improve social and emotional wellness and create a healthy classroom community.

Children learn self-awareness so that they can respond consciously to the needs of the moment, such as taking deep breaths when feeling overwhelmed.

Meals are catered by the Dreyfus University Center, which uses locally sourced, sustainable food products whenever possible. The campus garden is used as an outdoor classroom where students learn about cultivating food. They learn about alternative energy through the solar panels on the hoop house that power the ventilation system. The children also grow items in UCLCC's classroom garden during the spring and summer months. They learn how to care for the garden and are offered the food that they grow.

UCLCC believes in learning from the natural environment. Instead of plastic equipment, the school has a natural playscape, made of environmentally sustainable materials, repurposed from other areas of the campus. Children spend about 50% of their time at the center investigating the outside world. Eco-friendly artificial turf eliminates the need to water the grounds. A garden utilizes compost from the center as well as compost from a local organic farm, and both the UCLCC garden and playground are free of pesticides.

In the outdoor classroom, the children's interests drive a play-based approach to environmental STEM

exploration throughout the day. They learn about water and mud play at a sensory table. Large blocks, logs, and rocks are used to create complex structures. Themed focus boxes guide learning about specific environmental topics, such as trees, birds, insects, and water. Students participate in nature walks with books and use



*UCLCC children go on walking field trips to visit nearby green spaces. One of the favorite destinations is Schmeekle Reserve in Stevens Point, where college students teach young children.*



scientists' tools, including paper, clipboards, microscopes, magnifying glasses, and binoculars. Playground activity cards provide staff with inspiration for large and small group engagement, encouraging the children's connection to STEM, the environment, and sustainability education.

UCLCC's university campus location offers a wealth of field trip possibilities. The children visit the Schmeckle Nature Reserve, where the younger children observe nature around them, and the older children learn about animal habitats and conservation. The children also play gross motor games in the nature reserve. UCLCC children frequently visit the natural history museum, Boston School Forest, the campus botanical garden, and the sculpture garden.

UCLCC staff receive professional development, including Green & Healthy Schools Wisconsin workshops, the Midwest Renewable Energy Fair, and farm to school summits. Teachers rely on such programs as Project Wild and Project Learning Tree to enhance their curriculum.

## **Starms Early Childhood Center; Milwaukee, Wisconsin**

*A natural center of the community*

Starms Early Childhood Center (SECC), part of Milwaukee Public Schools, has grown from implementing simple programs, such as recycling in classrooms, to embedding principles of the Three Pillars of ED-GRS into the school curriculum and culture. The SECC building is over 100 years old and located in a central urban city where it serves 278 3- through 5-year-old kindergarten students, 88% of whom identify as Black, 6% as Hispanic, and 3% with two or more races/ethnicities. Ninety-five percent of students come from socioeconomically disadvantaged households.

In 2019, SECC completed a multiyear holistic schoolyard redevelopment project. The new schoolyard allows SECC to teach environmental themes, conservation, and cross-curricular lessons that emphasize careers. Through the project, SECC removed 12,200 square feet of asphalt and installed green infrastructure features that manage 42,430 gallons of stormwater per rain event. SECC is committed to saving water, learning about the environment, and reducing its carbon footprint. With the help of partners at Neighborhood House, a community center, SECC staff have aligned the district-assigned curriculum, Frog Street, and on- and off-site environmental education programs into daily teaching and learning. Children are taught to reduce, reuse, and recycle through many schoolwide initiatives that encourage the reduction of waste, both in school and in students' homes.

SECC accepts gently used donations from families and staff, which are given to others in need and used in a clothing size exchange program for families with growing children. SECC created a recyclable room where children and staff can put the recyclables they collect to be reused for art projects and as learning materials. The school also composts food waste, engages in vermicomposting, and contributes to the Crayola marker and Trex recycling programs. For its participation, SECC has been rewarded with a garden box, planter box, and a full-sized bench from the Trex recycling program.

SECC has automatic faucets. Outside, a bioswale has been installed to collect and filter water from permeable surface and runoff from the staff parking lot. SECC worked with the school district and community partner, Reflo, to install an aboveground cistern to harvest rainwater and add an additional rain garden, both of which are used as teaching tools.

School gardens consist of native plants, perennials, annuals, and different varieties of bulbs, which are tended to and explored by the children. The raised vegetable beds are cultivated, planted, tended, and harvested with the help of students, staff, family members, and volunteers. Moveable tree trunk small-group stations, toadstools, planter pots, and a student-sized picnic bench enable children to be immersed in the beauty of the garden.

With support from the City of Milwaukee Forestry Department, SECC has planted an arboretum on campus containing 30 varieties of trees. Twenty-five bird houses were installed and decorated with shapes, letters, and numbers so children can go on observation hunts. SECC uses green cleaning products; has installed energy recovery ventilation systems; tests for radon; and inspects monthly for mold, moisture, and water leakage.

SECC is a citywide school with many students arriving by bus. The district has established a no-idling policy for vehicles, with signs posted. Community field trips within walking distance are taken as much as possible, public transportation is utilized, and bus sharing is highly encouraged.

SECC has conducted an energy audit and receives a score of 91 in ENERGY STAR Portfolio Manager. The lights throughout the school are labeled with reminders to turn them off when leaving, and partial lights are used to conserve energy and create calm.

The school's Frog Street and Second Step curricula include opportunities to identify emotions and feelings while students learn to manage them. Children are taught self-regulation and calming strategies through practice and adult examples.

Strategies include self-talk, empathy lessons, breathing techniques, meditation, and yoga. Staff are given the opportunity to practice self-care skills through such techniques as yoga, wellness and healthy cooking classes; exercise challenges; and monthly mindfulness training.



*Starms Early Childhood Center children engage in outdoor exploration moving wood pieces, designing walkways, and creating and building different structures through loose parts play.*

Physical wellness is supported by a full-time nurse, the Fresh Fruit and Veggie Program, and brain breaks. Winter weather gear, including boots, coats, mittens, hats, and scarves, are provided on-site so that all children can experience outdoor winter activities.

Partnerships have been established with Aurora Health Care, the Social Development Commission, the Milwaukee Police Department, Bell Ambulance, the Milwaukee Fire Department, local secondary schools, and the

Hilton Corporation. Volunteers read to the students, support learning opportunities, lead schoolwide projects, maintain and assist with gardens, and attend schoolwide events.

SECC has designed and implemented an environmental curriculum for ages 3-5 that scaffolds from the previous year. This ensures that children are learning outdoors using developmentally appropriate practices, guided by the Wisconsin Model Early Learning Standards and Common Core standards, that incorporate imaginative play, conversation, and environmental exploration. An ongoing partnership with the Neighborhood House of Milwaukee, a local community center, supported SECC's transition to virtual learning with nature time programming.

Environmental education is embedded into SECC's curriculum through classroom displays focused on conservation or environmental justice themes and by exploring daily water use and learning in the schoolyard with the Outdoor Discovery Cart. Students visit nature centers, parks, and museums and participate in maple sugaring, animal tracking, and park cleanups.

## Clement Avenue School; Milwaukee, Wisconsin

### *Safe biking for all*

Clement Avenue School's (CAS) mission is to conserve, teach, and encourage healthier choices, both environmentally and physically. CAS, part of Milwaukee Public Schools, serves 406 students in 4-year-old kindergarten through eighth grade, 77% of whom are minority and 72% of whom qualify for free and reduced-price lunch. The CAS green team, made up of staff members and families of students, maintains the momentum of the campus redevelopment project and develops a school and community culture focused on environmental sustainability.

The CAS redevelopment project can manage over 88,000 gallons of stormwater every time it rains. The school has removed approximately 22,000 square feet of asphalt and has replaced it with green space and a mixed-use recreation and educational space. Because of CAS's successful school garden program, the school now has a new outdoor classroom with a rainwater harvesting system that helps reduce flooding and basement backups in the neighborhood, reduce combined sewer overflows, and improve the water quality in local rivers and Lake Michigan. It also serves as an opportunity for creative STEAM student and community engagement.

The school has installed efficient light and faucet fixtures, occupancy sensors, and computer power management systems and relies on natural daylighting whenever possible. CAS has begun working with a local company, called Compost Crusader, to divert organic material from the landfill in an economically and environmentally sustainable way. Student breakfast containers, including wrapping, cereal bowls, and milk cartons, are rinsed and recycled. Plastic and aluminum containers are saved for the art teacher or for use in the classroom for holding supplies.

CAS has worked closely with community organizations to bring outdoor physical activities to life. The physical education teacher teaches an annual unit on biking to encourage safely engaging in this outdoor activity, partnering with Safe Kids Southeast Wisconsin Lead Agency, the Children's Hospital of Wisconsin, the Milwaukee County Sheriff's Office, the City of Milwaukee Fire Department, COA Youth & Family Centers, the American Cancer Society, and Wisconsin Health and Physical Education. CAS teams up with the Wisconsin Bike Federation to offer additional bike and pedestrian classes that prepare students for the bike/run to school day. The addition of bike racks assists with the promotion of a healthy, active lifestyle.

The new CAS playground provides workout stations throughout the structure. A brightly painted traffic garden provides riding lanes and opportunities for students to learn bike safety and traffic rules on the schoolyard. In addition, natural play features support gross motor activities such as climbing and balancing. The grassy area is used for mindfulness activities and community soccer. Buddy Benches and social seating areas help promote social health and problem-solving.

CAS is an entrance way to Tippecanoe Park, part of the Milwaukee County Parks system, located just southeast of the building. CAS embraces the community not only as stakeholders in the renovation of the playground but also as active explorers and users of the area. Inclusivity is at the heart of CAS, a one-level school on a public transit bus line, allowing people who use wheelchairs or walkers the ability to use the facility and grounds.

The gardens continue to impact students and the community by promoting healthy eating. Students take part in managing what is planted, learn about the vegetation, and harvest what is there to use in recipes. CAS is one of 50 schools that serve as a site for anyone 18 or older in Milwaukee Public Schools to pick up breakfast and lunch daily, as well as weekly fresh produce to feed entire families. Each produce bag is paired with nutrition facts, a cooking video, and recipes.

Each week the school psychologist and social worker prepare social-emotional and wellness activities for families to practice. These are delivered weekly in an electronic school newsletter and through ClassDojo. Staff are offered yoga, mindfulness, and fitness classes. CAS encourages students to be physically active outdoors by offering turkey trot and jingle fun runs.

Students at CAS are immersed in environmental education, with integration across all grade levels and subject areas. Each year the early childhood classrooms participate in a butterfly life cycle program. One early childhood classroom is home to an aquaponics setup using tetra fish and mollies to grow kale and herbs. The older students help grow the plants and maintain the garden beds with the help of the school community and neighborhood around Clement Avenue. The second and third graders become Animal Ambassadors through a partnership with the Milwaukee County Zoo. Students study the ecosystem around them as well as how a city works. Fifth grade students learn about the water cycle using the green space and cistern.

In middle school, students plan community spaces in their design of cities. Students can volunteer by caring for butterfly gardens, planting, weeding, watering, and composting. The school uses every opportunity available to integrate environmental learning, including through an annual plant, compost, and rain barrel sale. Staff

members participate in the local green schools conference to learn and share about outdoor learning, school gardens, sustainability, and schoolyard redevelopment.

CAS served as a pilot school when Reflo and the Green Schools Consortium of Milwaukee were developing the EcoLiteracy Challenge. The EcoLiteracy Challenge provides a variety of resources, activities, and curricular connections that engage youth in environmental education and in sustainability focused learning opportunities while building a culture of environmental stewardship. The EcoLiteracy Challenge Activity Menu was shared with families to engage them in environmental education and sustainability activities.



*Clement Avenue School transformed its schoolyard from asphalt to a sustainable outdoor classroom to benefit students and the watershed.*

Students and their families have volunteered at the Bay View Bash, known as “Milwaukee’s Greenest Festival,” to learn while literally getting their hands dirty sorting trash, recycling, and composting, with the aim of earning funds toward the school’s playground renovation.

## **University of Wisconsin – Madison; Madison, Wisconsin**

*The bike capital of the Midwest*

The University of Wisconsin – Madison (UW-Madison) has a deep legacy of environmental stewardship: such pioneering figures as Aldo Leopold and Gaylord Nelson rooted their careers at the university, and today UW-Madison continues to be a leader in environment- and sustainability-related research, education, and

operations. UW-Madison signed Second Nature's Resilience Commitment in 2019, pledging to create an institutional Climate Action Plan. UW-Madison is a Sustainability Tracking, Assessment & Rating System Silver rated institution and is listed in the Sierra Club Guide to Cool Schools and Princeton Review Guide to Green Colleges every year.

UW-Madison has documented a 38% decrease in greenhouse gas emissions and a 20% decrease in potable water consumption over 10 years, while increasing gross square footage of building space by 18.5% and seeing the campus population increase by 7%. The majority of buildings on the UW-Madison campus are heated and cooled using natural gas. Facility improvements, such as lighting retrofits, utility infrastructure improvements, and building HVAC updates, have saved over \$44 million in energy costs in the past 10 years. Approximately 10% of UW-Madison's electricity use is offset by the purchase of Renewable Energy Certificates. UW-Madison also generates renewable electricity on its main campus through multiple rooftop solar photovoltaic systems and rooftop solar hot water systems and has partnered with its local electricity provider to support the development of the largest solar array in Dane County.

The Environmental and Occupational Health Program assesses and monitors water quality on campus. UW-Madison uses a number of IPM principles, such as planting native species, using physical controls as the first approach to pest management, and strictly monitoring and sampling soils prior to any fertilizing to reduce the need for fertilizer application. Campus Planning & Landscape Architecture employs rain gardens, permeable pavement, green roofs, stormwater ponds, cisterns, and underground detention systems to infiltrate, evapotranspire, or reuse stormwater to benefit campus users and the environment. Sustainability goals are included in the Campus Master Plan.

From 2007 to 2018, the university reduced total waste by 13% per campus user, and in 2018 diverted 43% of campus waste from the landfill. Efforts encompass surplus procurement; using food waste to make compost, liquid fertilizer, and biogas; and recycling.

With 16,000+ bike parking spots, a bicycle resource center for do-it-yourself repairs, bicycle-related classes, bicycle air and repair stations across campus, and a platinum-level bike friendliness rating from the League of American Bicyclists, UW-Madison can be considered the biking capital of the Midwest. Alternative transportation promotion encompasses carpools and vanpools, bike sharing, and discounted city bus passes.

UW-Madison is proud to be recognized by the Human Rights Campaign as a Transgender Inclusive Benefits University and offers comprehensive student health and employee assistance services. The Center for Healthy Minds works to cultivate well-being and relieve suffering for people of all backgrounds and ages through a scientific understanding of the mind. The Bandana Project is designed to spread awareness about mental health resources.



*UW-Madison students participate in a collegiate sailing competition hosted by the Wisconsin Hoofers Club.*

The Campus Food Shed distributes fresh produce that would otherwise be thrown away to several fridges located conveniently on the UW-Madison campus. The food is made available at no cost to students, faculty, and staff. The Open Seat, the university's student food pantry, distributes food from Second Harvest Food Bank. Students for Sustainable Agriculture has among its projects a 1.75-acre farm at Eagle Heights, where students learn organic and sustainable gardening techniques, producing

approximately 2,900 pounds of vegetables, fruit, flowers, and herbs each growing season. Most of the produce is distributed free of charge to the campus community at Harvest Handouts.

A university working group partners with the Native Nations in Wisconsin to improve health services, preserve the environment, develop local economies, strengthen families, and expand educational opportunities. Some of its efforts include a watershed education program that combines outdoor education with native culture; a partnership between the College of Agricultural and Life Sciences with the Menominee and Oneida Nations to develop collaborations for science education; offering culturally relevant climate literacy by integrating traditional ecological knowledge; and a community-based, multimodal early childhood intervention that addresses childhood obesity.

The UW-Madison Arboretum includes more than 17 miles of trails through restored prairies, savannas, woodlands, and wetlands. The Lakeshore Nature Preserve is a 300-acre natural area on the main campus situated on the south shore of Lake Mendota that is home to a plethora of native plants and animals. Both function as spaces for learning, research, and recreation for the campus and the community. The Wisconsin Hoofers is the outdoors club at UW-Madison, providing instruction and excellence in outdoor recreation. Outdoor UW serves as an outlet to the

outdoors for the campus community, providing recreation rentals, educational opportunities, and experiences.

The Nelson Institute for Environmental Studies is host to interdisciplinary programs and research that help to solve challenging environmental issues while also training leaders and innovators. The environmental studies major offers an interdisciplinary curriculum that spans all contemporary disciplines that touch upon the environment. The Environmental Studies Certificate program offers a unique opportunity for undergraduate students to broaden their studies through interdisciplinary coursework related to the environment. The Sustainability Certificate offers students the opportunity to pursue sustainability interests that complement their major(s).

The Engineering for Energy Sustainability Certificate offers undergraduate students a suite of courses addressing energy sustainability. The Community Environmental Scholars Program is designed for students who want to link their passion for the environment with a commitment to the community. The Sustainability Course Attribute allows for easy identification of coursework that relates to sustainability.

As one of the world's top research universities, UW-Madison produced the most climate change research of any Midwestern university from 2014-2018 and generated over \$459 million in funding for sustainability-related research in fiscal year 2020. The Center for Climatic Research brings together leading climate scientists to investigate climate and its implications for 21st-century climate change. The Center for Culture, History and Environment supports multidisciplinary environmental research and learning by fostering collaborations. The Center for Sustainability and the Global Environment examines the connections between natural resources, technology, policy, human health, security, and changes in the global environment. The Wisconsin Energy Institute is led by scientists and engineers committed to crossing traditional research boundaries to make major breakthroughs in the way society sources and uses energy.

UW-Madison is host to a wide range of sustainability-related student organizations. Campus Leaders for Energy Action Now consists of dedicated students from different backgrounds and majors who wish to transition the university away from fossil fuel-dependent energy. The Ethical and Responsible Business Network focuses on educating students and businesses on the ways sustainability and profitability go hand in hand. HELIOS advocates for more sustainable infrastructure at UW-Madison and educates community members on the importance of a sustainable future.

The UW-Madison Green Fund offers financial and administrative support for student-initiated projects that address the environmental footprint, social impact, and



operating costs of campus facilities. The Sustainability Advisory Council develops recommendations for the provost and the vice chancellor for finance and administration on how to advance sustainability at UW-Madison. Campus sustainability events include Sustain-a-Bash, an outdoor expo featuring dozens of sustainability-related organizations, departments, and local businesses, and Earth Week celebrations. Sustainably themed learning communities and an Office of Sustainability internship offer additional opportunities for learning outside of the classroom.



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