Green Genius: Leading Renewable Change Through Student Innovation

An Integrated Approach to STEM, Sustainability, and Community Impact

At Martin Luther King Jr. Middle School, Green Genius is a student-led STEM and sustainability initiative empowering students to drive a more sustainable and inclusive future through innovation, creativity, and hands-on learning. By integrating science, technology, and community action, students design real-world solutions to pressing energy and environmental challenges, grounded in clear goals, energy literacy, student leadership, and continuous evaluation. Through renewable energy projects and meaningful service-learning, students translate knowledge into measurable impact, demonstrating the power of student voice and innovation.

Beyond the classroom, the Green Genius team extends its impact through inclusive community engagement, participating in STEM Fairs using NEED resources, leading Energy Fairs and Multicultural Night, and teaching peers about sustainability. Their efforts in promoting recycling and environmental stewardship have contributed to the school's achievement of Green School certification. Through dedication, leadership, and outreach, students have strengthened both their school community and broader environmental awareness and action.

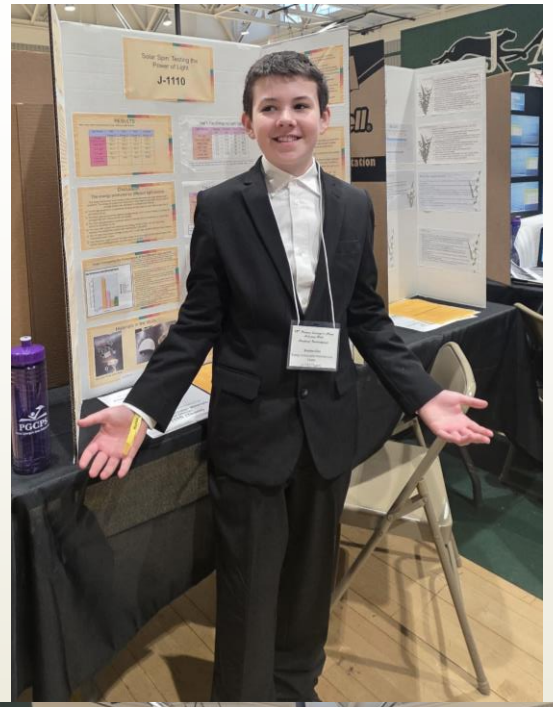
TEAM SPONSOR: ELAINE RAMOS

SCHOOL: MARTIN LUTHER KING JR MIDDLE SCHOOL

BELTSVILLE, MARYLAND

STEM & Engineering Innovation

Goal #1: Investigate, design, and refine STEM Fair projects focused on energy and conservation themes.



Energy Content:

Students applied and refined NEED-based experiments into STEM Fair projects integrated with robotics and coding, including Energy House models, solar fans, well-casing and porosity studies,

Student Leadership

- 15 students qualified for the 2026 district-wide STEM Fair.
- 45 students successfully completed energy and sustainability research projects.

Evaluation & Impact

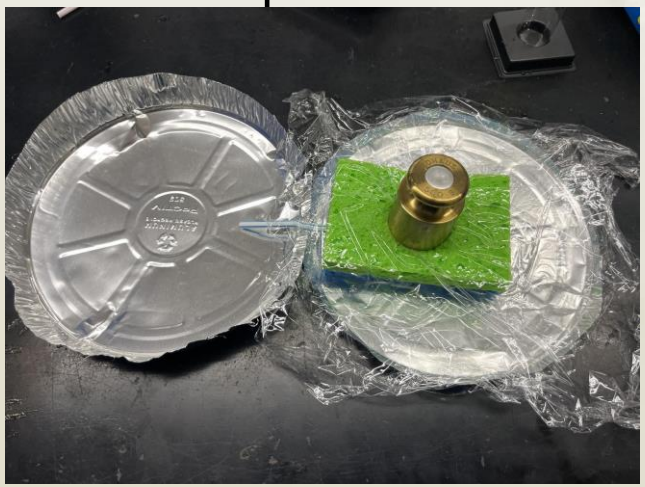
- 15 student leaders presented their findings across classrooms and grade levels, sharing results relevant to the school community.
- 6 out of 15 students won awards
- A total of 478 students were informed and engaged through these presentations, demonstrating broad school-wide impact.

STEM & Engineering Innovation

Goal #1: Investigate, design, and refine STEM Fair projects focused on energy and conservation themes.

The Green Genius team transformed NEED-based projects into rigorous STEM Fair investigations, applying engineering design and scientific inquiry to address real-world environmental challenges. Students utilized robotics to explore and propose solutions to global issues, demonstrating innovation in coding, automation, and problem-solving. Through the Energy Fair, they actively engaged the school and broader community by showcasing their understanding of energy conservation, sustainability, and environmental responsibility. Collectively, these experiences highlight how student-driven learning can connect STEM, social justice, and sustainability to create meaningful, real-world impact.

Set up for The Role of Porosity in Enhancing Petroleum & Natural Gas Extraction



Set up for Well-Casing Perforations' Impact on Oil & Gas Production

Set up for Energy House Project

Green Genius build Wind Turbines

Goal # 2: Actively engage in and showcase student learning through participation in the Energy Fair, competition in the Regional KidWind Challenge and District STEM Fair, and submission of a NEED project to a national conference.

Energy Content:

- Students utilized KidWind kits to design and build functional wind turbines, applying principles of renewable energy and engineering design.

Student Leadership:

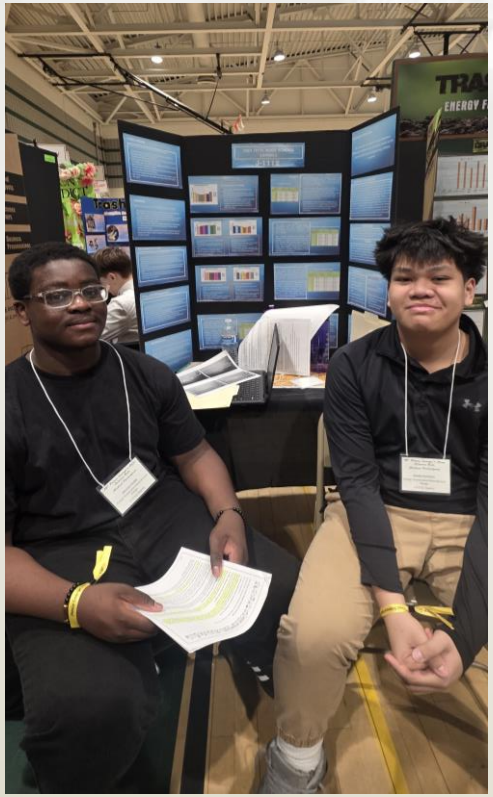
- 29 students competed in the 2026 Regional KidWind Challenge at the University of Maryland.
- 6 students advanced to the district-wide STEM Fair and earned awards for their projects.

Evaluation & Impact

- Student leaders presented their findings across classrooms, engaging 278 peers in energy learning.
- 236 community members were reached during Energy Fair Night, demonstrating strong school and community impact.

Robotics for Climate Solutions: Engineering a Sustainable Future

Goal #3: Design and program robots to monitor temperature across school environments, analyzing insulation effectiveness and its role in energy efficiency.



Energy Content:

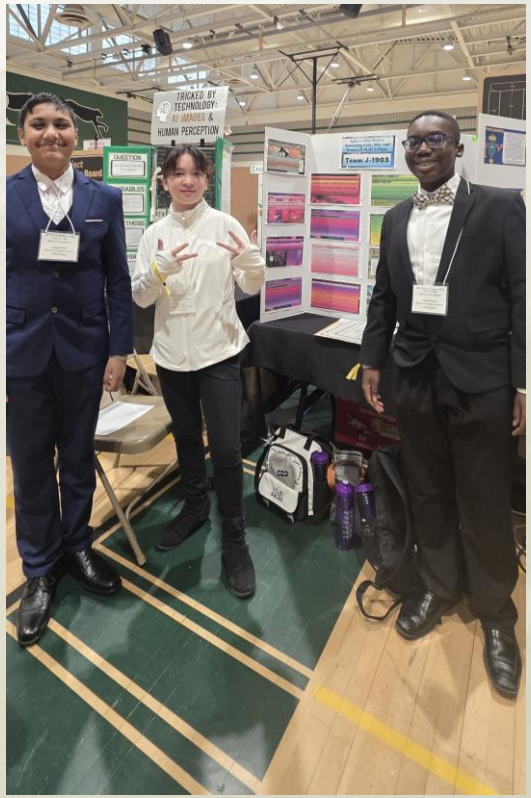
- Students applied principles of energy efficiency and heat transfer by designing and programming robots to monitor temperature variations across school environments, using data to evaluate insulation effectiveness and promote energy conservation.

Student Leadership:

- 9 students competed in the district STEM Fair.
- 221 students programmed Micro:bits to monitor temperature across the building, analyze data, and share findings.
- 428 students developed Sphero Mini programs addressing FOG management and food sustainability through wild rice applications.

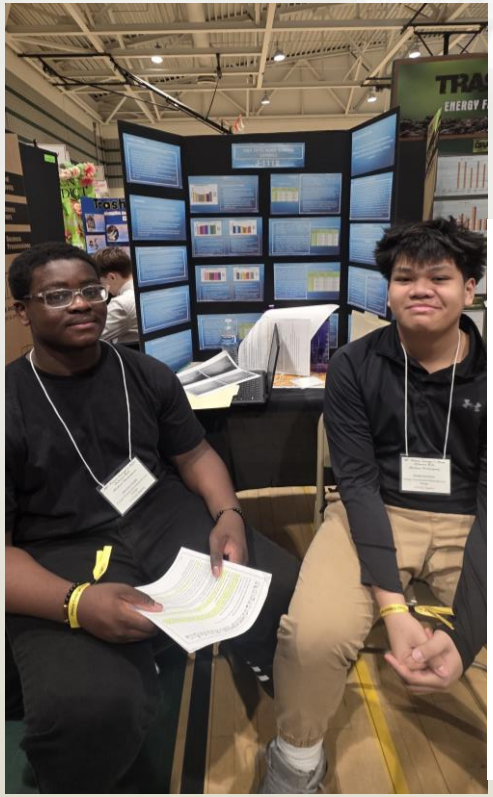
Evaluation & Impact:

- 15 student leaders presented findings across classrooms and grade levels, strengthening school-wide learning.
- 699 students engaged in hands-on robotics, collecting and analyzing real-time data. students showcased their projects on robotics during the Energy Fair Night and multi-cultural night
- 236 community members were informed of the findings of the investigation and extending impact beyond the classroom.

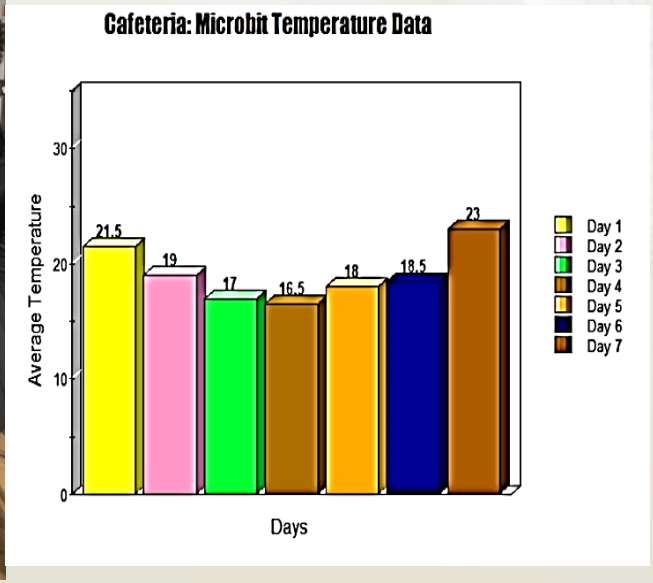


Robotics for Climate Solutions: Engineering a Sustainable Future

Goal #3: Design and program robots to monitor temperature across school environments, analyzing insulation effectiveness and its role in energy efficiency.

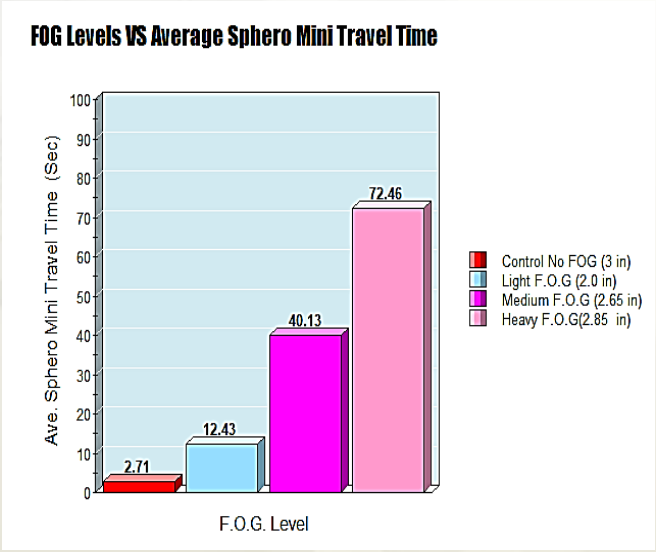


One of the data in school.
Average Cafeteria Temperature Over 7 Days



This graph presents the fluctuations of average temperature from 20 degrees Celsius to 24 degrees Celsius; it shows a pattern of inconsistencies from day to day meaning there is an uneven HVAC airflow or poor insulation.

FOG Levels VS Average Sphero Mini Travel Time



The bar graph shows how the average travel time of the Sphero Mini robot changes with different F.O.G. levels in the pipe. Each bar represents one F.O.G. level, and the height of the bar shows how long it took the robot to travel through the pipe.

Energy Detectives: Tracking Home Savings with BGE Tools

Goal #4: Students will use BGE-provided energy and water conservation devices at home to monitor usage and calculate projected energy and water savings by grade level across the school, in partnership with BGE as a community partner of MLK Jr. Middle School.

Number of BGE gadgets used by MLK student households out of the total distributed

BGE Gadgets	GRADE LEVELS		
	6th Grade (Total = 220)	7th Grade (Total=250)	8th Grade (Total = 225)
Smart Extension Cord	212	235	200
Shower Top	200	178	190
Faucet Cap	198	189	150
Refrigerator Thermometer	189	200	208

Note: The numbers signify how many students per grade level actually utilized the BGE Gadgets

6th grade Projected Total Grade level Total Household savings

BGE Gadget			
Smart Extension Cord	212	212 x $ 40	$ 8,480
Shower Top	200	200 x $ 50	10, 000
Faucet Cap	198	198 x $ 30	5, 940
Refrigerator Thermometer	189	189 x $ 15	2,835
		TOTAL	$ 27,255

Total Number of Kits distributed = 220.

Energy Content

- Students used BGE-provided energy and water conservation tools at home to monitor daily usage and understand patterns of consumption. They applied data analysis skills to calculate potential savings and identify strategies for improving household energy efficiency.

Student leadership

- 678 Students independently collected, tracked, and analyzed home energy and water data across grade levels, demonstrating responsibility in real-world sustainability practices. They collaborated to compare results and share conservation strategies with peers and families.

Evaluation & Impact

- Student findings were compiled to estimate grade-level energy and water savings, highlighting measurable environmental impact across the school community. The project strengthened student and family awareness of conservation practices, promoting long-term sustainable behavior at home and beyond.
- Students created a BGE station during Energy Fair Night to present their data to the community.
- A total of 238 attendees, including community partners, were informed about the projected energy and water conservation results.

Energy Detectives: Tracking Home Savings with BGE Tools

Goal #4: Students will use BGE-provided energy and water conservation devices at home to monitor usage and calculate projected energy and water savings by grade level across the school, in partnership with BGE as a community partner of MLK Jr. Middle School.

7th grade Projected Total Grade level Total Household savings

BGE Gadget			
Smart Extension Cord	235	235 x $ 40	$ 9400
Shower Top	178	178 x $ 50	8900
Faucet Cap	189	189 x $ 30	5670
Refrigerator Thermometer	200	200 x $ 15	3000
		TOTAL	$ 26,970

Total Number of Kits distributed = 250.

8th grade Projected Total Grade level Total Household savings

BGE Gadget			
Smart Extension Cord	200	200 x $ 40	$ 8000
Shower Top	190	190 x $ 50	9500
Faucet Cap	150	150 x $ 30	4500
Refrigerator Thermometer	208	208 x $ 15	3120
		TOTAL	$ 25,120

Total Number of Kits distributed = 250.

Launching Change: Building a Schoolwide Recycling Initiative

Goal#5: Implement a schoolwide recycling initiative that engages students, staff, and the community to reduce waste, promote sustainable resource management, and support Green School Certification.

Energy Content

- Students initiated a schoolwide recycling program to reduce waste and promote sustainable resource management, laying the foundation for long-term environmental responsibility within the school community.

Student leadership

- 678 students participated in the schoolwide recycling initiative, along with school personnels, teachers and other members of the community.

Evaluation & Impact

- Student efforts, along with supporting sustainability documentation, contributed to the school earning its initial Green School Certification, demonstrating measurable environmental impact and schoolwide engagement.

MLK Jr MS Student Initiative for Solid Waste Reduction

Launching Change: Building a Schoolwide Recycling Initiative

Goal#5: Implement a schoolwide recycling initiative that engages students, staff, and the community to reduce waste, promote sustainable resource management, and support Green School Certification.

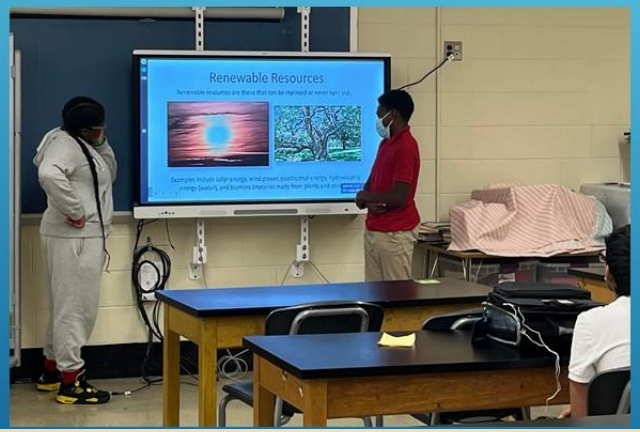
MLK Jr MS Student Initiative for Solid Waste Reduction

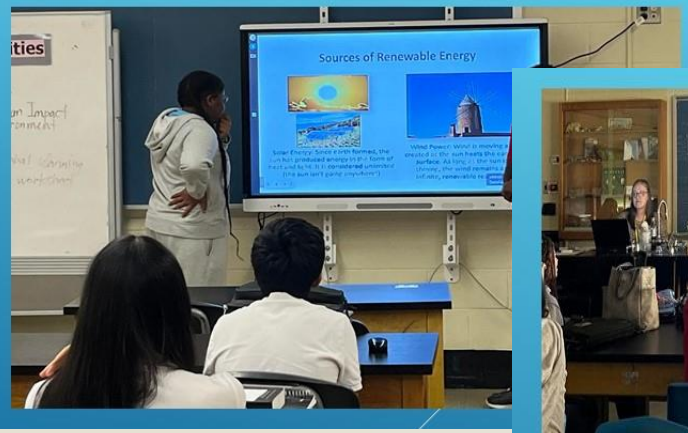
Launching Change: Building a Schoolwide Recycling Initiative

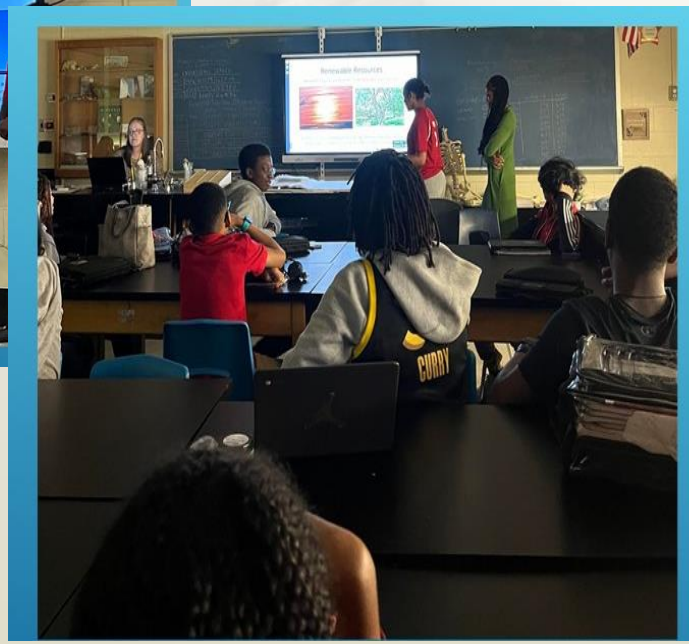
Goal#5: Implement a schoolwide recycling initiative that engages students, staff, and the community to reduce waste, promote sustainable resource management, and support Green School Certification.

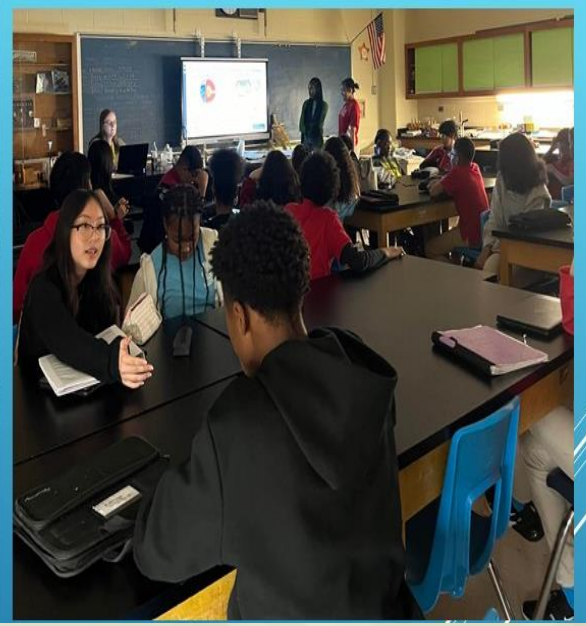
MLK Jr MS Students Educating others towards energy conservation

HERE ARE SOME PICTURES OF US TEACHING OUR PEERS





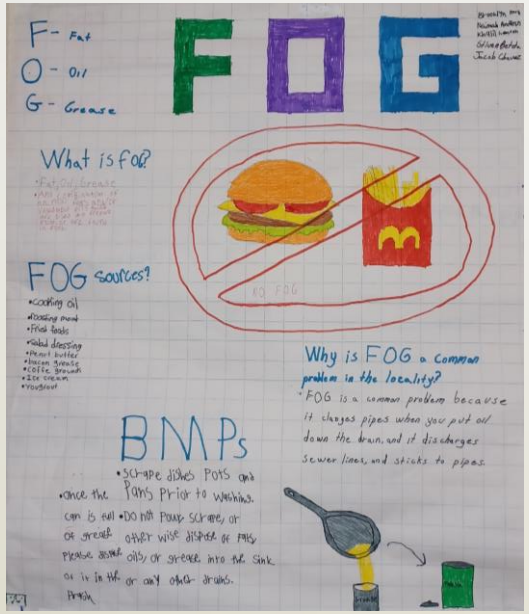


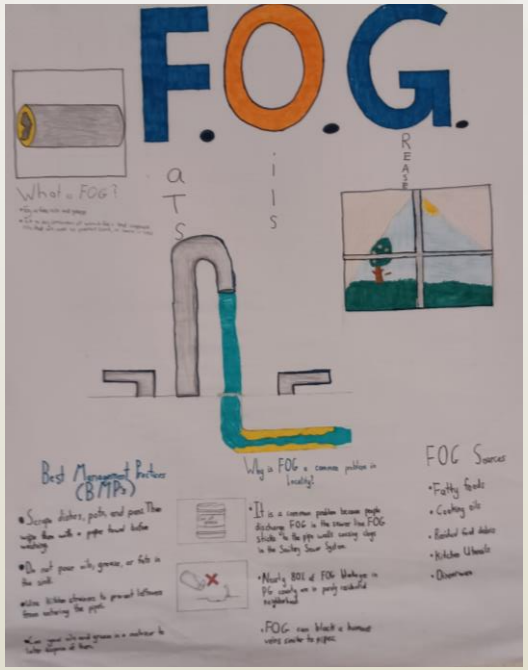


The students went to different classrooms to share information on the importance of renewable energy in alleviating environmental pollution.

Green Impact: Students in Action

Goal #6: Engage students in hands-on environmental service learning to investigate ecosystem challenges, promote sustainable practices, and take informed action to protect natural resources and community health.





6th Graders shared their FOG posters

Energy Content:

- Students explored the connection between energy use, climate change, and ecosystem health by engaging in service-learning projects that highlight how human activities impact water quality, food systems, and natural resources. Through hands-on investigations and environmental action, they examined how sustainable practices can reduce pollution, protect ecosystems, and support a more energy-efficient and climate-resilient future.

Student leadership:

Students across grade levels took active leadership in environmental action:

- 220 6th graders led FOG awareness and education efforts
- 250 7th graders managed wild rice planting and Chesapeake Bay watershed restoration activities
- 225 8th graders conducted investigations and presented solutions through the Delta Dead Fish curriculum.
- Students collaborated, educated peers and community members, and applied their learning to lead sustainable practices and environmental stewardship initiatives.

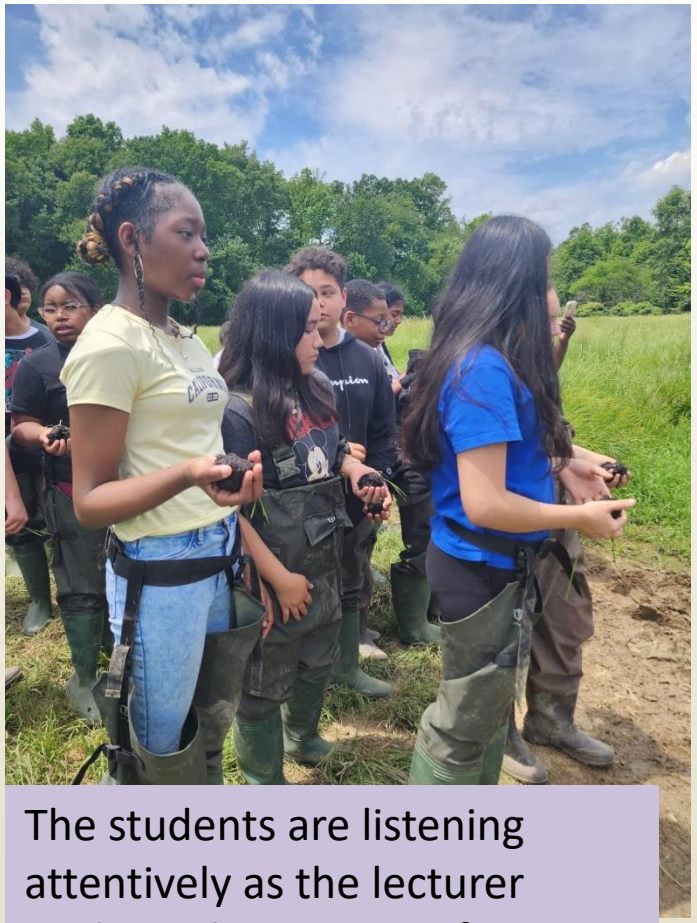
Evaluation & Impact:

- Students demonstrated measurable impact through increased environmental awareness, cross-grade collaboration, and community education on sustainable practices.
- 40 students participated in wild rice planting within Chesapeake Bay watershed restoration areas in partnership with the Accokeek Foundation, integrating cultural relevance and Indigenous perspectives.
- 255 students developed and published webpages promoting waterway protection and aquatic ecosystem health, extending their impact to a global audience.

Green Impact: Students in Action

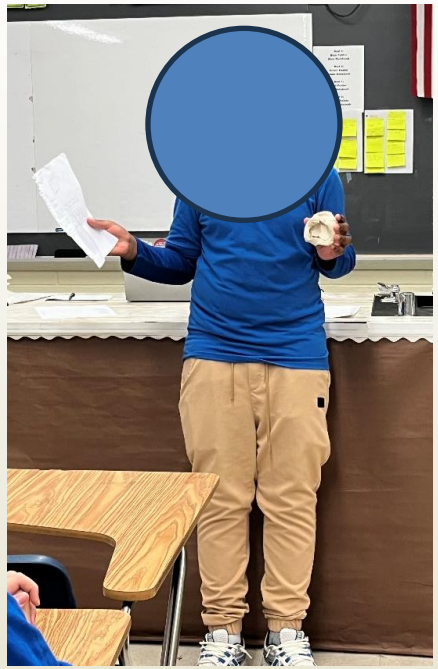
Goal #6: Engage students in hands-on environmental service learning to investigate ecosystem challenges, promote sustainable practices, and take informed action to protect natural resources and community health.

7th Graders actively engaged in their Student Service-Learning Activities



The students are listening attentively as the lecturer explains the process of planting rice in the wetlands of Chesapeake Bay.

The students in action: Planting rice at the Chesapeake Bay. The students grow the rice they plant in the classroom.



A student discussing his model to preserve wild rice

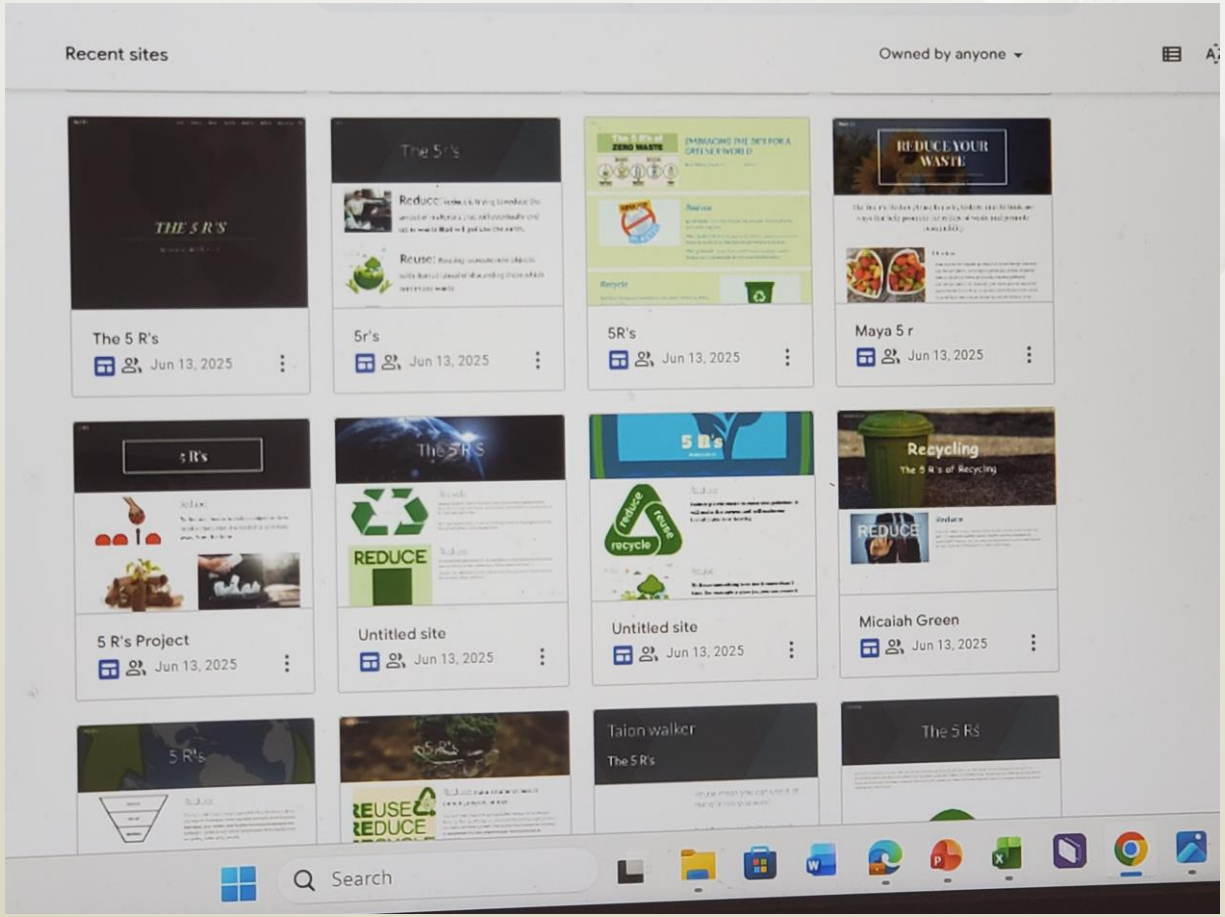
Students planting rice in the classroom and these rice are the ones they will plant in the Chesapeake Bay Restoration Area

Green Impact: Students in Action

Goal #6: Engage students in hands-on environmental service learning to investigate ecosystem challenges, promote sustainable practices, and take informed action to protect natural resources and community health.

8th Graders and their individually designed website for Student Service-Learning Activities

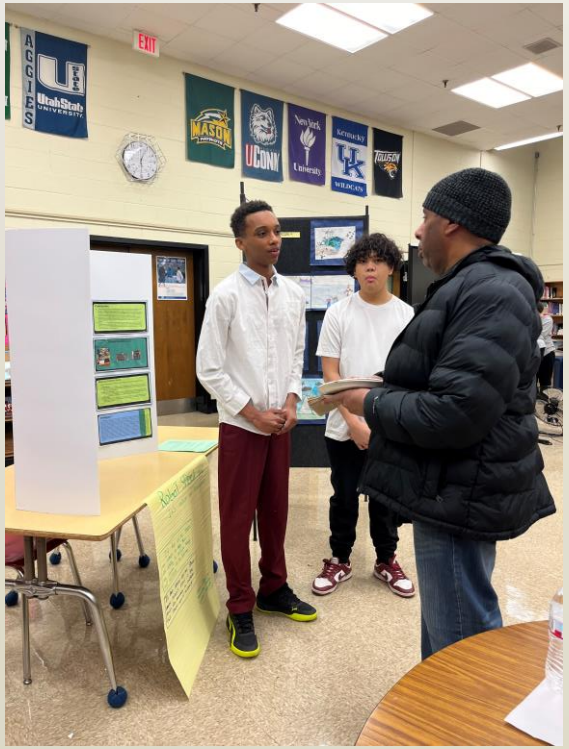
https://sites.google.com/u/0/?authuser=0&tgif=d



8th grade students designed and published their own websites through the Dead Fish Delta project, using digital tools to investigate water pollution and ecosystem health. Through their work, they promoted the 5 Rs—Refuse, Reduce, Reuse, Repurpose, and Recycle—as solutions for environmental restoration, preservation, and sustainability. By sharing their research and ideas online, students extended their impact beyond the classroom, raising awareness and encouraging responsible environmental practices.

From Culture to Climate: Students Leading Change

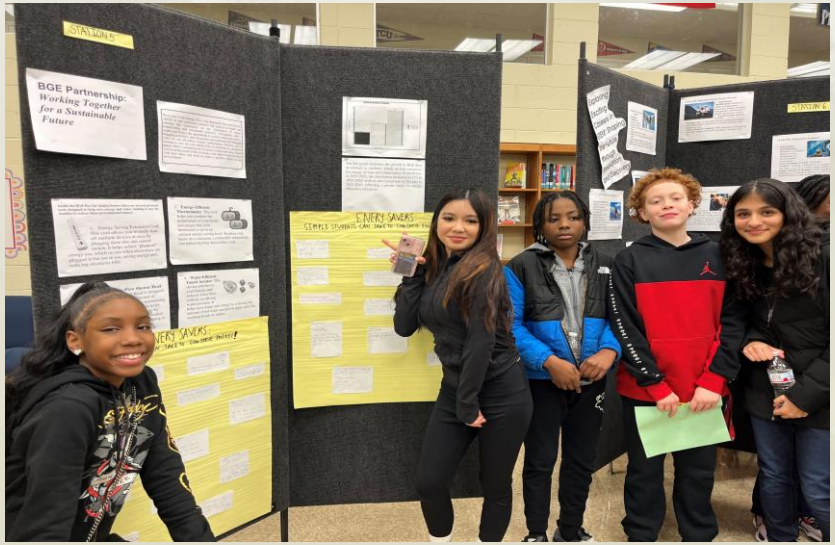
Energy Fair Night



Goal #7: Engage students in culturally connected, real-world learning experiences that integrate renewable energy and climate education through community events, empowering them to lead awareness, promote sustainability, and drive meaningful environmental change.

Energy Content:

Students connected classroom learning to real-world environmental issues through a walking field trip where they observed and recorded local conditions linked to energy use, pollution, and climate change. During Multicultural Night, they shared projects exploring cultural perspectives on climate change, social justice, and conservation. At Energy Fair Night, students, families, and community partners engaged in interactive renewable energy and conservation stations, promoting shared responsibility for a sustainable future.



From Culture to Climate: Students Leading Change

Goal #7: Engage students in culturally connected, real-world learning experiences that integrate renewable energy and climate education through community events, empowering them to lead awareness, promote sustainability, and drive meaningful environmental change.

Student Leadership:

- 45 students presented and facilitated during Energy Fair Night, students organized and supported interactive stations on renewable energy and conservation, actively engaging peers, families, and community partners in sustainability learning.

Student Leadership:

- 69 students presented and facilitated discussions during Multicultural Night, sharing cultural perspectives on sustainability, climate change, and social justice with families and community members.
- 219 seventh-grade students participated in a walking field trip to the BAPS Temple, where they explored Hinduism and its teachings on respect for nature and the interconnectedness of all living things. Students made meaningful connections between these beliefs and global efforts to protect natural resources, reduce environmental impact, and promote sustainability. This experience deepened their understanding of how cultural values can support energy conservation, ecosystem preservation, and long-term care for the planet.

From Culture to Climate: Students Leading Change

Goal #7: Engage students in culturally connected, real-world learning experiences that integrate renewable energy and climate education through community events, empowering them to lead awareness, promote sustainability, and drive meaningful environmental change.

- Evaluation & Impact:

  219 7th grade students participated the walking field trip to the BAPS Temple, they explored Hinduism and its teachings on respect for nature, deepening their understanding of global efforts to preserve ecosystems and protect the Earth. The students had a Socratic discussion with the facilitators of the fieldtrip in the temple.

- 69 students showcased their countries of origin during the Muli-Cultural night, examining how climate change has impacted different regions while sharing local practices for conserving energy, water, and soil.

- 48 student leaders facilitated interactive stations during the Energy Fair Night, engaging families, peers, and community members in renewable energy and sustainability learning, significantly expanding community awareness and participation.

Green Genius: Leading Renewable Change Through Student Innovation

An Integrated Approach to STEM, Sustainability, and Community Impact

The Green Genius STEM Team of Martin Luther King Jr Middle School integrated energy content, hands-on innovation, and real-world application, students developed a deep understanding of renewable energy, conservation, and environmental responsibility. Student leadership was evident as they designed solutions, led initiatives, and educated peers and the community, demonstrating ownership of their learning. The project resulted in measurable impact, including increased energy awareness, reduced resource use, and broad community engagement. Collectively, Green Genius showcases how empowered students can lead meaningful change and drive a more sustainable future.