E² Energy to Educate SM

As part of our commitment to education, E2 Energy to Educate grant awards support projects that are team oriented, hands-on projects with specific results. E2 Energy to Educate projects enhance student understanding of the science and technology needed to address energy issues and reach and inspire students to think differently about energy.

2022 E² Energy to Educate – Highlights

- **23 projects awarded more than $510,000, reaching nearly 20,000 students nationwide**
- Student projects include hydroelectric generators, electric vehicle kit projects, the construction of a solar powered net-zero home, and youth focused STEM teaching programs.

2022 E² Energy to Educate – Awardees

Albany State University Foundation
Albany, GA
Project Title: Green Energy Generation, Storage and Usage
Description: 500-700 middle and high school students will be directly involved in the design of a "green" system where a water reservoir will be used to store energy instead of a hazardous rechargeable battery. During the daytime, a water pump, operated by a solar panel, will lift water to a certain height and store it in a reservoir and in the nighttime the potential energy of the water will be used to generate electricity with a hydroelectric generator. The discharged water will be collected and lifted again in the daytime. High School students will learn about design calculations, various constraints in design and budget, and selection of proper materials or devices. Initially, the design work will start with the estimation of daily energy demand. After that, students will calculate the amount of water to be lifted, design the reservoir size, determine the capacity of a Direct Current (DC) water pump and finally the wattage size of solar panel that will run the pump.

American Nuclear Society
La Grange Park, IL
Project Title: See It, Be It: Exploring Careers in Nuclear Science and Technology
Description: As the premier association serving the nuclear field, ANS builds upon a rich history of K-12 programs with the project, "See It, Be It: Exploring Careers in Nuclear Science and Technology." ANS will utilize a cadre of nuclear professionals eager to enhance STEM education in the classroom - especially for students traditionally underrepresented in STEM -- through webcasts featuring inspiring voices of nuclear, in-classroom experiences with ANS Nuclear Ambassadors, and Navigating Nuclear, the ANS and Discovery Education curricular resource. In addition, ANS strives for diverse representation of panelists, featured speakers, and Nuclear Ambassadors.

Audubon Naturalist Society of the Central Atlantic States Inc.
Chevy Chase, Md
Project Title: POWERing Energy Education with Climate Ambassadors
Description: POWER (Peer Outreach With Energy Resources) will focus on climate education by building on last year's successful program. High school students will be trained and empowered as "Climate Ambassadors" to educate county residents and other students as well as local business owners, about energy use and conservation in Montgomery County. POWER is a collaboration between the American Nuclear Society, the Montgomery County Department of Environmental Protection, Montgomery County Public Schools and Montgomery County Public Libraries that will reach 300 or more county residents.

Sixteen Climate Ambassadors from a variety of high schools will create and present hands-on and engaging Energy Express activities for children at libraries and recreation centers throughout the county that align with the 2023 summer reading theme of "All Together Now: Todos Juntos Ahoras." At weekly meetings through June 2023, participants will explore topics related to energy use and conservation, practice communication and presentation skills, and learn to become Climate Ambassadors within their communities.

Carnegie Mellon Racing

Pittsburgh, PA
Project Title: Carnegie Mellon Racing 23e Car
Description: Carnegie Mellon Racing is a student engineering team at Carnegie Mellon University that participates in the Formula SAE Electric competitions hosted by the Society of Automotive Engineering (SAE). The team has a long legacy as an internal combustion team and switched to an electric vehicle in 2014. As one of the first university teams in the United States to make this change, the team pioneers electric racecar technology. The team is currently creating an all-electric, formula-style vehicle to compete in the summer of 2023 in the international field.

Champaign Habitat for Humanity

Champaign, IL
Project Title: RENU-House
Description: Champaign Habitat for Humanity (H4H) proudly supports the project entry of the Illinois Solar Decathlon Build Team. Illinois Solar Decathlon is a registered, multidisciplinary student organization at the University of Illinois at Urbana-Champaign. The team is working to design and build a single-family, solar-powered, energy net-zero home for Champaign H4H to compete in the U.S. Department of Energy (DOE) Solar Decathlon Build Challenge. The competition focuses on two critical goals: to integrate high-performance design and construction education into degree programs and to inspire the public and industry through innovations implemented by student teams. Teams competing in the Solar Decathlon Build Challenge have a two-year period to design build, and operate their houses in their respective region, with student work culminating in April 2023 with the Solar Decathlon Competition Event at the National Renewable Energy Laboratory in Golden, Colorado.

Children's First Fund The Chicago Public School Foundation

Chicago, IL
Project Title: Preparing Chicago's Youth for an Electrified Future
Description: Chicago Public Schools (CPS), supported by the Children First Fund (CFF), seeks to prepare youth for postsecondary pathways. CPS' Career & Technical Education's (CTE) Transportation Cluster aims to prepare youth for a range of careers in the transportation industry by integrating electric vehicle kits into its existing robust curriculum. Students will learn the fundamentals of electric vehicle engineering, vehicle design, and assembly while also gaining critical STEM technical skills that promote sustainability and environmental protection and set students on their way to a career in the transportation industry. The electric vehicle kits can be reused year after year and it is anticipated that these kits will have a life of, at least, five years.

Consumer Energy Education Foundation

Houston, TX
Project Title: Innovations in the Energy Sector
Description: In partnership with Constellation, the Consumer Energy Education Foundation requests a community investment of $25,000 to continue its successful week long Energy Summer Camp series in 2023 for 150 underserved and underrepresented middle and high school youth in Houston, TX and surrounding areas. The goal of this investment is to create a highly engaging, equitable and inspiring learning event that will connect youth with experiences and real world opportunities in energy sources to explore the evolving role of innovation in the Energy sector and how they might play an entrepreneurial role in it one day.

The proposed Innovation in Energy Summer Camp embraces a STEM hands-on active learning experience that is inquiry based and grounded in real-world issues and authentic experiences. Components of the program include development of hands-on activities and customized STEM kits, video programming and interaction with subject matter experts in the energy industry. In addition, robust pre and post survey data gathering and analytics campaigns will be implemented to measure the program experience and to maximize sustainability results which can be replicated.

Coppin State College Development Foundation, Inc.
Baltimore, MD
Project Title: Engaging STEM Youth in Baltimore City and the Greater Baltimore Area: Research into Biofuels Using Graphene Oxide and other biological materials at Coppin State University
Description: Students will learn the principle of production of biofuel. Students will also become familiar with the role of catalyst in the production of fuel cells. They will be introduced to the production of enzymatic biofuel cell which makes use of enzyme as a catalyst to oxidize the fuel to produce electricity. The enzymatic biofuel is made up of the enzyme, which is immobilized on electrodes, bioanode which is the oxidizing enzyme, biocathode, a reducing enzyme, a permeable membrane and electron flow from circuit. The students will become familiar with all these processes and their application. They will gain in-depth understanding of the various material used in the production of the enzymatic biofuel and their application in other fields of study.

Dickinson College
Carlisle, PA
Project Title: Clean Energy From Waste Education Program
Description: The Dickinson College Farm runs environmental education programs for elementary, middle, high school and college students on a working produce and livestock farm. Renewable energy and sustainable waste management are key components of the curriculum. These topics are combined in our biogas waste to energy initiative which began in 2008 with research and demonstration and will soon expand to a commercial scale. Biogas is a biologically derived, carbon neutral, renewable alternative to natural gas made through fermentation of organic materials. Currently the farm operates a pilot-scale biogas system, converting cattle manure and food waste into fuel for cooking use. The farm has demonstrated this technology to hundreds of K-12 students, including hands-on sessions covering basic science, feeding the digesters, and cooking snacks over freshly made biogas (please see blogs.dickinson.edu/farm/biogas for photos and video). To make biogas approachable to young learners we refer to the digesters as "fire-breathing, waste-eating dragons."

We are now developing a large-scale biogas to electricity system in partnership with a neighboring dairy farm. This system will convert manure from 150 dairy cows and two tons/day of food waste from the college, local schools and businesses into grid-tied electricity using a 50kW combined heat and power engine powered by biogas.

Ecorise Youth Innovations
Austin, TX
Project Title: Energy Sustainability and Equity with EcoRise
Description: This year, we invite Constellation to support a continuation of the project, which includes making Decarbonizing the Electric Grid (DEG) resources available to all our teachers along with a broader package of EcoRise energy-focused resources, including our foundational Sustainable Intelligence (SI) program, which is currently used by over 6,531 teachers and 365,000students in 50 U.S. states. SI is a bilingual curriculum consisting of 160 STEM-based, standards-aligned, hands-on lessons organized in distinct eco-themes (energy, water, waste, air, public spaces, transportation, food). The lessons engage youth in developing real-world solutions through project-based activities, design labs, and campus eco-audits. For this broader expansion, we are renaming the project Energy Sustainability and Equity with EcoRise.

Constellation funds will allow us to provide 50 teachers who express interest in teaching our decarbonizing instruction and/or who we know will enjoy teaching the program, access to following EcoRise resources.

Fairfield University
Fairfield, CT
Project Title: SuSTEMability
Description: The Fairfield University (Fairfield) School of Engineering (SOE) asks Constellation to consider a $50,000 grant in support of SuSTEMability. This proven program trains over 20 undergraduate engineering and science students in mentoring 500 K-12 students and 12 STEM educators from urban, Connecticut schools including Cesar Batalla (CBS), Davenport Ridge Elementary (DRES), and Wakeman Boys and Girls Club (Wakeman), in STEM education and hands-on activities using real-world issues that surround environmentally sound and sustainable energy sources.
SuSTEMability empowers K-8 students to become informed energy consumers as they participate in experiments that both align with Constellation's innovation themes and are relevant to energy issues facing the students' communities. Twenty Fairfield undergraduate students (Fellows) and their faculty mentors will visit each community partner ten times between January and June 2022, for a total of 20 classroom sessions. Participants will unite at a day-long event on the Fairfield's campus in April, and the program will culminate with a teacher professional development workshop in May.

Fusion Partnerships Inc
Baltimore, MD
Project Title: Ride4change
Description: Fusion Partnerships, Inc. is requesting $25,000 to support operational costs to purchase materials, support staff & instructors, and provide infrastructure for B360. We will serve 150-200 youth(ages 9-15) and place 10 young adults (ages 16-24) as trained instructors for programming. Through a cohort model (10 -15 youth, 1 young adult instructor, and 1B-360 Staff Lead) we will provide 40 hours of programming over 4 weeks for each cohort and 240+ hours of programming in a year. This will allow us to serve 4 - 5cohorts total in multiple communities of the greater Baltimore area that have household incomes less than $50K. Our workshops focus on learning the engineering design process, mechanics, robotics, coding (C/C++, Java) 3D printing, CAD, laser engraving, electricity soldering, welding, team building, green energy concepts, presentation, and entrepreneurship. In the end, students use these skills to create a 3D printed robot that they control and operate from a hand held device.

Our goal is to train youth and young adults who have a dirt bike hobby to harness that talent by utilizing our curriculum to prepare them for STEM careers available, educational opportunities, direct job placements as well as job opportunities with the organization.

Lets Go Boys & Girls
Annapolis, MD
Project Title: Lets Go Stem Pathway to Success
Description: LETS GO's Vision is "Students Today, Technology Leaders Tomorrow." Through research and experience, we developed a four-phase STEM Pathway to Success program (Appendix A), providing a road map to higher education and STEM careers, ultimately leading to financial stability for students in underserved communities. STEM Pathway to Success: Phase 1. STEM exploratory activities as early as kindergarten. Phase 2. STEM Scholars are students exhibiting especially strong interest and identity Phase 3. STEM Interns participate in competitive, prestigious national internship programs Phase 4. STEM and STEM-related careers pursued after high school or college graduation.

We partner with Title 1 schools, youth organizations, and collective impact nonprofits to deliver free, high-quality, multi-week, out-of-school time (OST) STEM education and workforce development programs. Additionally, we build capacity for low socioeconomic communities through professional development for teachers, instructors, and volunteers in a hands-on "train-the-trainer" model.

Montclair State University Foundation
Montclair, NJ
Project Title: Green Teams Program
Description: The Green Teams Program creates pathways to STEM careers by engaging low-income, first-generation college and traditionally underrepresented undergraduates in a paid transdisciplinary, hands-on sustainability internship program. The program helps this diverse cohort develop skills that make them highly desirable job candidates, while they work in collaborative learning teams to produce actionable recommendations for organizations to improve sustainability and create a greener, healthier planet. At the

same time, the Green Teams Program builds corporate-academic-community partnerships to engage students in real world settings, while bridging classroom experiences to career skills.

Northwest Indian Colleges

Bellingham, WA
Project Title: Renewable Energy Workforce Training and Outreach
Description: In support of providing Engineering and Workforce Training opportunities to Tribal Communities, NWIC requests funding of $50k to offer 10 solar training sessions over the course of a year. NWIC has partnered with Remote Energy (remoteenergy.org) to integrate solar training programs into Engineering curriculum as well as the Workforce Training program at NWIC. Engineering students use take-home solar kits to learn the basics of solar photovoltaics (PV) and troubleshooting, while Workforce students learn to install solar panels through hands-on training with the on-campus mock roof. The mock roof is a low to the ground training structure equipped with eight - 365 W panels and microinverters, which feed power to the adjacent building. NWIC and Remote Energy recently completed work on a mobile solar training lab -- a trailer equipped with solar panels, inverter, batteries, and a battery management system -- and have piloted a remote training program with Tribes in Washington and Montana using the trailer and hands-on solar kits. These remote trainings include the basics of solar PV, solar installation, solar maintenance, and grant writing workshops all tailored to the needs of the Tribal community requesting the training.

OurSpace World, Inc.

Bowie, MD
Project Title: Scaling Camp Earthpact: an Afrikan-centered youth environmental stewardship program
Description: Camp Earthpact is an African-centered youth summer environmental stewardship program targeting Black youth age 4-17. Piloted in Summer of 2022, the inaugural 7-week Camp Earthpact in Maryland served 26 students (ages 4-15) and was hosted by 2 Black educators in collaboration with a Black beginning farmer and The Federation of Southern Cooperatives Rural Training and Research Center in Alabama. The goal of Camp Earthpact is to build a pipeline for a future generation of climate-conscious Black land stewards, while building knowledge and skills around climate justice, sustainable land use, and sovereign community. By design, Camp Earthpact integrates ancestral wisdom, history, and core classroom subjects (math and science; literacy, language, arts and culture) into the real-world context.

Support from Constellation would enable OurSpace World Inc. ([OSW/OurSpace]www.ourspaceworld.org) to scale up the impact and reach of Camp Earthpact by training a cadre of Black camp counselors to deliver this program to even more Black youth.

Pottstown SD

Pottstown, PA
Project Title: CTE Pathways
Description: Pottstown High School is considered a "comprehensive" high school because it has ten approved Career and Technical Education (CTE) Programs and a full academic/college preparatory school within one building. Many students benefit from the ability to schedule advanced placement (AP) courses and CTE courses. Therefore, Pottstown High School proudly prepares each student by name for success at each level by offering the knowledge and skills needed to go directly to the workforce, trade school, or four year university after graduation.

This project will provide the following opportunities for students: Industry visits, Job Shadow Experiences, Post-Secondary Education visits, STEM Camps/Pre-college Summer Prep Camps and Programs.

Rochester Institute of Technology

Rochester, NY
Project Title: Clean Energy Training Sessions for High School Teachers and Students
Description: Rochester Institute of Technology (RIT) has developed programs to educate undergraduate students, high school teachers, and high school students in the field of "Clean Energy Generation Using Fuel Cells." The proposed 2023 program will include at least 5 on-campus weekend workshops for new high school teacher and student participants, including presentations and discussions, hands-on experience using fuel cells, and tours of the Golisano Institute for Sustainability and demonstrations in their Fuel Cell Test Bed. In addition, zoom meetings with previous high school teacher participants will provide continued

support for their education programs throughout the year, and they will be invited to bring their students to 3-5 experimental laboratory demonstrations at RIT.

Saint Josephs University
Philadelphia, PA
Project Title: Physics Wonder Girls Summer Camp at Saint Joseph's University
Description: The Physics Wonder Girls Camp has a demonstrated record of recruiting campers from underrepresented groups in STEM and underserved school districts, with 60-80% of students being non-Caucasian in prior years. Each cohort participates in an immersive week-long camp that focuses on project-building solar-powered fidget-spinners, solar cars or boats, solar cookers, wind turbines and fuel-cell cars. Campers tour research labs and industrial plants, meet with women scientists from industry and academia, and present at energy-themed poster sessions. Physics majors, trained in fundamentals and applications of renewable energies will mentor middle-school campers and comprise the camp crew. Dr. Roberto Ramos, professor of physics at SJU is the camp director overseeing the successful implementation of this program.

Salvadori Center LTD
New York, NY
Project Title: Building Green: Collaborative, Hands-on STEM Education for Under-resourced Students
Description: The Salvadori Center's Building Green curriculum introduces students to energy efficiency, active and passive solar, energy transfer, and sustainable design and construction. We will deliver Building Green for free to 120 students at under-resourced public schools in New York City from October 2023 to June 2024. During the program students engage in a series of project-based experiments. Sessions are cumulative, and each activity builds knowledge and skills so students can build a successful model. Leading up to the final project, participants measure retention and release of heat in materials. They learn about energy storage, decentralized energy, insulation properties, natural ventilation techniques, active and passive solar, recycling, and converting waste into energy.

Thompson Island Outward Bound Education Center, Inc.
Boston, MA
Project Title: Green Ambassadors: Environmental Career Development on Thompson Island
Description: The Green Ambassadors program aims to prepare young people for green careers by providing them with hands-on work experience in conservation and environmental stewardship, while engaging them in social and environmental justice education and social-emotional outdoor challenge activities. Students work for six weeks on Thompson Island and have the option of participating in the program throughout the school year. Each year includes a different focus area, but in all years, apply STEM learning, engage in Outward Bound challenges and expeditions, and learn about green careers.

Wheeling High School
Wheeling, IL
Project Title: Electric Vehicle Technicians of Tomorrow
Description: Electric vehicles represent the future of the automotive industry. The career pathways program at Wheeling High School represents the future of secondary education. The Electric Vehicle Technicians of Tomorrow initiative will bring together these forces and prepare the next generation of automotive maintenance experts for in-demand careers in a safer, greener world. Wheeling High School's automotive career pathway gives kids who have a passion for cars a foundational education in automotive systems, diagnostic testing, and repairs. Students can earn early college credit, complete basic automotive industry certifications, repair cars in the school shop, and engage in work-based learning experiences, including internships at local businesses. These opportunities allow Wheeling graduates to advance swiftly toward an associate's degree or professional certification.

YWCA Tri-County Area
Pottstown, PA
Project Title: YW Steam Ahead
Description: To introduce youth to solar energy applications and concepts, YWCA Tri-County Area in 2023 will offer the STEAM Ahead Solar Car Race as part of its science, technology, engineering, and math enrichment program for youth. The STEAM Ahead Solar Car Race brings an environmentally sustainable solar energy engineering program to middle school students in the Pottstown area. The program uses curriculum from the Philadelphia Solar Energy Association, which hosts the Jr. Solar Sprint for middle school students.

Youth will be led by YW's STEAM education manager, who also will guide youth in learning about additional alternative energy sources and STEAM concepts. The STEAM education manager will be an addition to the Youth Empowerment Program steam in 2023; based on experience in past STEAM youth programs, fully engaging youth in STEAM concepts and projects requires a youth educator dedicated to empowering youth to understand STEAM from a broad approach -- how STEAM concepts relate to their everyday lives and to renewable energy sources. The STEAM manager also will encourage creative and solution-based thinking with STEAM concepts.