

SHARING OUR ENERGY VIBES



ROCHESTER SCHOOL

Rochester School is located in Chía, Colombia, and is the only LEED Platinum–certified school in Latin America. Its curriculum is deeply aligned with the concept of using the campus as a living laboratory, allowing students to engage directly with their environment as part of the learning process. Furthermore, NEED resources strongly support the school’s mission of fostering a culture in which students teach and learn from one another.



OBJECTIVES

1. Use NEED resources in class to support the idea of the campus as a living laboratory.
2. Encourage activities where students teach and learn from one another.
3. Design a Pi Day event that incorporates engineering challenges related to energy.
4. Connect the SDGs with the projects completed during this school year.



EXPLORING PHOTOVOLTAICS

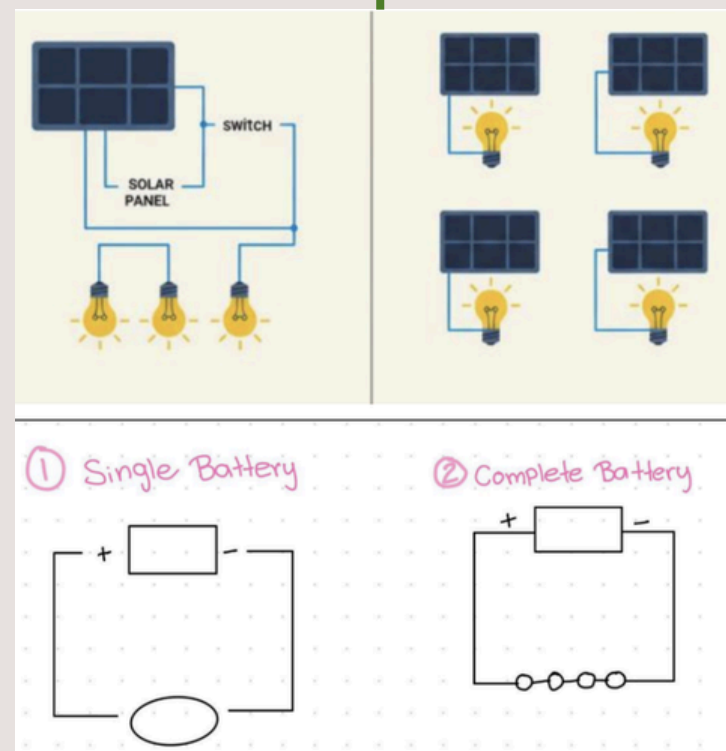
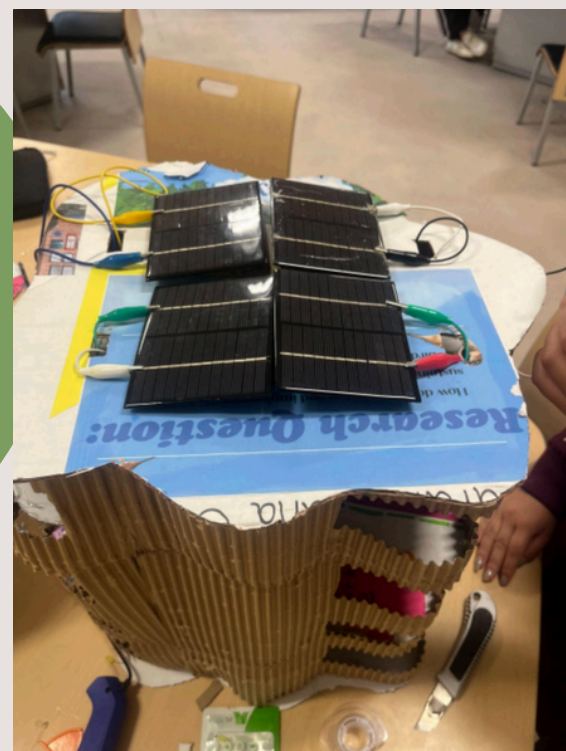
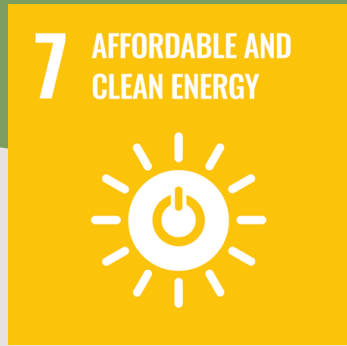
Students explore the properties of electricity, such as current, voltage, and power. They also develop useful skills, including how to use a multimeter, calculate power usage, and determine the payback period of photovoltaic systems.



THE PHOTOVOLTAIC PANELS PROJECT

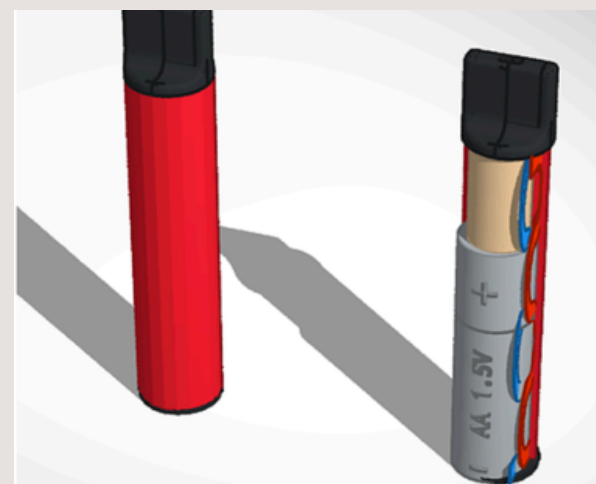
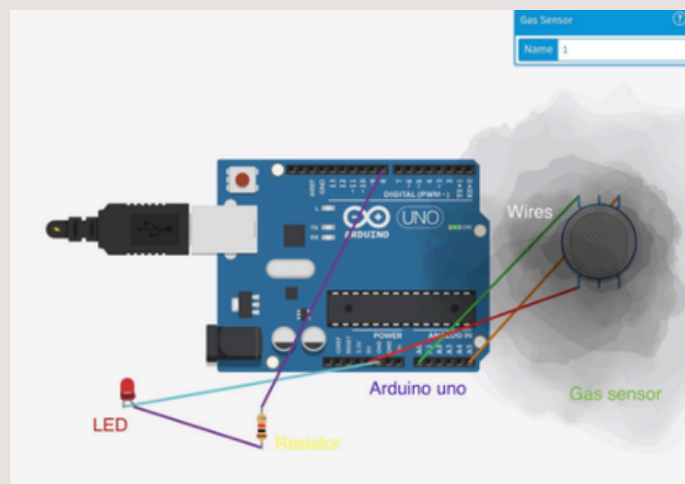
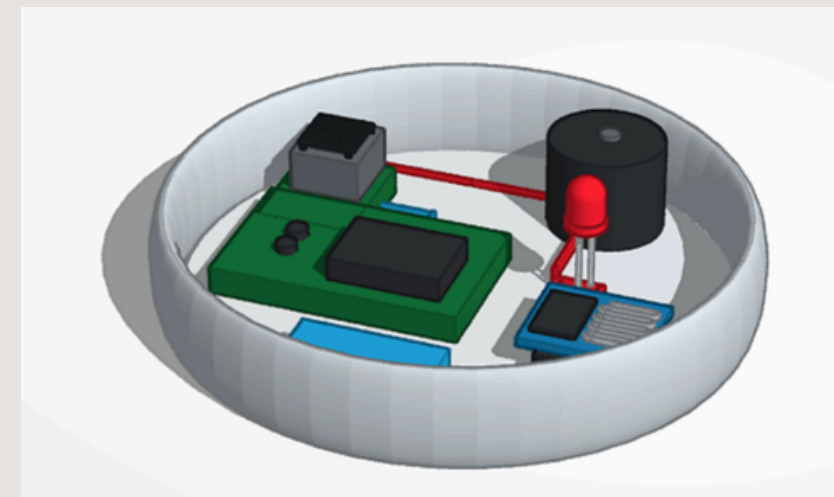
High school students developed a scale model of a school building powered by solar panels to demonstrate how solar energy functions. They connected four solar panels in a series circuit to light bulbs representing each floor of the building. Additionally, they calculated key values such as voltage, current, and power to deepen their understanding of how the system generates electricity. Through this model, they illustrated how solar energy can be used to power buildings while emphasizing the importance of renewable energy and electrical circuits.

We also learn from our mistakes



THE VAPE DETECTOR PROJECT

High school students designed a project to explain how vaping devices and vape detectors function, applying physics concepts such as electrical circuits and thermodynamics. They described how a vaping device uses a battery and a heating coil to vaporize liquid, as well as how vape detectors utilize sensors to identify aerosols or chemical particles in the air and send alerts. Additionally, they developed a 3D model and provided a scientific explanation illustrating how electricity, heat transfer, and sensor technology operate within these systems. This topic is particularly relevant for teenagers, as it helps them understand the science behind vaping devices, promotes informed decision-making, and raises awareness about the potential health and safety implications associated with their use.



WIND ENERGY: THEORY AND TURBINE ASSEMBLY

In this project, students designed and tested a small wind turbine to analyze how different blade characteristics influence the amount of electricity generated. They experimented with variables such as blade pitch, surface area, number of blades, and added mass, and measured the voltage produced to determine which configurations generated the greatest amount of energy.



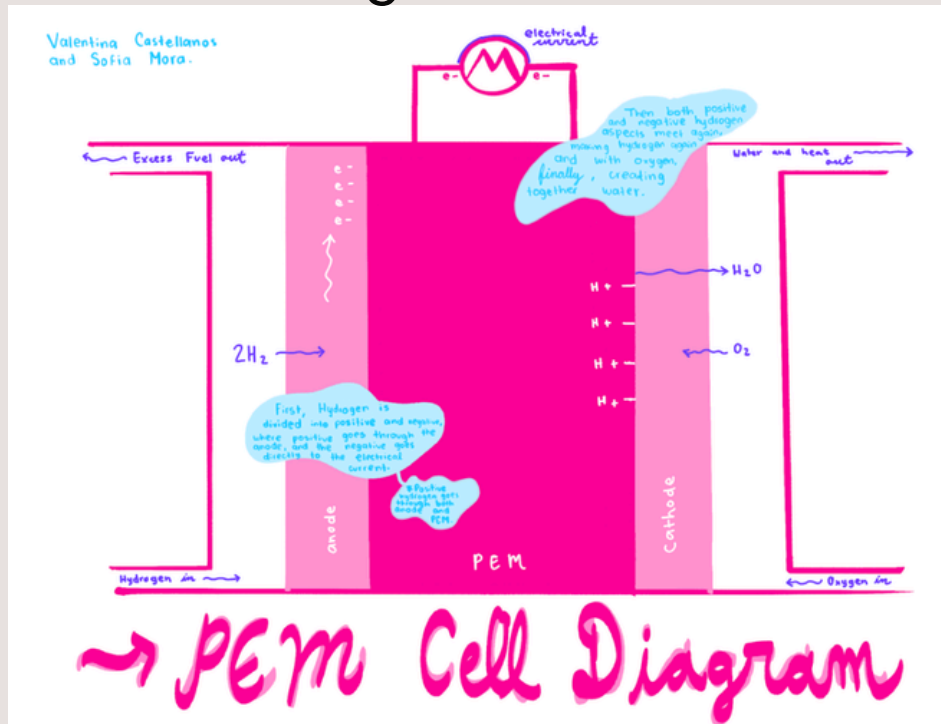


FUEL CELLS & CELLULAR ENERGETICS



In this project, students explored how hydrogen fuel cells generate electricity and how this process relates to cellular energetics in biology. They analyzed the components of a fuel cell, explained the chemical reaction between hydrogen and oxygen that produces electrical energy, and connected these concepts to biological processes such as photosynthesis and cellular respiration.

Process Diagram



Stage	Location	Inputs	Outputs	Purpose (1 sentence)
Glycolysis	cytoplasm	Glucose	ATP and NADH	Glycolysis breaks down glucose to generate ATP
Krebs Cycle	mitochondrial matrix	Acetyl-CoA, 3 NAD, FAD, 1 ADP, and water	CO ₂ , NADH, FADH and ATP	The Krebs cycle makes energy by oxidizing Acetyl-CoA.
Electron Transport Chain (ETC)	inner mitochondrial membrane	NADH, FADH, Oxygen and ADP	ATP, Water, NAD and FAD,	ETC uses energy from the NADH and FADH to make ATP

Feature	Fuel Cell	Electron Transport Chain (Cell)
Energy source	Hydrogen	CO ₂ and H ₂ O
What moves electrons?	PEM	Light inputs electrons
Final electron acceptor	Oxygen	NADPH
Product(s) formed	electricity and water	ATP
Type of energy released	electric and heat energy	chemical energy
Role of membranes	the anode releases the electrons and the cathode intakes the electrons	harvest light, synthesize ATP and move electrons

ELEMENTS AND ISOTOPES

In this activity, students analyzed isotopes and radioactive processes to understand how changes in an atom's nucleus affect stability and energy release. They examined the differences between isotopes, studied alpha and beta decay, identified both natural and artificial sources of radiation, and explored how the proton-to-neutron ratio influences nuclear stability through a simulation of stable and unstable isotopes.

Elements and Isotopes

Jacobo Gallón and Julian Soler

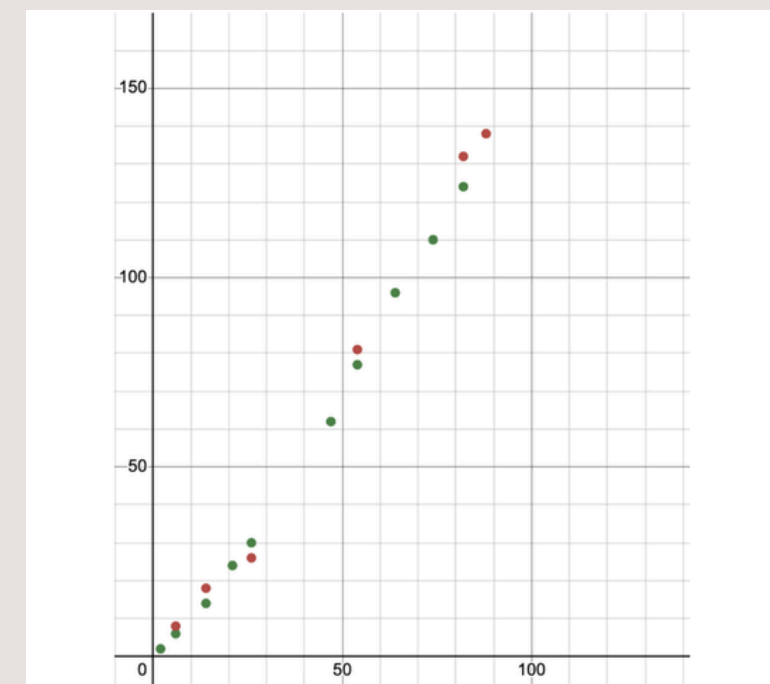
1. Complete the tables on the following page. Use the Periodic Table of the Elements to find the atomic number and number of protons.

Stable Isotopes and Unstable Isotopes

Stable Isotopes	Atomic #	Protons (Z)	Neutrons (N)
Helium-4	2	2	2
Carbon-12	6	6	6
Silicon-28	14	14	14
Sulfur-32	16	16	16
Iron-56	26	26	26
Xenon-136	54	54	54
Gadolinium-157	64	64	64
Tungsten-184	74	74	74
Lead-208	82	82	126

Unstable Isotope	Atomic #	Protons (Z)	Neutrons (N)
Carbon-14	6	6	8
Silicon-32	14	14	18
Iron-52	26	26	26
Xenon-135	54	54	51

2. On a separate piece of graph paper, draw a vertical Y-axis and label it "Neutrons" with a scale from 0-150.
 3. Draw a horizontal X-axis and label it "Protons" with a scale from 0-100.
 4. Plot the points of the stable isotopes. When all isotopes have been plotted, draw a bold curve through the points. Make the curve as smooth as possible. This is the "band of stability."
 5. Next, plot the unstable points on the graph. Use a key so you can identify the different isotopes.



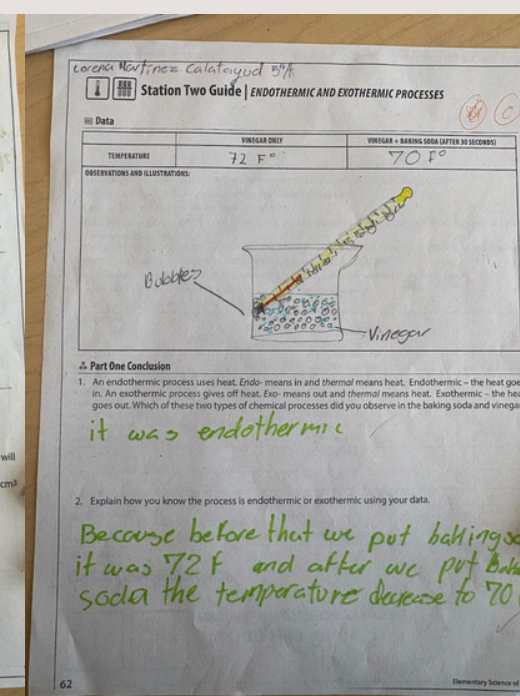
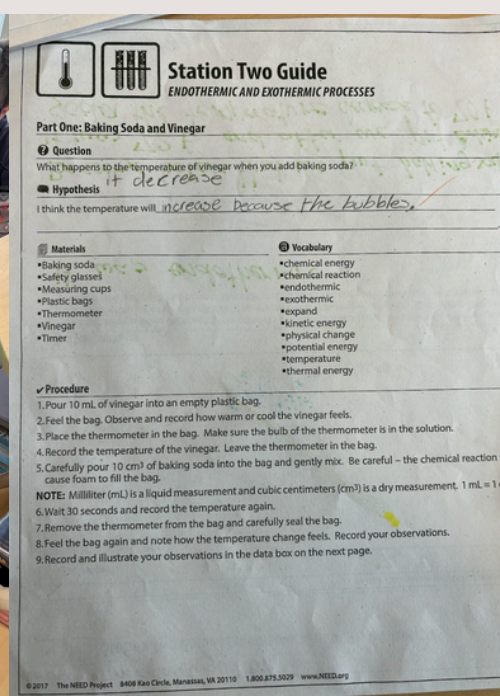
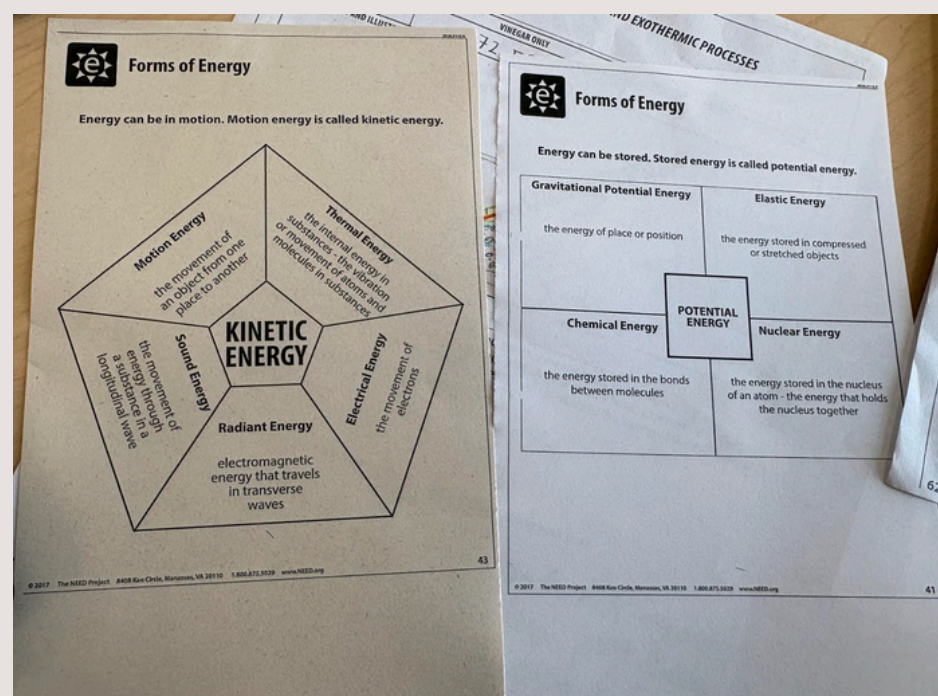
6. Where do the unstable isotopes fall relative to the band of stability?

Unstable isotopes fall outside the band of stability.
 too many neutrons, they are above the band.
 too few neutrons, they are below the band.

Rochester School

ENDOTHERMIC AND EXOTHERMIC PROCESSES

The 5th-grade students completed a booklet from NEED, where they explored endothermic and exothermic processes by mixing baking soda and vinegar. They measured the temperature before and after the reaction, observed bubbles, and concluded that the reaction was endothermic because the temperature decreased.



PI-DAY CELEBRATION



During Pi Day, the school celebrated with different activities for each level. In the sustainability club, we sold 3D-printed animals made of PLA (polylactic acid) filament. We taught students how to measure energy consumption using a Kill-A-Watt device and discussed actions they can take to reduce energy use at home and school. The estimated number of students, parents, and teachers who attended the stands is



IN-DEPTH LOOK AT SOME PI DAY PROJECTS

Sustainable Energy

Students presented a project in which they demonstrated how individuals can use energy more efficiently.



3D Eco printing

Students 3D printed animals to collect money with a material derived from sugar cane and corn.



Be conscious of residual waste at school

Students conducted a workshop to raise awareness about residual waste at school.



VIRTUES IN OUR SCHOOL

Rochester School integrates virtues—kindness, hope, and gratitude—into its 2025–2026 projects, connecting academic learning with real-world challenges. Students develop scientific and technological skills while considering themselves, others, and their context, fostering empathy and collaboration. The school remains committed to continuing this values-based approach for future generations.



**Sustainability Club
2025–2026**

WE WANT TO GIVE SPECIAL THANKS TO...

To students who participated in projects:

Lucía Guzmán Ardila, Sol Mariana Maldonado Cadena, Santiago Pérez Arévalo, Santiago López Sánchez, Renata Bernal Pérez, Juana María López Navia, Michelle Menevar Murcia, Juan Antonio Llopper Gil, Juanita Lozano Herrera, Salomé Rey Manosalva, Nicolás Acuña Díaz, Nicolás Álvarez Ramírez, Julián Andrés Soler Rodríguez, Martín Jiménez Peña, María Alejandra Benítez Alvarado, Simón Etra Hincapié, María Camila Gómez Vargas, Ángela María Ortiz Fajardo, Samuel Bincos Lozano, Valentina Quintero Álvarez, Isabella Hermida Escobar, Federico Ruiz Barón, Owen Jeremy Mejía Torres, Dana Gabriela Castro Chaparro, Alejandro Álvarez Ramírez, Valentina Castellanos Rodríguez, Sofía Mora Zambrano, Amelia Ocampo Valencia, Susana Colmenares Vivas, Sara Juliana Sanabria Díaz, Martín Santiago Rodríguez Carvajal, Simón Camilo Pérez Rojas.

To teachers who designed the projects:

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To our school:

Because thanks to our school, we are able to accomplish all of this, as it provides us with the resources, guidance, and opportunities to learn, explore, and grow through meaningful experiences.



THANK YOU

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