St. John the Baptist Catholic School

Powering Up School with Energy Education
Advisor: Scott Valenta

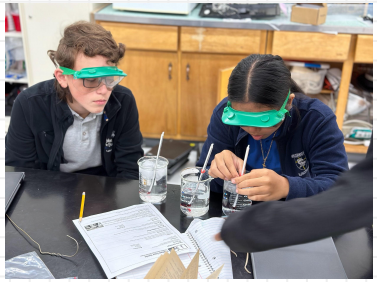
Goal: The goal of this project was to increase interest in STEM and STEM careers not just in the Junior High but in the whole School. To accomplish this, we created several “Mini Goals” along the way, such as running an Energy Fair, assessing our Village’s Energy Grid, Presenting our findings to Industry Professionals, Having opportunities to pass knowledge down to younger grades, exploring Energy with real world and hands on activities, and more.

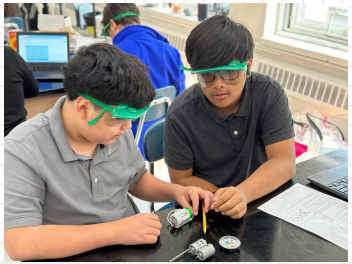
Goal: To increase our knowledge of the forms of energy and create a presentation detailing our findings to our classmates.

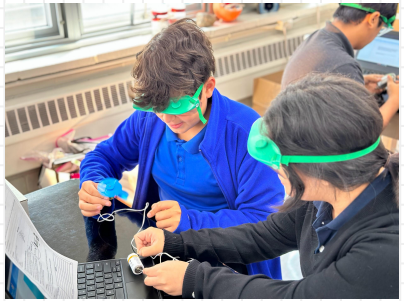
Energy Content: We completed labs from NEED's Science of Energy, which covered a large amount of Energy Information (Potential, Kinetic, Solar, Chemical, etc) through experiments and data collection

Leadership: Each group was responsible for teaching the rest of the class about their station and ensuring they understood it

Community Education & Involvement: We were responsible for teaching our classmates about our station.
Evaluation: We were quizzed on all forms and of Energy, requiring us to pay close attention to our classmates presentations





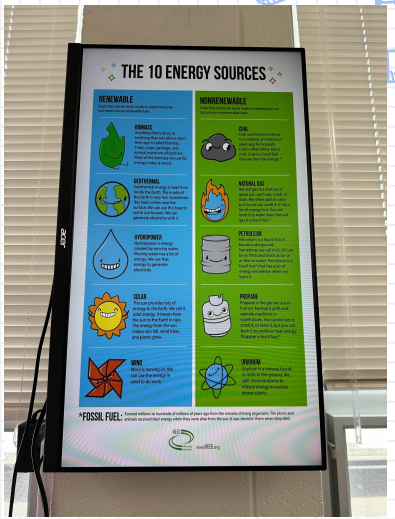


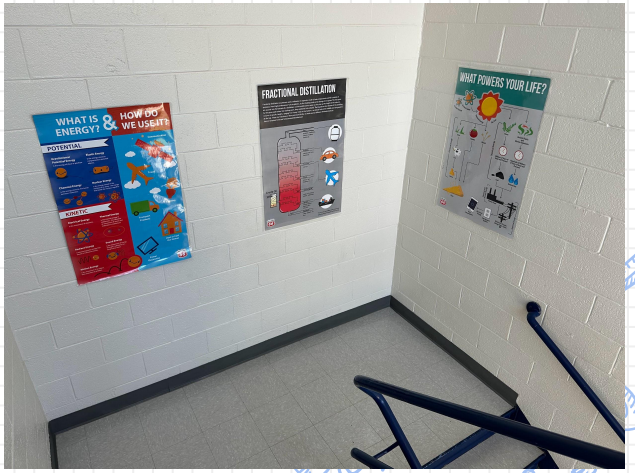
Goal: We noticed an empty stairwell, as well as that Mr. V's room lacked posters. We decided to create a stairwell of energy, with energy posters, and a digital poster board in Mr. V's room to display energy posters throughout the year.

Energy Content: Some info included renewables and non renewables, fractional distillation, the flow of energy, wind turbines, and more.

Leadership: We picked which posters we wanted displayed, hung up the posters, and worked with Mr. V to create the digital poster display

Community Education & Involvement: The stairwell is located inside the school in a place all classes use, allowing every grade to see them and learn more about energy.

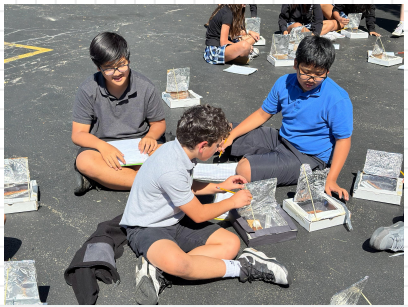




Goal: We created solar ovens, and collected data to compare them to a commercial option. We also utilized our solar ovens by making smores and warming up precooked bacon.

Energy Content: NEED Energy from the Sun. Our solar ovens utilized radiant energy, thermal energy, heat transfer, insulators, and conductors. We collected temperature data over time in our ovens and the commercial oven.

Evaluation: Our ovens got quite hot, but took longer to heat up and never reached the same temperature as the commercial oven. We proposed modifications to our ovens that may make ours more similar.

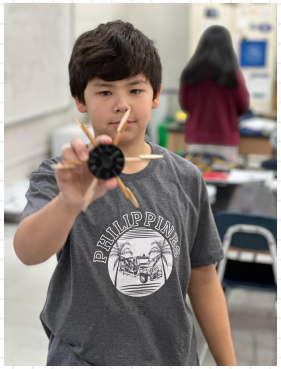


Goal: To understand how magnets, generators, and moving water can be used to generate electricity. Determine how things like water volume, penstock height, and turbine blade design effect the energy of a dam.

Energy Content: NEED's Energy of Moving Water: Gravitational energy, electromagnets, dams, multimeters, etc

Leadership: Student leaders in pod groups made a goal of making sure everyone understood. We explained concepts to those who were unsure, and reviewed with groups.

Evaluation: Our collected data allowed us to understand how different factors affect the output of a dam. We came up with an ideal dam from this data.



Goal: We wanted to use our knowledge of circuits, motors, batteries, and electricity in a STEM engagement project with 2nd grade. We taught them these things while using those skills to build walking robots with them. We wanted every 2nd grader to successfully build a working robot with their 8th grade helper.

Energy Content: Circuits, Motors, Batteries, Electricity, Kinetic Energy

Leadership: We assisted the 2nd graders rather than build it for them. We wanted them to learn the concepts and hands on skills rather than just watch.

Community Education & Involvement: We each had a 2nd grade buddy who we taught about Science and helped them build a walking robot.

Evaluation: Every 8th/2nd grader team was able to build a robot. We measured how fast they walked and determined a winner.

Goal: We wanted to understand the relationship between light color color and energy, to determine what colors have the most energy and which ones have the least energy. We did this by using Phosphorescent paper and different colored LEDs, recording which colors could and couldn't write on the paper, and how bright the writing was and how long it lasted.

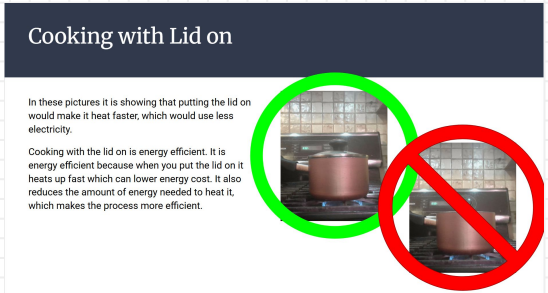
Energy Content: Energy of light, LEDs, batteries, photons

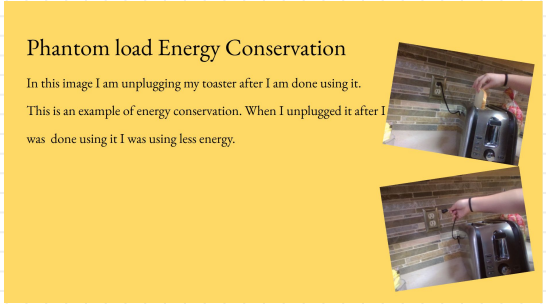
Evaluation: We were able to use our data from our experiments to successfully predict the energy of different colors of light

Goal: We wanted to learn about energy efficiency and conservation by creating entries for NEED's Holiday Contests. We created presentations on the *Twelve Days oF Energy* as well as *Gingerbread Energy Efficient Houses*. Creating the Gingerbread house required a research paper explaining energy efficiency and different ways to build/modify houses to achieve it. We

Energy Content: Energy Efficiency, Energy Conservation, Insulation

Evaluation: We successfully entered the contests, learning about Energy Efficiency and Conservation and won our classroom prizes





Goal: We wanted to learn how to perform an Energy Audit, so we could Audit our school and make changes to lower our Energy Usage. We learned from a Professional Energy Auditor and performed an audit on several different rooms in the school.

Energy Content: NEED ESP Energy Audit, NEED Building Science, NEED School Energy Inspectors, Light meter, Thermometer, Hygrometer, Killawatt meter, Energy Conservation, Energy Efficiency

Leadership: Students on the audit reported back to our classmates what happened in the audit, our findings and results.

Community Education & Involvement: We reported the results of our audit to the teachers whose rooms were audited. Letting them know what changes they could make to improve their energy usage

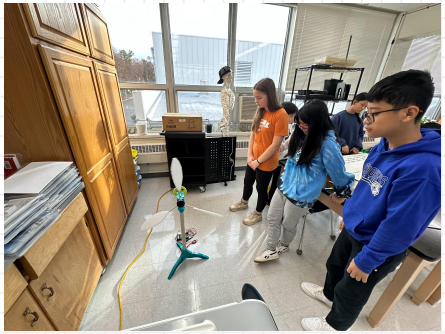
Evaluation: Changes were made such as turning off lights when classrooms were not in use, timers on projectors, and sleep settings on teacher laptops

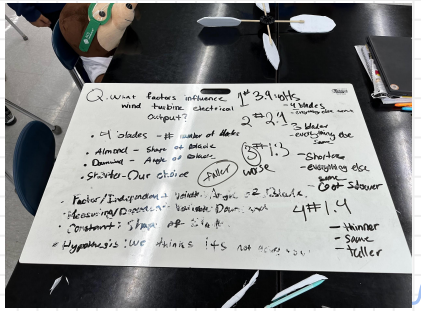
Goal: We wanted to learn about Wind Energy, and the best turbine blade design. We performed experiments to see how things like blade shape, size, and number changed the electricity produced. Each pod used our data to argue what the best wind turbine design would be.

Energy Content: NEED Energy from the Wind, Multimeters, Generators, Wind Energy, Renewable Energy

Leadership: We made it a friendly competition to see who could produce the most electricity. Rather than be competitive with other groups we were supportive and helpful.

Evaluation: We used our data to argue what the most efficient wind turbine would be, by finding the best electricity producing combination from each test.





Goal: We analyzed neighborhoods in our village to see how climate change might affect the electrical grid in them. This included touring each neighborhood to find parts of the electrical grid. We then proposed solutions and built working models of our neighborhood with the solution implemented.

Energy Content: Climate Change, Energy Conservation, Energy Efficiency, Energy Policy, Circuits, LED's, Transformers, Electrical Grids, Wire Stripping, Arduino Microcontrollers, etc

Leadership: Some students emerged as electrical advisors, giving other groups assistance and advice on wiring up their neighborhood.

Evaluation: Every group was able to successfully produce a model with our solutions shown and have our electrical grid function.

Goal: From our Village Climate Change Grid Analysis Project we constructed a presentation and used our model to propose our solution to ComEd employees. We wanted their feedback and ideas on our projects as Industry Professionals. We also networked with them over lunch, gaining information and insight into Energy Careers and the Industry.

Energy Content: Energy Conservation, Energy Efficiency, Power Grids, Cost/Benefit Analysis, Climate Change, Energy Careers

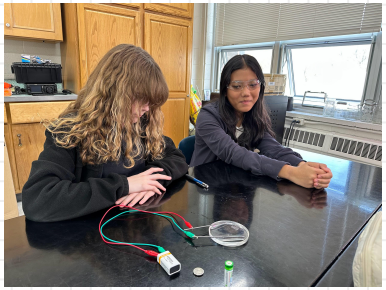
Community Education & Involvement: We invited Industry Professionals from ComEd to hear our solutions, offer feedback, and network with us.

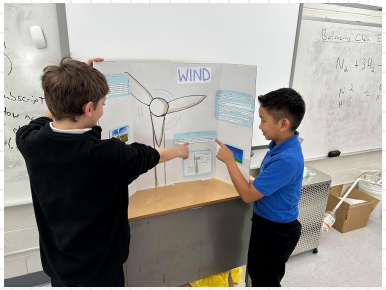
Evaluation: We received feedback, questions, and comments from the ComEd professionals. Some factors we learned about that were important to consider were cost/benefit analysis, and the water table.

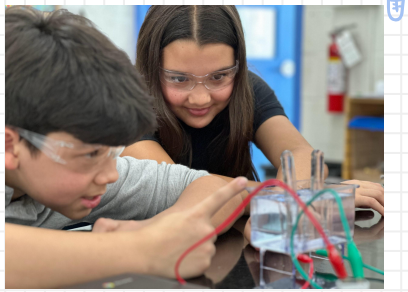
And more! We learned and did way more activities than could possibly fit on 15 slides. Some highlights include, constructing Energy Info Boards, experiments collecting data on elastic energy, learning about Hydrogen as an energy source, several experiments with Weather and Wind, and learning how to use arduinos and create circuits using parts like capacitors, resistors, and others.

We're hoping to learn more before the year ends.

Every previous slide and all the things that couldn't fit were all in build up to something.



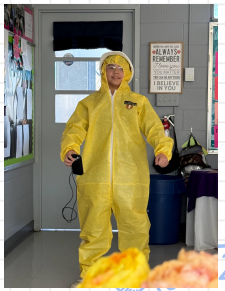




Goal: We wanted to show off our collected knowledge to the rest of the school through an Energy Fair. We wanted everyone to know about all the cool things we did and help the rest of the school learn. We wanted at least half the classes to attend.

Energy Content: Basically everything! Everything from every preceding slide was on display in some form at the Energy Fair. The fair had things like solar ovens, wind turbines, hydrogen generating brownlee apparatus, paper circuits, our Winfield Climate Change Grid models, Energy Info Boards, UV bracelets, and MORE!

Leadership: The Energy Fair was design and ran entirely by students. Students were responsible for creating their station showing off an aspect of our energy learning, gathering the required supplies, and finding ways to explain the information to students as low as PK and as high as 8th. One student emerged as a leader with the idea of showing up in Safety PPE in several classrooms to hype up the Energy Fair.



Community Education & Involvement: We invited every grade level to our Energy Fair in our PK-8 School. We taught every student and teacher who came by about Energy, and got them involved with hands on activities and experiments. We had a station sending home an Energy Conservation Contract for students to complete with their parents to assess their energy usage.

Evaluation: Our Energy Fair was a huge success! *Every single student* and grade level teacher were able to attend. Every recess period was full of kids checking out their UV bracelets, and many lockers had Energy Sidekicks hanging from them. We were featured on our School's Social Media, and were even featured in a Community Newsletter. 85% of students who attended completed and turned in an Energy Passport, certifying they attended at least 9 Energy Stations. Some students earned ComEd swag bags.