Hawk Energy Club

Myrtle Beach Middle School

Myrtle Beach, SC

About Our Club

- Myrtle Beach Middle School
- Hawk Energy Club
- **Advisor:** Katie Forrest, 8th grade science
- **Student Leaders:** Malik Gillard, Ja'Niyah Wood, George Sourlis, Vanessa Mujica-Sargento
- **Project Title:** The Future is Now
- This is the second year for our club. Last year we worked on the transition from our old school to the new, energy efficient school.
- Since we started our club with brand new members this year, we began to learn about the energy efficiency of our new school designed by FirstFloor, Inc. We focused on the Solar Panels, Geothermal Wells, Plug Loads, and Light Energy. We finished out the year with our Genius Hour Playground presentation for the school and any community members who wished to attend. It helped us understand, as well as others, the fact that we can do so much better in conserving energy for the future!

Goal 1

Learn about different energy alternatives

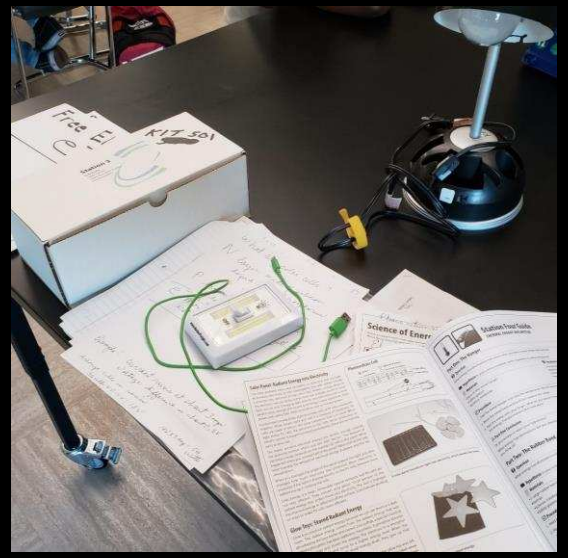
- **Activities And Tasks**
  - Lectures and hands-on activities about solar panels
  - Geothermal Wells and how they work
  - Brainstorms with group as well as family
- **Energy Content and Resources**
  - Energy websites linked on www.NEED.org and www.energywiseschools.com
  - Energy Wise notebook resources
  - Videos and Information linked to www.santeecooper.com
  - NEED Learning and Conserving Kit
  - NEED Science of Energy Kit
  - NEED Intermediate Energy Infobook Activities

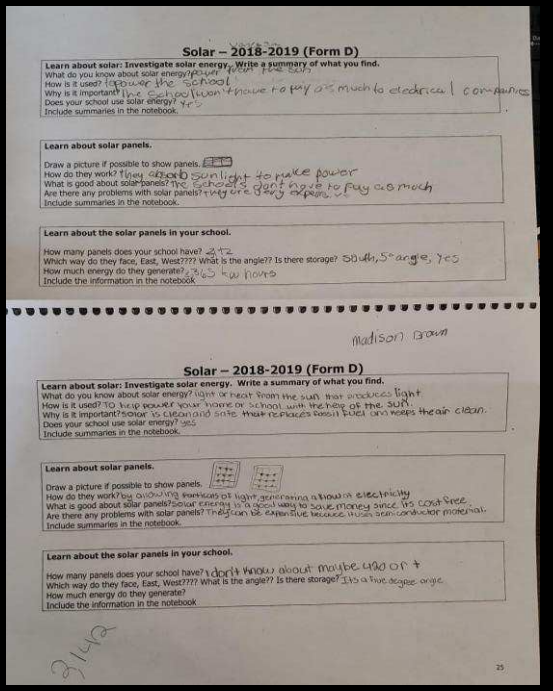
Student Leadership

- 14 students total
- 2 ambassadors to greet guests
- 2 club secretaries
- 6 patrol members
- 4 editors

Evaluation

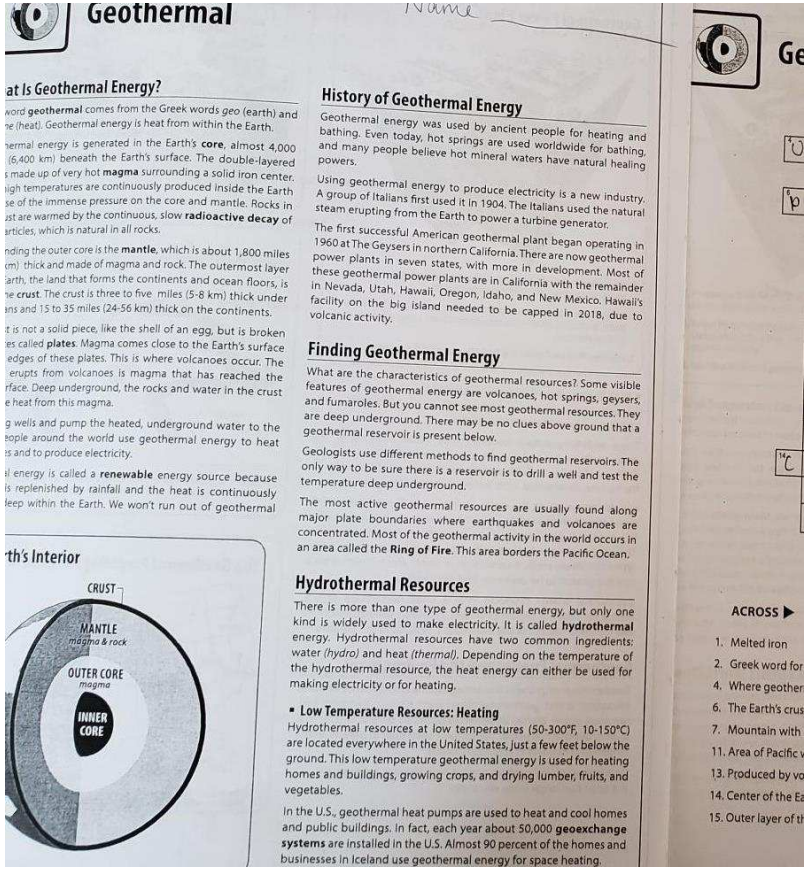
- Discussed and evaluated visitor presentations
- Website discussion and evaluations
- Patrol forms evaluated
- Tour of the solar panels on the roof and tour of geothermal wells location

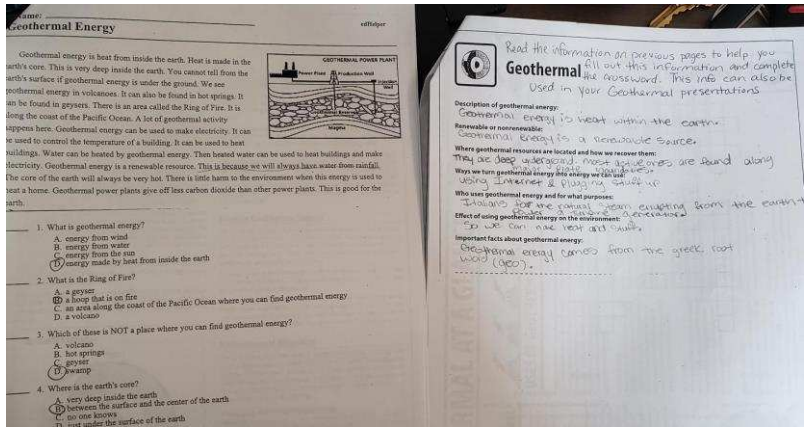




Learning about Solar Panels

"It was fun to 'be a solar panel' in Mrs. Keele's experiment. I really understand what is going on now!"
--8th grade Hawk Member





Learning about Geothermal Wells

"I had no idea we could heat and cool the school using water!"
--6th grade Hawk Member

Goal 2

•Teach students and educators how to be more energy efficient

Activities And Tasks

- Solar Panel and Geothermal Wells presentations
- Energy websites linked on www.NEED.org and www.energywiseschools.com
- Energy Wise notebook resources
- Light energy patrols/patrol forms
- NEED Learning and Conserving Kit (KW meter, light meter, flicker checker)
- NEED Science of Energy Kit
- SC State Energy Office “Energy Zapping Challenge”
- Genius Hour Playground Presentations for MBMS

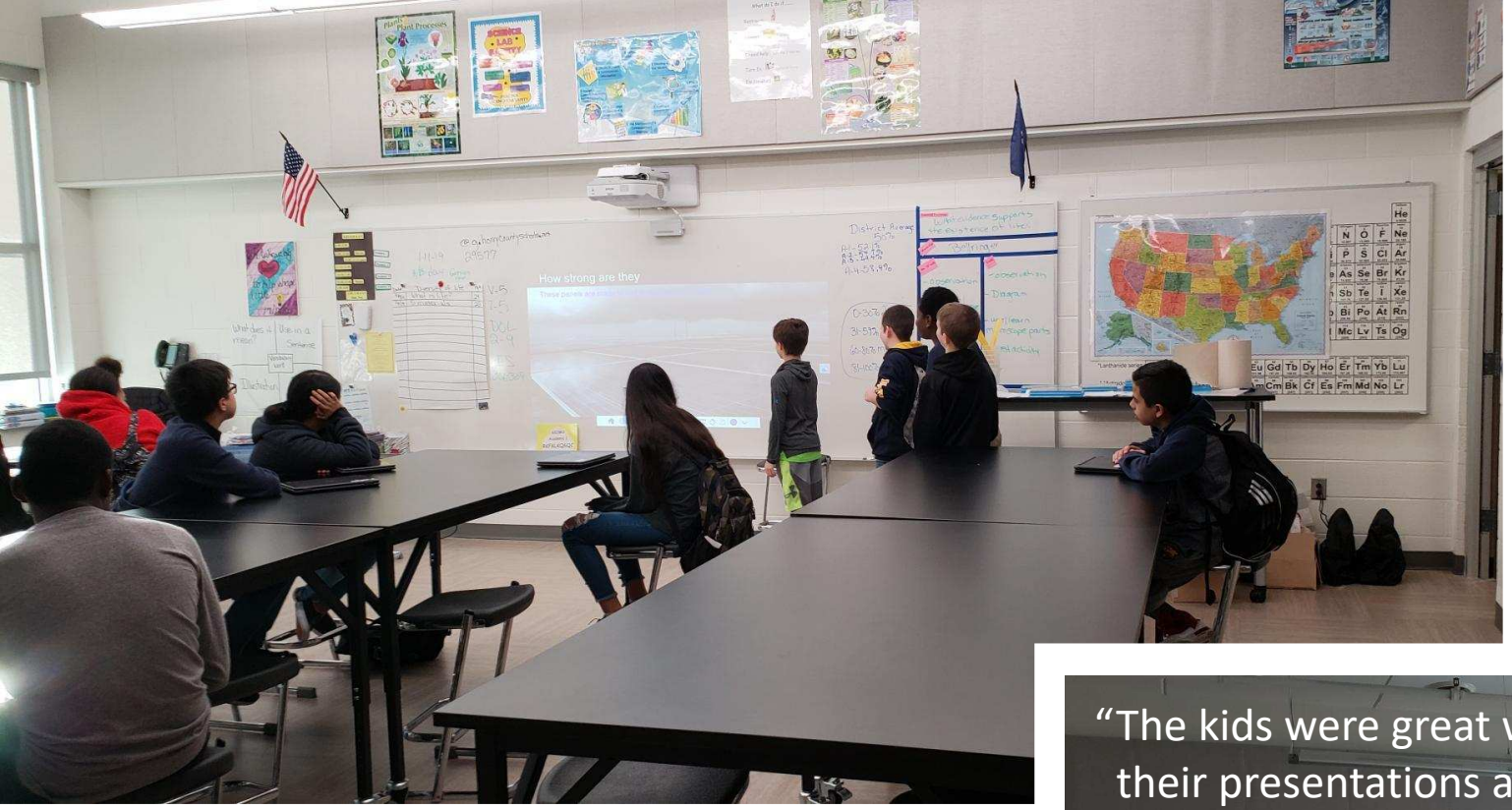
Student Leadership

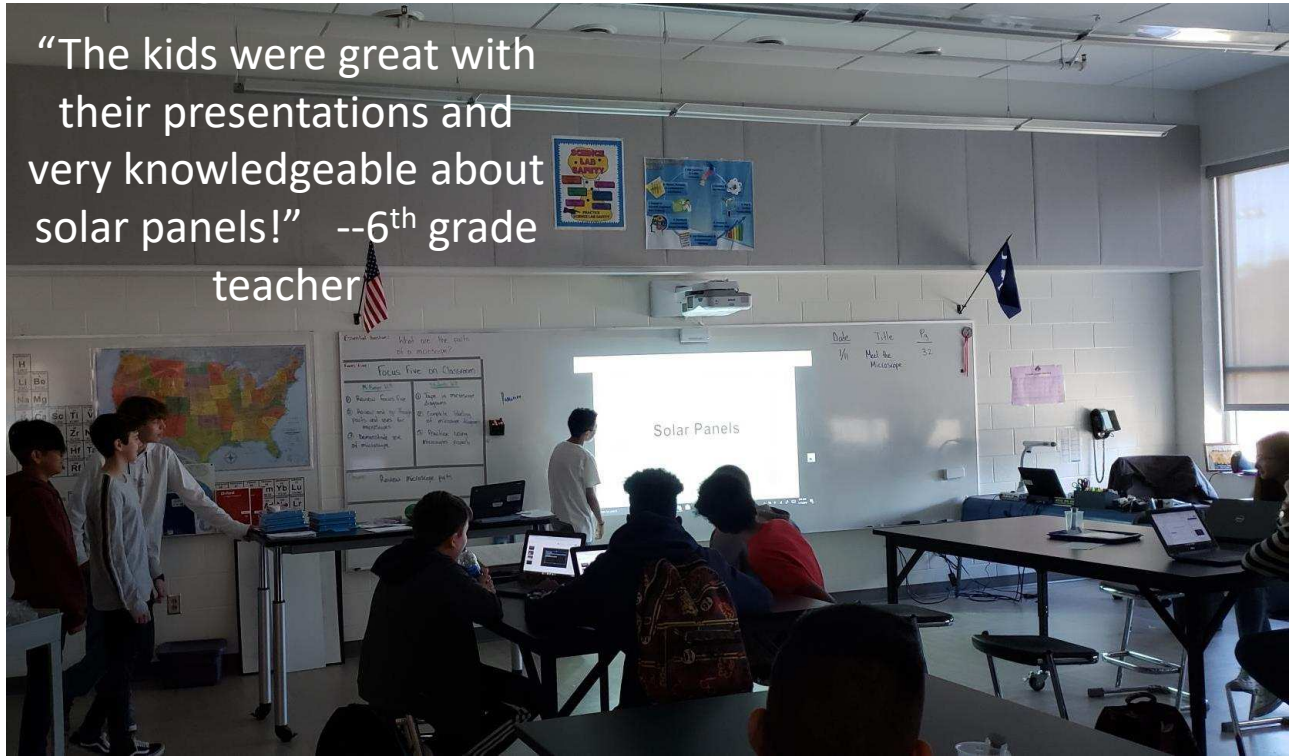
- 14 students total chosen
- 2 ambassadors to greet guests
- 2 club secretaries
- 6 patrol members
- 4 editors

Evaluation

- Patrol forms evaluated
- Posters created to show light energy and plug load usage
- Presentations created to share alternative forms of energy

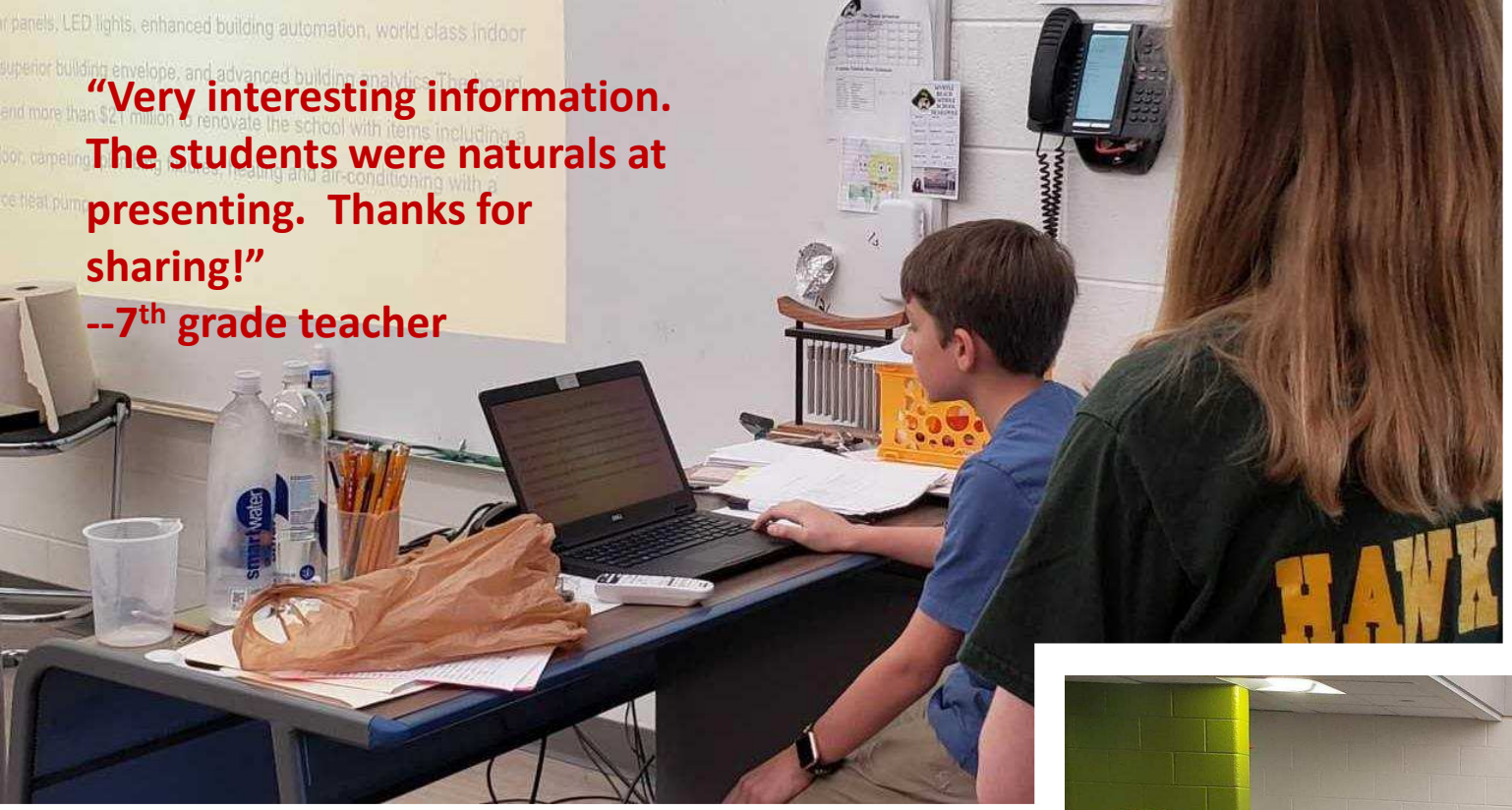
Solar Panel Presentations



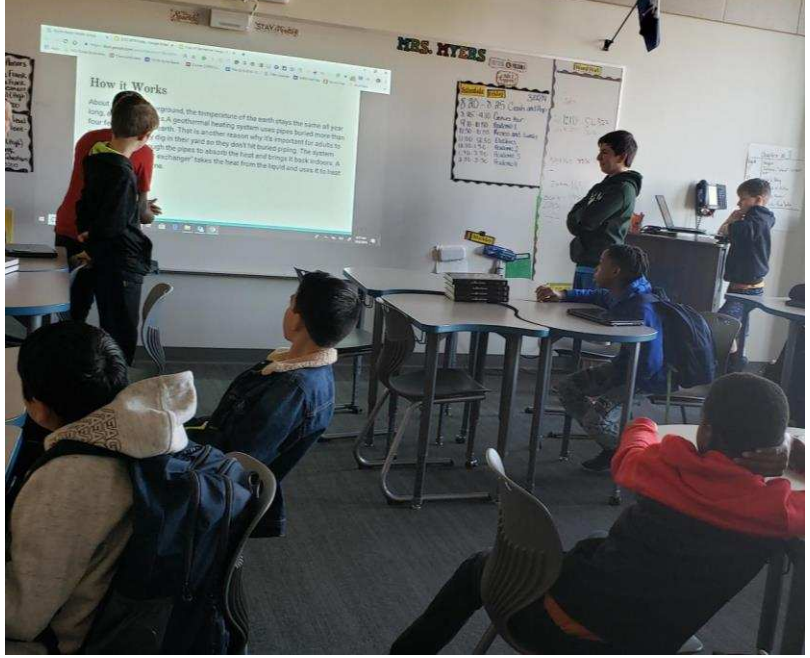


"The kids were great with their presentations and very knowledgeable about solar panels!" --6th grade teacher

Geothermal Wells Presentation

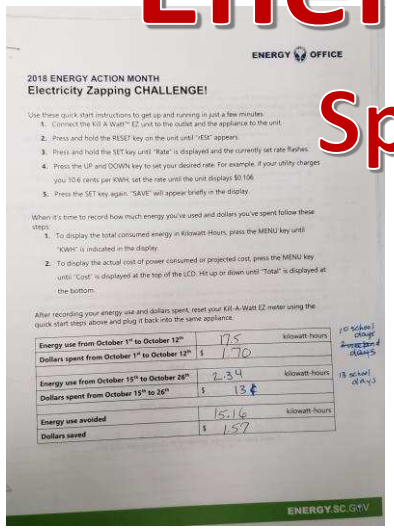


"Very interesting information. The students were naturals at presenting. Thanks for sharing!"
--7th grade teacher



Energy Zapping Challenge

Sponosored by EnergySC.Gov



ENERGY OFFICE

2018 ENERGY ACTION MONTH

Electricity Zapping CHALLENGE!

Use these quick start instructions to get up and running in just a few minutes:

1. Connect the Kill A Watt™ EZ unit to the outlet and the appliance to the unit.
2. Press and hold the RESET key on the unit until "rESt" appears.
3. Press and hold the SET key until "Rate" is displayed and the currently set rate flashes.
4. Press the UP and DOWN key to set your desired rate. For example, if your utility charges you 10.6 cents per KWH, set the rate until the unit displays $0.106.
5. Press the SET key again. "SAVE" will appear briefly in the display.

When it's time to record how much energy you've used and dollars you've spent follow these steps:

1. To display the total consumed energy in Kilowatt-Hours, press the MENU key until "KWH" is indicated in the display.
2. To display the actual cost of power consumed or projected cost, press the MENU key until "Cost" is displayed at the top of the LCD. Hit up or down until "Total" is displayed at the bottom.

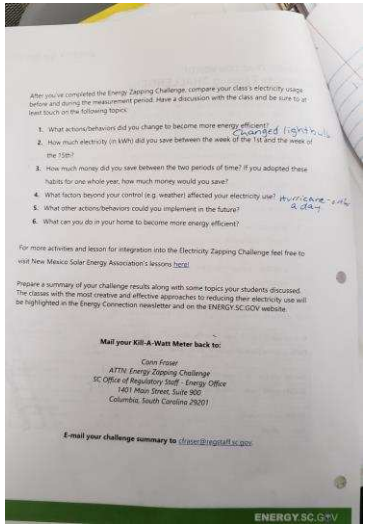
After recording your energy use and dollars spent, reset your Kill-A-Watt EZ meter using the quick start steps above and plug it back into the same appliance.

Energy use from October 1st to October 12th	17.5	kilowatt-hours
Dollars spent from October 1st to October 12th	$ 1.70	
Energy use from October 15th to October 26th	2.34	kilowatt-hours
Dollars spent from October 15th to 26th	$ 13¢	
Energy use avoided	15.16	kilowatt-hours
Dollars saved	$ 1.57	

10 school days

13 school days

ENERGY.SC.GOV



After you've completed the Energy Zapping Challenge, compare your class's electricity usage before and during the measurement period. Have a discussion with the class and be sure to at least touch on the following topics:

1. What actions/behaviors did you change to become more energy efficient? changed lightbulb
2. How much electricity (in kWh) did you save between the week of the 1st and the week of the 15th?
3. How much money did you save between the two periods of time? If you adopted these habits for one whole year, how much money would you save?
4. What factor beyond your control (e.g. weather) affected your electricity use? hurricane - out a day
5. What other actions/behaviors could you implement in the future?
6. What can you do in your home to become more energy efficient?

For more activities and lesson for integration into the Electricity Zapping Challenge feel free to visit New Mexico Solar Energy Association's lessons here!

Prepare a summary of your challenge results along with some topics your students discussed. The classes with the most creative and effective approaches to reducing their electricity use will be highlighted in the Energy Connection newsletter and on the ENERGY.SC.GOV website.

Mail your Kill-A-Watt Meter back to:

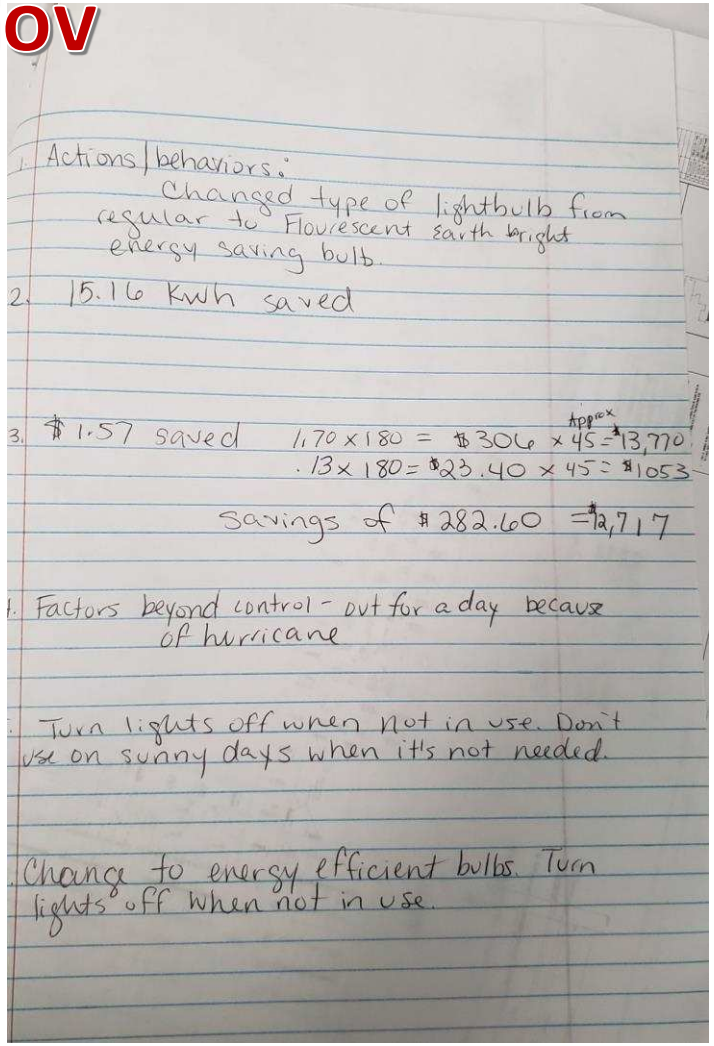
Conn Fraser
ATTN: Energy Zapping Challenge
SC Office of Regulatory Staff - Energy Office
1401 Main Street, Suite 900
Columbia, South Carolina 29201

E-mail your challenge summary to cfraser@regstaff.sc.gov

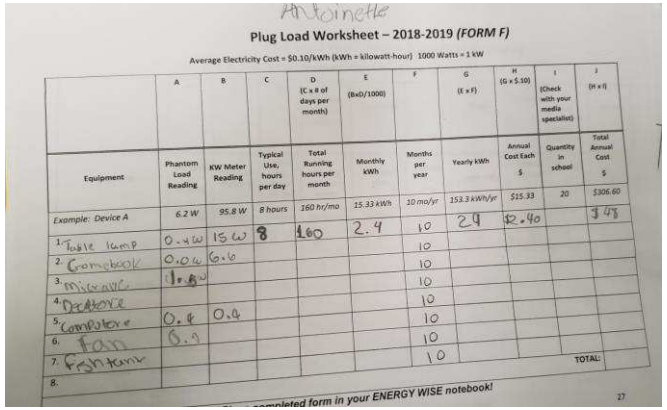
ENERGY.SC.GOV

"The Energy Zapping Challenge was interesting. It really showed us what a difference it could make just to change lightbulbs to more energy efficient ones!"

--8th grade science teacher



1. Actions/behaviors:
Changed type of lightbulb from regular to Flourescent Earth bright energy saving bulb.
2. 15.16 kwh saved
3. $1.57 saved 1.70 x 180 = $306 x 45 = $13,770 (approx)
.13 x 180 = $23.40 x 45 = $1053
savings of $282.60 = $12,717
4. Factors beyond control - out for a day because of hurricane
5. Turn lights off when not in use. Don't use on sunny days when it's not needed.
6. Change to energy efficient bulbs. Turn lights off when not in use.



Antoinette

Plug Load Worksheet – 2018-2019 *(FORM F)*

Average Electricity Cost = $0.10/kWh (kWh = kilowatt-hour) 1000 Watts = 1 kW

	A	B	C	D (C x # of days per month)	E (B×D/1000)	F	G (E x F)	H (G x $.10)	I (Check with your media specialist)	J (H x I)
Equipment	Phantom Load Reading	KW Meter Reading	Typical Use, hours per day	Total Running hours per month	Monthly kWh	Months per year	Yearly kWh	Annual Cost Each $	Quantity in school	Total Annual Cost $
Example: Device A	*6.2 W*	*95.8 W*	*8 hours*	*160 hr/mo*	*15.33 kWh*	*10 mo/yr*	*153.3 kWh/yr*	*$15.33*	*20*	*$306.60*
1. Table lamp	0.4W	15W	8	160	2.4	10	24	$2.40		$.48
2. Chromebook	0.04	6×6				10				
3. Microwave	1.3					10				
4. Dehumidifier						10				
5. Computer	0.8	0.4				10				
6. Fan	0.9					10				
7. Fish tank						10				
8.									TOTAL:	

...completed form in your ENERGY WISE notebook! 27

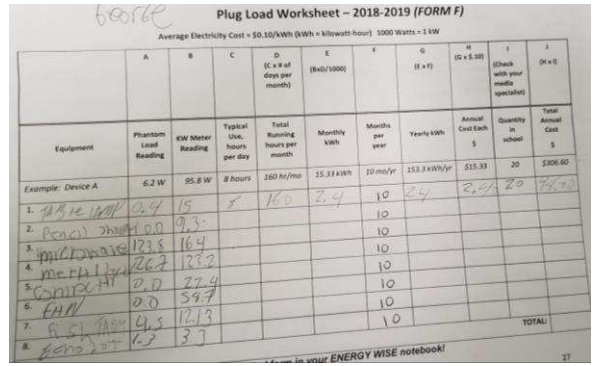
Plug-Load Study (*FORM F*) - THIS IS DONE ONLY ONCE

- Another way a team assesses energy is to do a plug-load study with a Kill-A-Watt meter to determine how much electricity is being used by an appliance.
- See instructions in the Student Guide in the Learning and Conserving Kit on how to use the Kill-A-Watt meter that is in the Energy WISE kit.
- List each piece of equipment tested on Form F, the quantity in your school (Media Specialist should have information), and the WATTS reading from the "Kill-A-Watt" meter. *Some suggestions for items to test:* computer monitors, TVs, VCRs, pencil sharpeners, document readers, smart boards, fans, heaters, copiers, refrigerators, microwaves, etc.
- Use a Kill-A-Watt meter to determine if the equipment has a phantom or vampire load (i.e., if the equipment continues to use electricity after it is turned off). *For example:* a VCR may be turned off but is still using energy. The VCR must be unplugged or plugged into a power strip that can be turned off to eliminate all energy usage.

TO COMPLETE *FORM F*:

- **Measure** the wattage of each piece of equipment using the Kill-A-Watt meter. The Watt and VA button is a toggle function key. Press the button once to display the Watt reading. The Watt reading is the value used to calculate kWh consumption, not the VA reading.
- If a phantom load is present, write the value in **column A**. Turn on the electrical appliance and measure the energy used. This number is recorded in **column B**. Estimate the typical usage for **column C**.
- **Calculate:**
  - Column D (the total running hours per month) by multiplying typical use of hours/day times number of days/month.
  - Column E (monthly kWh), by multiplying Kill-A-Watt meter reading times Total running hours/month and dividing by 1000. **B x D/1000**
  - Column G (yearly kWh) by multiplying monthly kWh times # of months used. **E x F**.
  - Column H (annual cost of each electrical device) by multiplying yearly kWh by $0.10. **G x $0.10**
  - Column J (total annual cost) by multiplying annual cost times the number of devices. **H x I**

13



barbie

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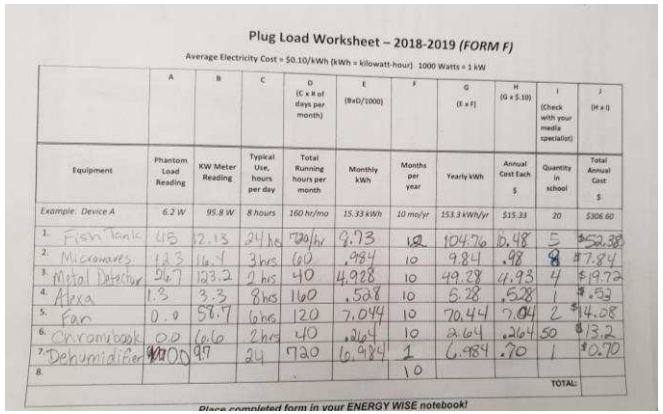
1. [illegible]	0.4	15	x	160	2.4	10	24	2.40	20	[illegible]
2. Pencil sharpener	0.0	9.3				10				
3. microwave	123.8	16.4				10				
4. [illegible]	26.7	123.2				10				
5. computer	0.0	22.4				10				
6. FAN	0.0	54.7				10				
7. [illegible]	4.5	12.13				10				
8. [illegible]	1.3	3.3							TOTAL:	

...your ENERGY WISE notebook! 27



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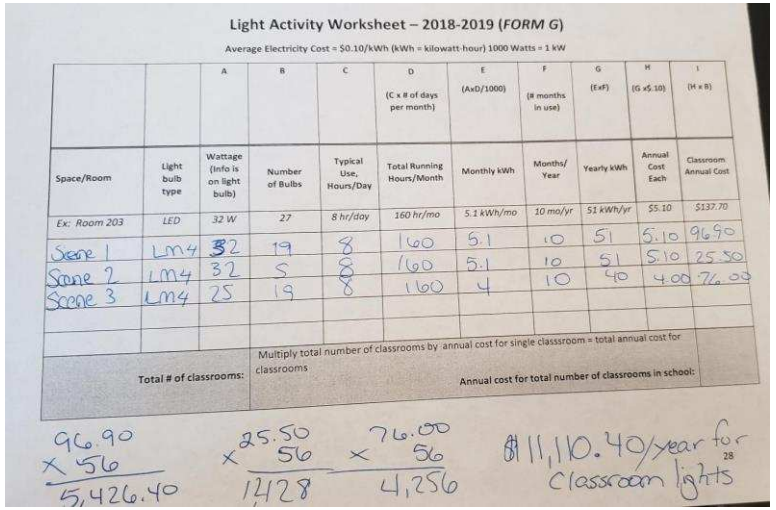
Example: Device A	*6.2 W*	*95.8 W*	*8 hours*	*160 hr/mo*	*15.33 kWh*	*10 mo/yr*	*153.3 kWh/yr*	*$15.33*	*20*	*$306.60*
1. Fish Tank	45	12.13	24hr	720/hr	8.73	12	104.76	10.48	5	$52.38
2. Microwaves	123	16.4	3hrs	60	.984	10	9.84	.98	8	$7.84
3. Metal Detector	26.7	123.2	2 hrs	40	4.928	10	49.28	4.93	4	$19.72
4. Alexa	1.3	3.3	8hrs	160	.528	10	5.28	.528	1	$.53
5. Fan	0.0	58.7	6hrs	120	7.044	10	70.44	7.04	2	$14.08
6. Chromebook	0.0	6×6	2hrs	40	.264	10	2.64	.264	50	$13.2
7. Dehumidifier	0.0	97	24	720	6.984	1	6.984	.70	1	$0.70
8.						10			TOTAL:	

Place completed form in your ENERGY WISE notebook!

"I never knew just leaving things plugged in would end up costing money!" --6th grade Hawk Member

Plug Load Analysis Activity

Light Energy Analysis Activity



Light Activity Worksheet – 2018-2019 (*FORM G*)

Average Electricity Cost = $0.10/kWh (kWh = kilowatt-hour) 1000 Watts = 1 kW

		A	B	C	D (C x # of days per month)	E (A÷D/1000)	F (# months in use)	G (E×F)	H (G x$.10)	I (H x B)
Space/Room	Light bulb type	Wattage (Info is on light bulb)	Number of Bulbs	Typical Use, Hours/Day	Total Running Hours/Month	Monthly kWh	Months/ Year	Yearly kWh	Annual Cost Each	Classroom Annual Cost
Ex: Room 203	LED	32 W	27	8 hr/day	160 hr/mo	5.1 kWh/mo	10 mo/yr	51 kWh/yr	$5.10	$137.70
Scene 1	LM4	32	19	8	160	5.1	10	51	5.10	96.90
Scene 2	LM4	32	5	8	160	5.1	10	51	5.10	25.50
Scene 3	LM4	25	19	8	160	4	10	40	4.00	76.00
Total # of classrooms:		Multiply total number of classrooms by annual cost for single classsroom = total annual cost for classrooms					Annual cost for total number of classrooms in school:			

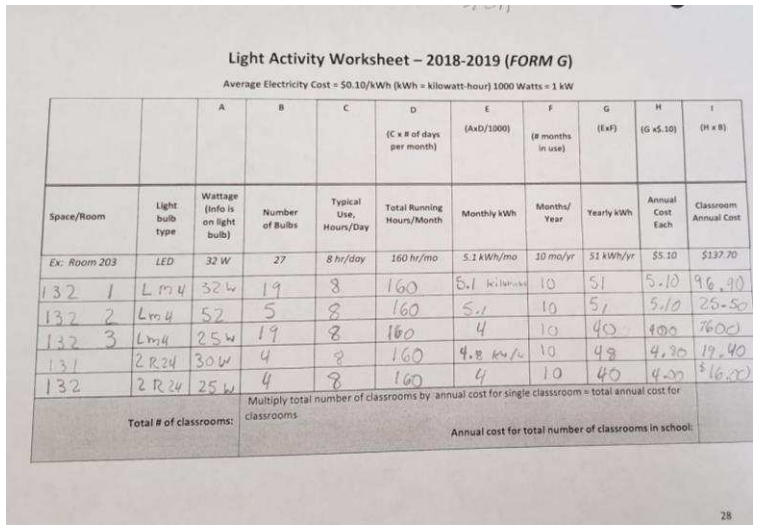
96.90 × 56 = 5,426.40

25.50 × 56 = 1428

76.00 × 56 = 4,256

$11,110.40/year for classroom lights

28



Light Activity Worksheet – 2018-2019 (*FORM G*)

Average Electricity Cost = $0.10/kWh (kWh = kilowatt-hour) 1000 Watts = 1 kW

		A	B	C	D (C x # of days per month)	E (A÷D/1000)	F (# months in use)	G (E×F)	H (G x$.10)	I (H x B)
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132 1	LM4	32W	19	8	160	5.1 kilowatt	10	51	5.10	96.90
132 2	LM4	32	5	8	160	5.1	10	51	5.10	25.50
132 3	LM4	25W	19	8	160	4	10	40	4.00	76.00
131	2R24	30W	4	8	160	4.8 kW/h	10	48	4.80	19.40
132	2R24	25W	4	8	160	4	10	40	4.00	$16.00
Total # of classrooms:		Multiply total number of classrooms by annual cost for single classsroom = total annual cost for classrooms					Annual cost for total number of classrooms in school:			

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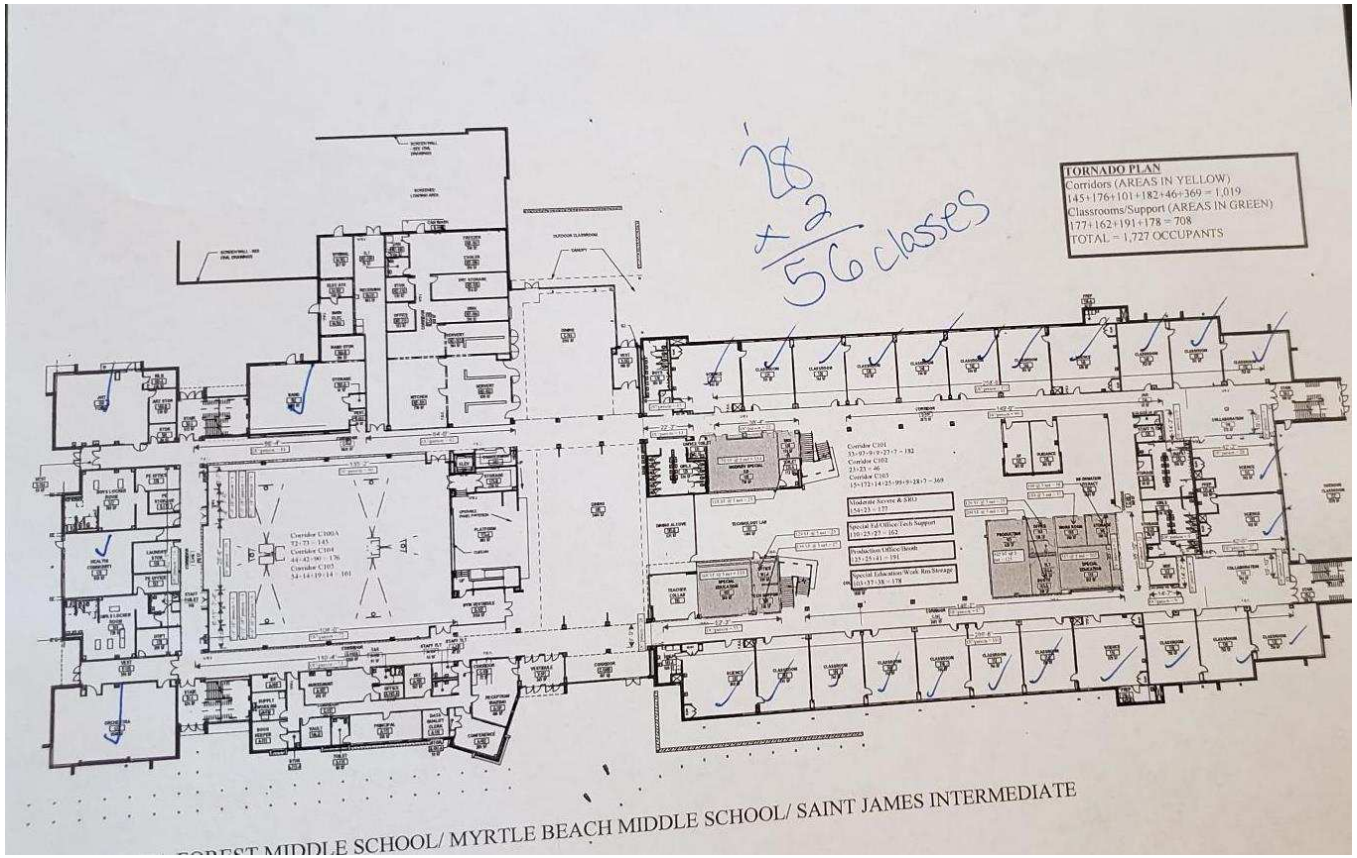

"Imagine how much energy we could save if we turned the lights off when we left the room?!" -- MBM Staff member

What we learned this year….

"I like that we learned about solar energy and how to save money and save energy." --Antoinette

"Energy is not created, just changed." --Owen

"I LIKED THE SOLAR PANELS THE MOST!" --MALIK

"Energy is something you can obtain in many ways and you must save." --Vanessa

"We need energy for our life essentials." --Madison

"I hope to accomplish more next year and learn more about energy." -Anthony

"I enjoyed the solar panels because we learned how solar power is made and we got to see them on the roof." --George

"I loved going on the roof to learn about solar panels!" --Ja'Nyiah

"WE LEARNED ABOUT EVERYTHING THAT POWERS OUR SCHOOL AND BASICALLY CONTROLS IT." --COLIN

Summary and Goals for next year!

We have really enjoyed learning about energy conservation; how solar panels and geothermal wells work. Next year we are looking forward to learning about the building envelope, temperature and moisture control, and construction practices. We also want to do more to educate the community about our school and its use of alternative energy. Net positive schools are the schools of the future. Our future will lead to a better, more energy efficient world!

Links to presentations

Geothermal Energy Presentation:
https://docs.google.com/presentation/d/1LclRct3Bcx3WwlntJFVoyoSohncpJZhAoBGHTe9Eq1A/edit?usp=sharing

Solar Panel Energy Presentation:
https://docs.google.com/presentation/d/1EjCMJQfwzE2jn2SJpi7fsByzMsM6-mNen9lrT0WWT6U/edit?usp=sharing