



# That's A Lot-A-Watts

Ockerman Middle School Energy Club

Advisor: Mrs. Jennifer Davis

Our project this year focused on the energy we use at our homes and at school. We looked into how much energy our cold drink machine used through our Vending Miser project. We also calculated how much energy we could save using the different items in the Duke Energy Home Efficiency kits. We decided to build an energy bike to demonstrate how much more energy it takes to light up a CFL light bulb compared to an LED light bulb. We worked with the school district's energy manager to get a grant for the bike supplies. We also worked with the custodians and maintenance department to design and build the energy bike. We set up a demonstration station and gave out Efficiency kits at the school's Evening with the Arts event and let families use pedal power to light up CFL and LED light bulbs.

# Vending Miser Project

- We did a load study last year with our school's cold drink machine, but it was an EnergyStar rated machine and we found that it would only save \$11.00/year to have the Vending Miser attached. We installed that Vending Miser on another machine at the maintenance department.
- This year the school got a different (older) cold drink machine, so we decided to do the project again. We did a 2 week load study without the Vending Miser, then took data for 2 weeks with the Vending Miser installed.

# Vending Miser Study Data

| Energy Use Without Vending Miser (kWh) | Cost to run the machine for a month (at \$.11/kWh) | Cost to run the machine for a year (at \$.11/kWh) | Energy Use With Vending Miser (kWh) | Cost to run the machine for a month (at \$.11/kWh) | Cost to run the machine for a year (at \$.11/kWh) |
|--|--|---|-------------------------------------|--|---|
| 63.35                                  | \$14.94  | \$181.68  | 39.0                                | \$9.20   | \$111.85  |

Conclusion: Installing a Vending Miser on this machine would save **634.9 kWh** of energy and save \$70 per year. We got permission from our district's energy manager, Karen Lenihan, to keep the Vending Miser that we used for the load study installed on the school's cold drink machine. That's a lot-a watts of energy we will be saving!

# Vending Miser Project Action Pics



The pop machine was too heavy to move so we used Mrs. Davis' selfie stick to get this picture



# Duke Energy Home Efficiency Kit Demonstrations

- We had two opportunities to demonstrate the kits: at the Boone Co. Innovation Luncheon and at the Evening with the Arts event at school.

## **Innovation Luncheon**

At the Innovation Luncheon Zac McEachern (one of our student leaders) and Mrs. Davis (our Energy Club advisor) went to Receptions and set up a display to help show others how much energy they could save with an efficiency kit. Our display included the NEED Facts of Light chart, information about infiltration (and the light switch/outlet covers in the kit), and about how saving water helps save energy (to go along with the slow flow showerhead and aerators in the kit).

# Evening with the Arts

- We talked to the PTSA to see if we could set up a demonstration at the Evening with the Arts event. It is a big event for the school with a spaghetti dinner, the school's spring book fair, and performances by all of the arts programs at the school. Over 200 people attended the event.
- We knew it was going to be big, so we decided we had to go big. We did some research and decided to build a demonstration that would get everyone's attention. We found an old NEED/Ohio Energy Project curriculum called Energy Bike. We decided we were going to build our own energy bike. We set up right at the school's entrance and we did get everyone's attention.

# Building the Energy Bike

- Actually building the energy bike was a lot of fun. It took two weeks of meetings to finish it. First we contacted Ms. Lenihan (our districts energy manager) about getting the supplies we would need. We got a bike donated from the Science teacher who runs the bike club at our school. Mrs. Davis' husband let us use his bike trainer. We built the stand for the CFL bulb and LED bulb first. We wired up the sockets and drilled holes into the 2x4 for the wire to go through. Next we attached our 12v DC motor to some sections of 2x4 with some metal straps. We attached the 2x4s to a piece of plywood. We connected some copper wire to the motor wires so that we could attach them to the sockets with alligator clips. We took the back tire off of the bike and put a belt on the back rim. The belt connected the bike to the motor.

# Building the Bike Action Pics



# Time to Test

- Once the bike was built, it was time to test it. We attached the wires from the motor to the socket we wired. Brayden got on the bike and pedaled, and the LED bulb lit up easily, but when we attached it to the CFL bulb it wouldn't light up. We tried to switch sockets, and it still wouldn't work (plus we broke one of the sockets). We contacted the energy manager, Ms. Lenihan, and she talked with the maintenance guy, Keith, who helped us earlier into the project. He explained to us that CFL bulbs only work on Alternating Current (AC) and we were using a DC motor. We got more funding and purchased an inverter that changed the DC current to AC. It worked! We were ready to show off our energy bike!

# At the Evening with the Arts

- A lot of people stopped by our station to try out the energy bike. We also showed them the other items (besides the LED bulbs) that come in the kits, and a few signed up for free kits. A lot of people said they already got a kit from the play at the elementary schools.
- The kids that tried the bike could light up the LED without much effort, but only some of them could pedal fast enough to light up the CFL bulb. This showed that the LED bulb was more energy efficient than the CFL because it took more power to light up the CFL.
- We do need to make a few changes to the stand, because the belt fell off several times. We also got a different bike donated, because the first one was too small. We are going to take our bike to the Makers Fair later this month.

# Evening with the Arts Action Pics



# More Action Pics



# Last Pics, We Promise



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