

**Marcus Garvey School Energy Detectives and Coaches
reduce energy use 9%**

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Informing Ecological Design, LLC
and CPS EnergyNet Program

Students at Marcus Garvey Elementary School 10308 S. Morgan Avenue, Chicago, IL, have participated in EnergyNet’s energy education program since spring 2006. Led by teachers Ms. Maudie Walls and Mr. Ken Vaughn, the students have learned energy terms and ideas and applied their skills to help save energy at their school. Mr. Daley, the engineer, and Mr. Lennett, the assistant, have supported the program enthusiastically; they enjoy having students and teachers help them conserve energy.

No Cost Actions at the School Level		
Category	Action	Gar
HVAC	Do not block air flow to HVAC vents to allow system to operate efficiently.	A
Shades and Blinds	In winter, open shades and blinds during winter hours. In summer, close during daylight hours.	T
HVAC	Keep classroom doors, exterior doors and windows closed while HVAC system is running.	A
HVAC	Limit after school activities to as few heating/cooling zones as possible; turn off the systems to the rest of the building.	T
Lighting	Make sure lighting controllers are working and properly set. Make sure exterior lighting is off in the daytime!	A
Thermostat	Set thermostat to 68° F for winter. Set thermostat to 78° F for summer.	A
Office Equipment	Turn off computers, monitors, printers, & copiers every night and every weekend. Turn off and unplug coffee machines, desk lamps and fans.	T
Lighting	Turn off lighting in unoccupied areas when not in use or where windows provide sufficient daylighting.	A
Low Cost Actions, controlled at the School Level		
Category	Action	Gar
Weatherization	Ensure that doors and windows have tight seals and remain closed.	A
Motor Operation	Minimize operation of motors associated with HVAC system	A
HVAC	Perform scheduled maintenance on units including cleaning burners and a/c coils, replacing and cleaning air filters, checking ducts and pipe insulation for damage	A
Lighting	Reduce general overhead lighting by de-lamping and use task lighting where needed	A
Lighting	Replace incandescent exit lighting with Energy Star LED lamps	T
Lighting	Replace incandescent lighting with Energy Star compact fluorescent bulbs	L

What students and staff have done at Garvey School 2007-2008

Students and teachers have tracked the no cost and low cost actions for Garvey School 2007-2008. The tables to the left show actions with codes “L = Look”, “T = Test” and “A = Act to make permanent during the school year.”

The table appears on our project web-site, www.energy-detectives.net

Student Energy Stakeouts and Audits of Lighting

Students help staff remember to turn off lights in classrooms when not needed, reminding teachers with door hangers and notes both when students see good conservation practices and when opportunities to turn off lights are found.

On a visit to the school 23 April 2008, classes were in an assembly and all the classroom lights were turned off. Good job!

Ms. Walls is now organizing an experiment, with the help of the school engineer, to use lighting more intelligently in the lunch room and gym this spring. The Garvey team will report on the impact of this test before the end of the school year.



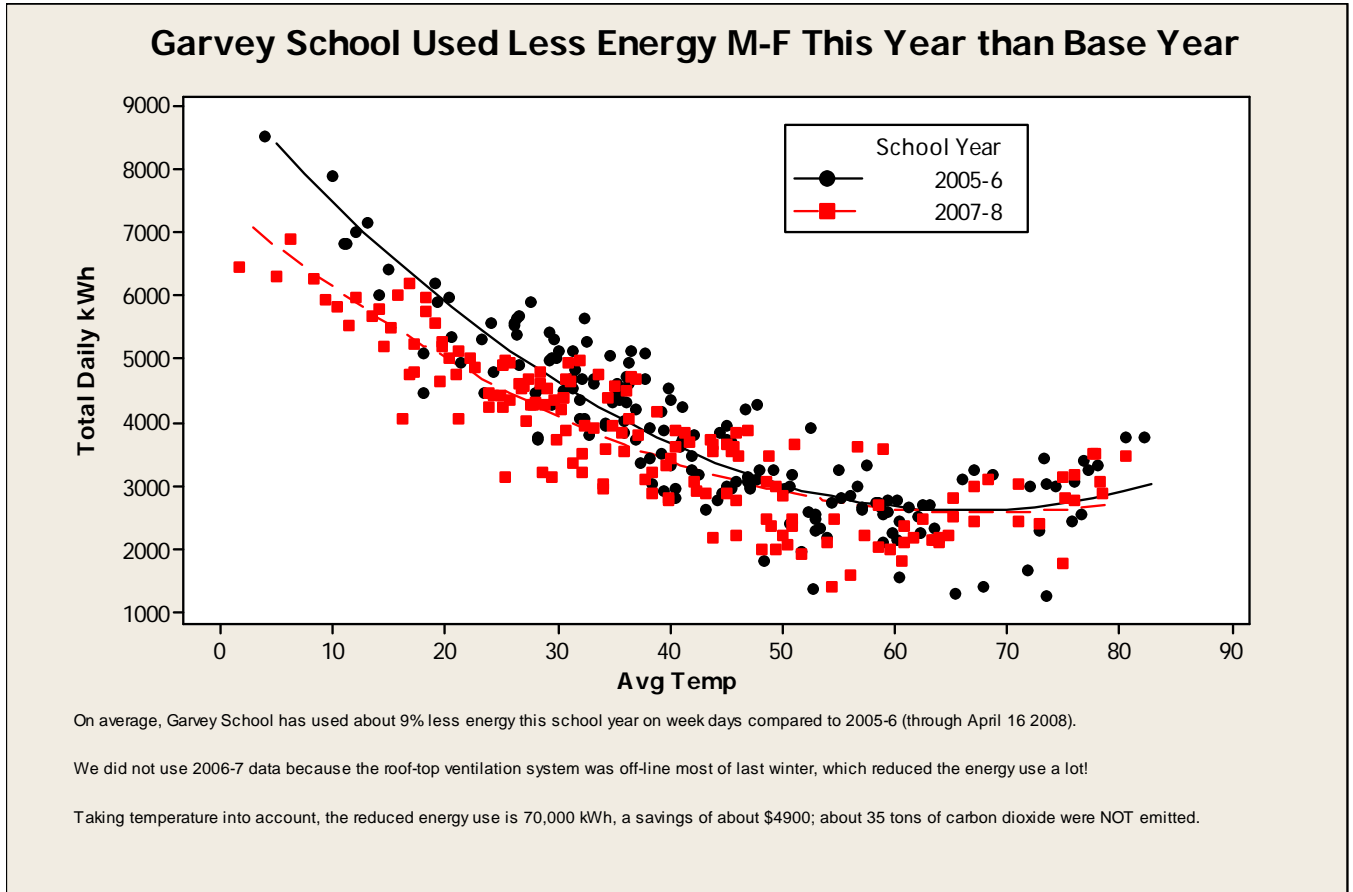
The lunch room has lots of windows, so on sunny days there may be no need for additional artificial light.



Here's a picture of Mr. Williams, Garvey security staff, in the lunch room with just "unoccupied" setting lights on and sunlight coming from the windows. (photos taken 23 April 2008.)

How we estimated energy savings

The electric energy use at Garvey School depends on temperature as the school has electric heat. In the graph, each dot shows the energy use for one day plotted versus the average temperature recorded at O'Hare airport for that day.



You can see that the red dots (M-F, 1 September 2007 through 16 April 2008) on average are lower than the black dots (M-F, 1 September 2005 through 30 April 2006). 2007-8 has been colder on average than 2005-6, so there are more red dots at the left side of the graph.

We must adjust for temperature in comparing energy use year to year. One way to estimate change in energy is to predict the energy use, using information from the base year. We fitted an equation for 2005-6 (shown by the black line on the graph) that gives the daily energy use as a function of temperature.

The equation is:

$$\text{Energy Use on a week day (kWh)} = 9387 - 204.3T + 1.154T^2$$

We use the equation to predict the energy use in 2007-8, substituting the observed daily temperatures. Then we compare the predictions to the actual energy use in 2007-8. The actual energy use is about 9% lower than our prediction.

We used 2005-6 as the base year because the 2006-7 school year had unusually low energy use in the winter. The roof-top ventilation units were broken from the fall until March 2007, dropping energy use by more than 30% relative to winter 2005-6.

We also used just Monday through Friday because we know that the school rented space to a religious congregation on Sundays in 2005-6; the building is not rented out this school year, so we cannot distinguish energy improvements over the weekend from a decrease in building use.

The Garvey School data for our analysis comes from 30-minute meter records provided to the project by CPS, through its energy information manager Siemens Corporation. We thank Siemens Corporation for their great cooperation in providing the interval data to our project and for giving us access to the monthly utility data!