

How Much Energy Money Exercise Pollution ?

OVERVIEW

Students determine how much their PV array has contributed to the school in terms of energy, food, money, consumption and pollution avoidance. To get a sense of how much energy this represents, students will use the Energy/Pollution Equivalent from Soltrex. As a synthesis of their findings, students design a way to share these findings with the rest of the school.

PRIOR KNOWLEDGE

Although not necessary, students will be most successful with this lesson if they are familiar with their school's solar array and have been introduced to the idea that energy has many forms. As preparation, use "Get to Know Your PV System."

TIME

One 45-minute class period

MATERIALS

- Access to internet and www.soltrex.com website
- Student worksheet

PREPARATION

- Review Procedures
- Visit the soltrex website – ensure that you can find the cumulative kWh measurement.
- Familiarize yourself with Soltrex's Energy/Pollution Equivalent. Below is what the Energy/Pollution Equivalents interface looks like on Soltrex. To access the energy calculator, click on either the "more electricity equivalents" or "more pollution equivalents" to be able to input your own kWh data for any length of time.
- Copy worksheets for students.

Energy/Pollution Equivalents

cumulative kWh (automatically updates at the 1st of the month)

Since monitoring began, this system has produced **148 kWh** of electrical energy.

Enough electricity for...



4
Americans'
electricity needs
for one day.



11,361
hours use of an
energy-efficient
CFL light bulb.



8,951,273
minutes
yakking on a
mobile phone.

[More electricity equivalents](#)

And offsetting...



206
lbs. of CO2 emissions,
the main cause
of global warming.



225
miles worth of
CO2 emissions from
average American car.



0
trees cut down,
given their capacity
to absorb CO2.

[More pollution equivalents](#)

PROCEDURES

- Introduction – Ask students to guess how much energy the solar panel has produced since it has been installed? How many fast food meals would have the same amount of energy? How much money do they think the school has saved? How many pounds of coal would provide an equivalent amount of energy?
- After some guesses, explain that you are going to determine the answers to those questions by finding the total amount of energy the panel has produced and then converting into other energy equivalents.
- Distribute worksheets.
- Obtain the reading of cumulative kWh.
- Have students record the value on their worksheets.
- Explain that they will be using this value and an “Interactive Energy Calculator” to complete the worksheet and find interesting energy equivalents.
- Introduce students to the Energy/Pollution Equivalent section of the Soltrex website so they can complete the worksheet (either individually or in small groups).

Suggestion: Introduce the activity to this point and assign the worksheet as homework for the next day.

- Discussion - After students have completed the worksheets, reconvene as a large group to discuss their findings. The following questions could be used to guide the discussion.
 1. Has the solar panel produced more or less energy than you would have guessed?
 2. What equivalent did you find the most surprising? Why?
 3. How can we share these equivalents with the whole school? See suggested outreach activities below.

- Suggested Outreach
 - Bulletin Board – have students create a bulletin board or display showing the different energy equivalents. Keep the display up-to-date so the whole school can see the contributions of the solar panel. Maybe update it every month and keep it in the school lobby for example. Suggested items:
 1. A graph showing the amount of electricity generated (in kWh).
 2. A posting showing how much money the school has saved in electric costs due to contributions from the PV system.
 3. Graphics showing energy equivalents in terms of fast food meals, pounds of coal, gallons of gasoline, etc. For example, one “lump of coal” could represent 10 pounds of actual coal, or one graphic of a gasoline dispenser could represent 10 gallons of gasoline.
 4. A world map showing the worldwide energy usage comparisons.

 - Keeping Pace with the Sun Fitness Challenge – Using the exercise energy equivalents, have a contest to see which class/grade/team can use the same amount of energy through exercise. Or see how long it takes the whole school to use that amount of energy by exercising.

How Much? - Student Worksheet

Electricity - Record the total amount of electricity the PV System has generated since it was installed.

_____ kWh

Economics – Using an average cost of \$0.08 / kWh, calculate how much money your school has saved by using PV Power in place of electricity from the grid.

$$\frac{\text{_____}}{\text{Number of kWh}} \times \frac{\text{0.08}}{\text{Cost per kWh}} = \frac{\text{_____}}{\text{Total Savings!}}$$

Energy/Pollution Equivalents – visit the interactive energy calculator. Using the total kWh from your PV system, find out what that amount of energy is equivalent to for something in each of the following categories. As you will see at the website, there are MANY possible answers, record the one that is most interesting to you for each category.

Chemical Energy



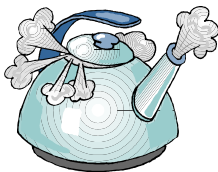
_____ kWh is equivalent to the energy stored in:

Mechanical Energy



_____ kWh is equivalent to the energy of:

Thermal Energy



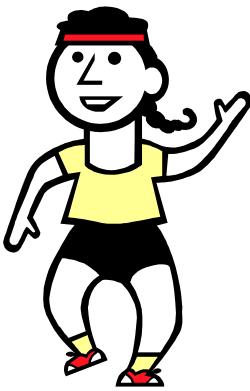
_____ kWh is equivalent to the energy used by:

Worldwide Energy Use



_____ kWh is equivalent to the average amount of energy consumed per month by:

Exercise



For a person of _____ pounds, _____ kWh is equivalent to the energy used in the following types of exercise:

Pollution



Using _____ kWh of energy produced by a non-polluting solar array prevents the release of the following pollutants that would have come from conventional electricity generation: