

WEEK SEVEN **Alternative and Renewable Energy**

This week students will:

1. Increase knowledge and awareness of the different types of energies, and to illustrate the positives and negatives of each.
2. Be encouraged to consider more sustainable energy choices at school or home.
3. Learn about civic leadership and what decision-making processes are used at a local government level to make decisions on sustainability and other issues.
4. Learn to calculate energy consumption.
5. Learn how to interpret energy consumption data in order to make conclusions about what factors influence consumption patterns.
6. Be able to identify the most energy intensive appliances/equipment.
7. Identify strategies to reduce energy at school and home.

Learning outcomes

Year 3

Geography ACHGS025

Digital Technologies ACTDIK007,
ACTDIK008

Year 4

Geography ACHGS027, ACHGS03Z

Science ACSHE062

Digital Technologies ACTDIK007,
ACTDIK008

Year 5

Geography ACHGS034, ACHGS035

Science ACSHE081, ACSHE217

Mathematics ACMNA107, ACMSP120

Year 6

Science ACSHE098, ACSHE220

Mathematics ACMNA123, ACMNA124

Materials required:

1. Paper and pens.
2. Print Appendix 3 – Energy Consumption of Household Appliances.

Activities:

1. Design your house: Draw the layout of your house, including mark the direction of the sun. Work out the approximate size of your roof and how many solar panels you may put on the roof. You can have them for all your energy needs or just your solar hot water. Work out how much energy your family uses, minus the power you are now creating with your solar panels and see if you will be putting electricity back into the grid.
2. Appliances:
 - a. Set up a fake energy company – pick a name and design a logo.
 - b. Pretend that you have gone into your home to do an energy audit.
 - c. List all of the appliances you have in your house. Arrange the list to show which appliances consume the most energy. See table below.
 - d. Write an energy saving plan for your home to save money and power. Prepare the energy saving plan for your parents.
 - e. Class Activity: Do a group activity that audits the energy in your school. Draw up a list of recommendations for your Principal.

Week 7 — Alternative and Renewable Energy

Habitat the Game rewards players who decrease their energy consumption.

Alternative energy is defined as energy from sources that do not use up natural resources or harm the environment. One of the biggest sources of alternative energy is the sun.

In the game this is measured as carbon saved. Players can see this represented as balloons. The number of balloons represents the volume of greenhouse gas emissions that you have saved. Measured in terms of volume of Carbon Dioxide (CO₂) gas as 1 kilogram of CO₂ is equivalent to 140 typical party balloons. CO₂ is the most important greenhouse gas contributing to global warming.

Players are also rewarded for using alternative or renewable energies. The game also asks quiz questions about alternative energy.

Households vary in the ways they gain their power from and how much is from alternative energy sources. Some people's houses are completely powered by coal. It has only been recently that the old infrastructure of coal that powers our economy for 150 years has been overlaid with new 'clean' technologies that reduce pollution and energy use.

Some of the innovative ways that people power their houses includes solar power, wind power and biomass. Let's look at solar power.

The Sun provides a stable source of heat and light energy. Photocells transfer light into electricity, and glass can provide passive heating for buildings. Wind turbines transfer kinetic energy in the wind into electricity.

Photocells



Solar-powered ticket machine

The Sun is a stable source of energy that is transferred to the Earth as light and heat energy. We can use this energy.

Photocells are devices that transfer light energy directly into electrical energy. They produce DC — direct current — electricity. This is electricity in which the current moves in the same direction all the time.

Photocells have no moving parts. They do not need to be connected to the National Grid, so no cables are needed and they can work in remote locations. For example, they are used to power the lights for some road signs.

The output of photocells depends on the surface area that is exposed to light. For a given light intensity, the larger the area, the greater the power output.



The Hubble Space Telescope uses photocells to generate the electricity it needs — image courtesy of NASA.

You may have seen photocells in pocket calculators. Very large panels of photocells are used to power satellites in orbit around Earth.

Advantages and disadvantages

Photocells produce no power in bad weather or at night. But sunlight is a renewable energy resource and photocells do not produce polluting waste while they are in use. Here are some other advantages to photocells:

- no fuel is needed
- no power cables are needed
- they have a long life and are rugged - little maintenance is needed.

Reference: (http://www.bbc.co.uk/schools/gcsebitesize/science/ocr_gateway/energy_resources/energy_from_the_sunrev1.shtml)

Energy Consumption of household appliances

Typical wattages of various appliances

Here are some examples of the range of nameplate wattages for various household appliances:

Aquarium = 50 – 1210 Watts

Clock radio = 10

Coffee maker = 900 – 1200

Clothes washer = 350 – 500

Clothes dryer = 1800 – 5000

Dishwasher = 1200 – 2400 (using the drying feature greatly increases energy consumption)

Dehumidifier = 785

Electric blanket (Single/Double) = 60 / 100

Fans

Ceiling = 65 – 175

Window = 55 – 250

Furnace = 750

Whole house = 240 – 750

Hair dryer = 1200 – 1875

Heater (portable) = 750 – 1500

Clothes iron = 1000 – 1800

Microwave oven = 750 – 1100

Personal computer

CPU – awake / asleep = 120 / 30 or less

Monitor – awake / asleep = 150 / 30 or less

Laptop = 50

Radio (stereo) = 70 – 400

Refrigerator (frost-free, 16 cubic feet) = 725

Televisions (color)

19" = 65–110

27" = 113

36" = 133

53" - 61" Projection = 170

Flat screen = 120

Toaster = 800–1400

Toaster oven = 1225

VCR/DVD = 17–21 / 20–25

Vacuum cleaner = 1000–1440

Water heater (40 gallon) = 4500–5500

Water pump (deep well) = 250–1100

Water bed (with heater, no cover) = 120–380

Reference: <http://energy.gov/energysaver/articles/estimating-appliance-and-home-electronic-energy-use>