

Subject
Science
Mathematics

Summary
Students make a list of appliances that consume energy in their home and compare it to equipment on a sailboat that uses power.

Overall Expectations
Demonstrate an understanding of the importance of conservation of energy in relation to the wise use of renewable and non-renewable energy sources

Specific Expectations
Number sense and Numeration
Select and perform computation techniques appropriate to specific problems involving whole numbers and decimals and determine whether the results are reasonable.

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Renewable energy 2: How does your power use compare to Amanzi's?

BACKGROUND

Most sailboats traveling for long periods of time, like Amanzi, have installed equipment to harness the wind's power, a source of **renewable energy**.

On board Amanzi, we use a wind generator especially designed for boats. Can you think of other sources of renewable energy?



As long as there is wind, we can generate power and store the energy in our battery bank. Our **battery bank** is made up of four 6-Volt batteries. These are the same type of batteries that are used in motorized wheelchairs and golf carts.

If our wind generator does not generate enough power, then we have to turn on our diesel engine for about an hour a day. The diesel engine uses fuel to change chemical energy into electrical energy. This energy is then stored in our batteries and we call this *charging* our battery bank. However, diesel fuel is a **non-renewable energy** source. So, we prefer to rely on our wind generator.

At home, your power is supplied by the power plant in your community. Your home is equipped with an "electrical meter box". Someone from the power company may visit your house to read your meter. The power company then tallies how much energy you've used at the end of each month, and sends you a bill charging you for the amount of energy you've used. It's very different than being on a sailboat.

Challenge: We've put together a table listing some equipment and appliances that require power on our boat. We want you to compare similar appliances that you use in your home. Check out how much power is used and see the difference.

Activity

Below is a chart to complete. On one side, AMANZI's electronic equipment is listed with the amount of power (amps/hr) each piece uses. On the other side, typical appliances in YOUR HOME. Follow the questions to complete the chart with items that use power in **your** home. Two are completed for you.

1. Predict and order what appliances in **your home** use the most energy by marking it with a **P1, P2, P3** etc.
2. Find out how many Watts each appliance uses. Search the internet (one suggested site is :<http://www.mid.org/services/save/hm-appl-cost-2005.htm>) or look at the label on the appliances (they may list Watts).
3. Using the number of watts the appliance uses, convert it to Amps/Hour using the formula: $\text{Watts} \div \text{Voltage} = \text{Amps}$. The voltage in your home = 120 volts. (Hint: dryers and stoves use 220 volts, so use 220 instead of 120 in the formula).

Amanzi	Amps/ hour	Your Home	Energy eaters	Watts	Amps/hour
Refrigerator	7	Refrigerator		600	$600 \div 120 = 5.0$
Self-steering autopilot	30	Microwave			
Computer	20	Computer			
Indoor light	1.5	Television			
Navigation Lights	3.0	Reading lamp		100	$100 \div 120 = 0.83$
Stereo	1	CD player			
VHF Radio	6	Dryer			

With our four 6-volt batteries, we have a total of 480.00 amp hours available when the batteries are fully charged. However, we're only able to use 150 amp hours per day.

4. In the evening, we usually turn on 3 lights in the cabin. If we had the lights on for 4 hours, how much energy (amp hours) would we use?
5. Our biggest energy consumers are the computer and the refrigerator on a daily basis. How long can we operate both the refrigerator and run the computer before we have to top up (recharge) the batteries?
6. Consider how **your** appliances would run on our boat, using **our** battery bank.
 - a) How long could you run a television on Amanzi?
 - b) Work out the maximum number of appliances you could run on Amanzi and how long the batteries would last for that period.