

# Quick Start -- Power and Energy in the Home

When the applet opens, the dishwasher, ceiling fan, and personal computer are demanding a total of 1,341 watts of power. After one hour, the meter shows 1.34 kWh of energy used, and the bill is \$0.13. When you change the appliances, or open and close the blue switches by clicking on them, the demand for power changes and is shown in the **Current power consumed** tabulator.

The meter between the power pole and the circuit breaker box measures the energy being used as time passes. The meter continues to run for 99 hours and 59 minutes unless the **Pause Time** button is clicked.

**Elapsed time** and **Current power consumed** are shown near the bottom of the power pole.

Clicking **Start Time** causes the meter and the **Elapsed time** clock to begin tabulating again from the point at which they had been paused.

Clicking **Pause Time** pauses the **Elapsed time** clock. The meter stops measuring kWh and cost, because energy is only consumed as time passes.

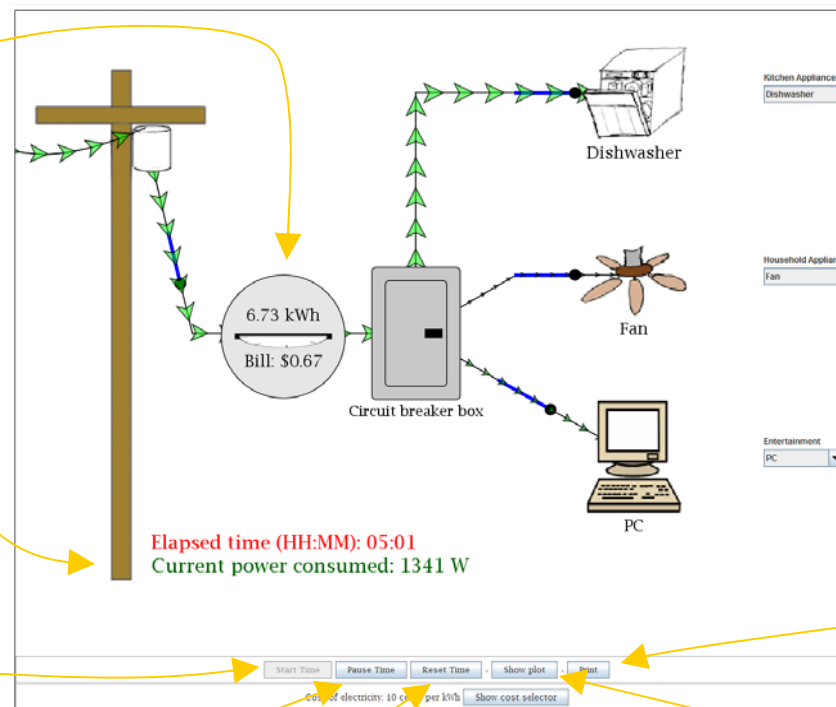
Clicking **Reset Time** sets the meter and **Elapsed time** back to zero.

Clicking **Show cost selector** shows a slider that allows you to change the cost of a kilowatt hour of electricity. The average price of electricity in the U.S. is around 10¢ per kWh. Electricity in the Midwest and Plains states is less expensive than on the coasts. The New England area has the highest rates.

If you change the appliances, the power demand will increase or decrease, and the meter will adjust and spin faster or slower, just like the wheel that spins in the meter at your home. The meter shows the cost of the energy at a rate of 10¢ per kilowatt hour. If the only appliance you are using is a 100-watt light bulb, the cost of the energy is 1¢ per hour. Disconnecting the power pole stops energy usage and power demand. The meter stops but doesn't reset to zero. Time is still passing.

The **Print** button allows you to print the applet.

Clicking **Show plot** opens a new window showing a graph. The window can be resized or moved to a convenient place on the screen. It also has a button for printing the plot.



## Use the applet to explore power and energy in the home

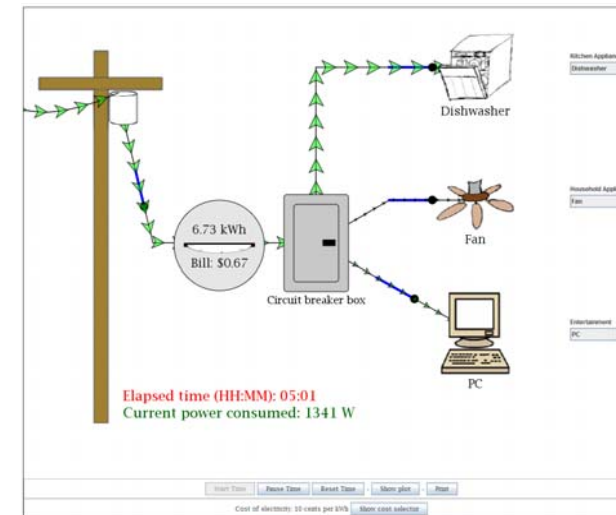
<http://tcip.mste.illinois.edu/applet1.php>

- Open and close the blue switches and use the drop-down menus to change the appliances. Watch how the flow of power changes. What do you see?
- Which appliances use a lot of power?
- Set the blue switches so that only the Energy Star refrigerator (“E-Star Fridge”) is on. What is the **Current power consumed**? (It’s the green number near the bottom of the pole.) Compare the Energy Star refrigerator with the standard refrigerator. About how much more power does the standard refrigerator use?
- Energy is sold by the kilowatt hour. A kilowatt is 1,000 watts. If you use the 1,000-watt hair dryer for one hour, you use 1 kWh (one kilowatt hour) of energy. How much energy is used if you dry your hair for 15 minutes?
- If your XBOX 360 and 40” LCD TV are on for 10 hours, how much energy is used?
- Set the blue switches so that only the toaster is on. What is the **Current power consumed**? Click on the **Pause Time**, **Reset Time**, and then **Start Time** buttons. You should see the energy use and energy cost change on the kWh meter. You should also see the **Elapsed time** total changing near the bottom of the screen. If you use the toaster for 10 minutes, how much energy do you use? When the cost is 10¢ per kWh, how much do you pay to use the toaster for ten minutes?
- Set the switches so that only the solar module is connected. What happens? Switch on the LCD TV. Now what happens? Which appliances need less power than the solar module can supply? If there were twenty of these solar modules producing electricity, how much power could they supply?
- Click on the **Show plot** button. You should see the graph of Power Consumed Over Time. Change the appliances and click **Reset Time** to start the time over. How does the graph change as you change appliances and open and close the various switches?



## Power and Energy in the Home Quick Start Guide

for the applet at <http://tcip.mste.illinois.edu/applet1.php>



Some appliances need a lot of power, but we don’t often use them for a very long time period so they don’t use much energy. Other appliances may not need as much power, but they are used for more time.

A toaster needs a lot more power than a room air conditioner, but most people use a toaster for a much shorter time. Energy use depends on both the amount of power needed, and the amount of time it’s used. The cost to the consumer depends on these as well as the rate charged by the utility.



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