

Quick Start -- Electricity & Time-of-Use Pricing

When the applet opens, it is 4:00 PM and the pricing plan is Hourly Plan - Spring. The current price for electricity is 6.8¢ per kWh. 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 \$0.09. 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. As the time of day changes, the price per kWh changes.

Current Time and Current power consumed are shown near the top.

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

This graph shows the cost of electricity in cents per kWh at various times of day. Current time and price are indicated by the moving red dot. The plot changes with the selected pricing plan.

Use the drop down arrow to select a pricing plan. A constant price plan and two types of time sensitive plans, each with seasonal variations are offered. There is an hourly pricing plan, and a plan that has three Time-of-Use periods per day.

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

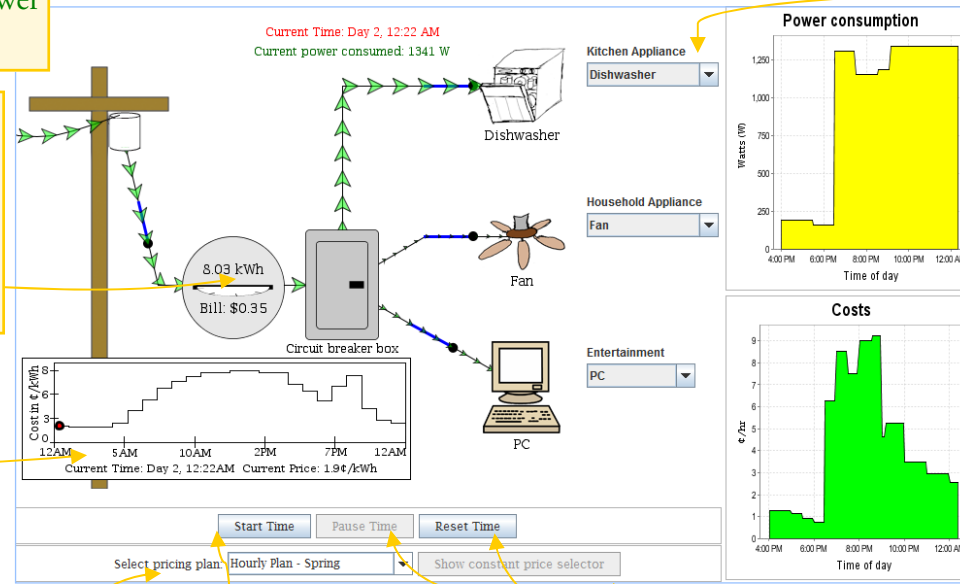
Clicking **Pause Time** pauses the **Current Time** clock. The meter stops measuring kWh and cost, because energy is only consumed as time passes.

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

If you change the appliances, the power demand will increase or decrease, and the meter will adjust and spin faster or slower. The meter shows the cost of the energy for the period of time that the applet has run. Disconnecting the power pole stops energy usage and power demand. The meter stops but doesn't reset to zero. Time is still passing.

The yellow **Power consumption** plot shows watts used over time. The yellow area shows the energy used. The green area shown in the **Costs** plot shows the amount the household pays for energy.

When in Constant Price mode, click **Show constant price selector** to see a slider that allows you to change the cost of a kilowatt hour of electricity. The average retail price (this includes transmission and delivery charges) of electricity in the U.S. is about 10¢ per kWh. The range is from approximately 6¢ to 30¢. Hawaii has the highest rate.



Use the applet to explore electricity and time sensitive pricing

<http://tcipg.mste.illinois.edu/applet/tou>

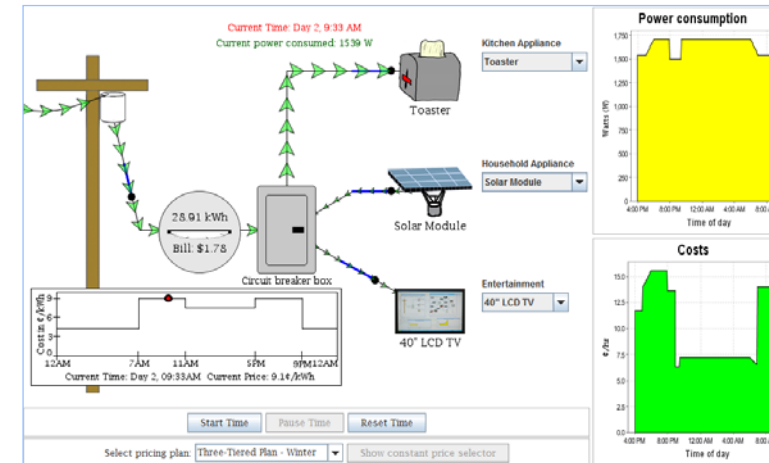
- Open and close the blue switches and use the drop-down menus to change the appliances. Watch how the flow of power changes. What do you see?
- Set the blue switches so that only the Energy Star dishwasher (“E-Star Dishwasher”) is on. What is the **Current power consumed**? (It’s the green number near the top of the applet.) Click on **Reset Time** and then when the **Current Time** reads **Day 1 5:00 PM** click on **Pause Time**. Read the meter to find the number of kWhs of energy used and to determine the bill. Now operate this same refrigerator for one hour between 10:00 and 11:00 PM. What changes and what stays the same? Explain why.
- Change the **pricing plan** to Three-Tiered Plan - Summer and operate the Energy Star dishwasher for the same two one-hour time periods. What differences do you notice?
- 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 do you pay for the energy used, if you dry your hair for 15 minutes starting at 8:00 AM on a winter weekday using the Three-tiered plan?
- If your XBOX 360 and 40” LCD TV are on for four hours starting at 7:00 PM on a summer evening, how much do you pay for the energy used using the Hourly Plan?
- How much money would you save by getting up early to play your Xbox with the LCD TV from 6am to 8am rather than staying up and playing from 8pm to 10pm?
- Set the switches so that only the solar module is connected. Reset the time and watch for 24 hours. What happens? How does the time of day affect the production of the solar module? Under which pricing plan does the solar module save the home consumer most money?
- How can the plots help you determine when you should consider time of day when operating your appliances?

Learn more. Open and use the lesson pages on the website <http://tcipg.mste.illinois.edu/applet/tou>



Electricity & Time-of-Use Pricing Quick Start Guide

for the applet at <http://tcipg.mste.illinois.edu/applet/tou>



Many electricity providers offer their customers **time sensitive, or time of use, pricing plans**. These plans reflect the actual cost of producing electricity

at the time it is needed. They are designed to encourage customers to lower their electricity use during times when the cost of producing electricity is high.

People and businesses use varying amounts of electricity throughout the day and power utilities adjust to these changing demands. When demand is low, utilities can supply electricity using less expensive sources, but when demand is high, more expensive sources must be added to supply enough electricity.