

## Real-time Pricing for Electricity

### Introduction

If you ride a bus, ride the Washington, D.C., Metro, or buy tomatoes, you have probably noticed that the price of a ride or a tomato varies with the day of week, time of day, or season of the year. The same is true of electricity, although most of us don't realize it because we have always paid for electricity using a rate that is averaged over the course of the year. Now that the electrical industry has been deregulated in Pennsylvania and beyond, we have the opportunity to take advantage of hourly variations in electricity prices by using a "real-time pricing" rate rather than the averaged rate.

### Background

Let's start with an analogy. If you operated a taxi company, you would want to send out your most efficient cabs for as much of each day as possible. When more cabs are needed, you would dispatch your less efficient cabs only until demand drops down and you can meet the need for cabs with only the efficient cabs. Using this method would minimize your overall cost of operation.

Now, back to electricity generation. Since the cost to generate electricity is different for each power plant, the cost to generate each kilowatt-hour (KWH) of electricity changes constantly depending on which plants are operating and how cost effective those plants are. If we don't consider transmission congestion and emissions limitations for the moment, we should consider that there are many generators producing the necessary electricity at any given time. And, they are generally operated on an "economic dispatch" basis like the taxi cab example above. But, the limitations of the traditional electric meter made it impossible to keep track of how much energy (KWH) was purchased when, so energy was priced based on averages. Everyone paid the average price per KWH regardless of when that KWH was consumed.

### Why Does This Matter?

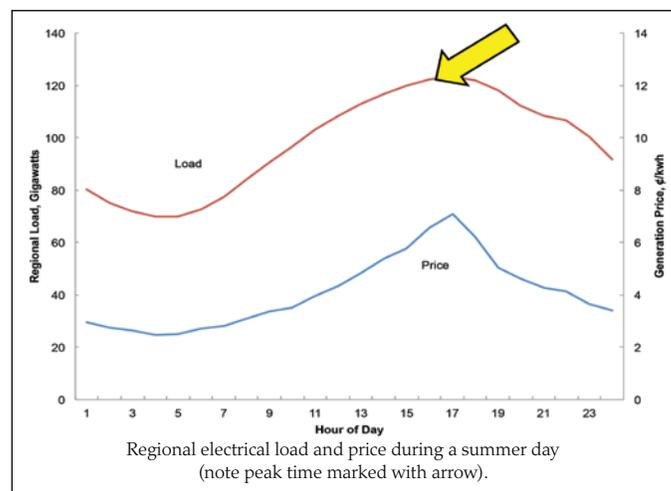
We all make economic choices many times a day. Do you choose a sandwich from the dollar menu instead of the deluxe sandwich? Do you order a prescription refill and select standard delivery or express (at extra cost) delivery? These choices are based on what we find acceptable or unacceptable. If you have some of your prescription tablets remaining when you order the refill, the less expensive standard delivery will do. Often, if you plan ahead, you can be rewarded with a lower cost. The same is true of electricity.

So, to benefit from the effects of real-time electricity pricing, you really need four things:

1. An understanding of how and when prices vary
2. The flexibility to enable you to purchase when the price is lower
3. A way to be aware of energy prices and to control your appliances that use a lot of electric energy
4. A meter that keeps track of how much energy you used and when

### How and When Prices Vary

The graph below depicts a typical summer electric load shape for a community. With few exceptions, when the load peaks, the price also peaks. So, if you can move some of your electricity consumption away from the peak times, real-time pricing will enable you to save money by buying more of your energy at lower prices. The yellow arrow indicates the load peak of the day. This is also the time of the highest energy prices, from about 2:00 p.m. to 6:00 p.m. Recently, the energy generation price bottomed out at about 7¢ at 4:00 a.m. and peaked over 12¢ at 6:00 p.m. in one day.



### Purchasing When Prices Are Lower

Should you pursue a real-time pricing arrangement, remember that what you are really trying to do is to beat the average price. If you are billed currently on a fixed rate, then that rate represents the average over all hours of the year (unless the rate has a seasonal

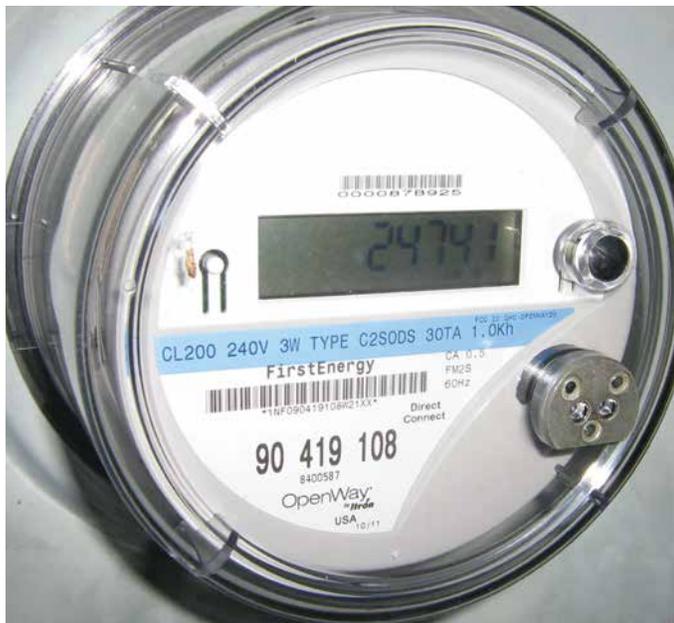
provision). The least expensive KWH of the 24-hour period may be as low as half the price of the most expensive KWH in the same 24-hour period. Therefore, if you can shift some of your electricity use to times of the day when prices are lower, you will end up paying less for your electricity.

### Knowing Prices and Controlling Load

If your electric utility offers real-time pricing, they will likely be able to provide you with hourly pricing in more than one way. Perhaps they will provide the data online or by text message, email, or phone. But to take advantage of real-time programs, you must monitor prices and be flexible in the ways you choose to use electricity. Typically, the appliances that use the most electric energy are dishwashers, air conditioners, electric clothes dryers, and space heaters. There are also “smart appliances” available that can receive electric pricing information through the smart meter and delay their operation until the price drops off based on your instructions.

### Meters

Traditional electricity meters, which have been used for the vast majority of electricity customers for a century or so, simply measure cumulative energy use (KWH). Like the odometer in your car, which measures only miles, there is no recognition of how the car was driven during the process. Calculating your electric bill under real-time pricing requires measurement of the energy used in each hour of the billing period. Therefore, a special meter that records your use every hour is needed. This is typically called a “smart meter.” At the end of your billing period, the electric distribution company (EDC) downloads the hourly energy use data from your meter and uses those data to calculate your bill. Your electric meter may have to be upgraded to accommodate this type of billing.



A smart meter like this one is able to record your energy use on an hourly basis so you can be billed using real-time pricing.

### Details

EDCs generally bill their customers on a monthly basis. Your bill will be calculated using a formula that starts with the wholesale price of electricity. Some ratios are applied and other charges (for transmission, delivery, administration, etc.) are added to arrive at your total bill. The charges on your bill derived from the wholesale price of electricity will be calculated for each hour in the billing period, and then the other charges will be added. An additional charge may also be included for the use of a smart meter since these are relatively new.

The concept of real-time pricing is relatively simple, but the rules, regulations, and procedures can sometimes be confusing. And while the formula used in the calculations may seem a bit daunting, it is really just a sum of the charges for each hour in the billing period. Each EDC must submit their real-time pricing plan (tariff) to the Pennsylvania Public Utility Commission (PUC) prior to implementing it; not all EDCs have implemented real-time pricing yet.

### How to Get Started

If you are interested enough in your electric energy use pattern to seriously consider modifying that pattern to reduce your electric energy costs, signing up for real-time pricing might be right for you. Contact your utility to find out if real-time pricing is an option for you. After all, it is your money.

For more information visit Penn State Extension’s Renewable and Alternative Energy website at [extension.psu.edu/natural-resources/energy](http://extension.psu.edu/natural-resources/energy) and click on “Energy Use and Efficiency.”



Prepared by Gary Musgrave. Reviewed by Daniel Ciolkosz and Edward Johnstonbaugh.

## extension.psu.edu

An **OUTREACH** program of the College of Agricultural Sciences

Penn State College of Agricultural Sciences research and extension programs are funded in part by Pennsylvania counties, the Commonwealth of Pennsylvania, and the U.S. Department of Agriculture.

This publication is available from the Publications Distribution Center, The Pennsylvania State University, 112 Agricultural Administration Building, University Park, PA 16802. For information telephone 814-865-6713.

This publication is available in alternative media on request.

Penn State is committed to affirmative action, equal opportunity, and the diversity of its workforce.

Produced by Ag Communications and Marketing

© The Pennsylvania State University 2013

Code EE0089

10/13pod