

Energy Efficiency Explained

How to Track Your Home Energy Expenses

With simple instructions for creating a Microsoft Office Excel® spreadsheet

--A special report by Holly Martin--

Need to slash your monthly energy bills? Want to reduce your carbon footprint by reducing your home's energy consumption? You can make significant movement toward both goals by tracking how much you spend on electricity, gas, propane and/or heating oil every month.

For the past century, we in the U.S. were blessed with cheap, readily-available energy. Well, that's all about to change. Even though fuel costs are yo-yoing, energy utilities are raising rates, and will continue to do so in the future.

When the price of oil nearly quadrupled in 2008, electric companies announced double-digit rate hike to cover the cost of fuel used to make the electricity. And when oil prices bottomed out later that year, utilities didn't lower their rates to consumers.

If you pay attention to how much energy you're using, you'll automatically reduce your consumption—by 10 percent to 20 percent!

But higher utility rates don't have to mean cutting back other areas of your budget. Research has proven that if you pay attention to how much energy you're using, you'll automatically reduce your consumption—by 10 percent to 20 percent! That can add up to a lot of dollar savings, as well as a significant reduction in air pollution.

So if you usually spend \$1,000 a year on electricity, just by paying attention to how much energy you're using, you could easily save \$100 to \$200, without making drastic lifestyle changes. And remember, the savings goes on year after year—almost like an automatic 401(k) plan.

There are two basic ways to watch your watts: one appliance at a time or the whole house together. In this report, we'll focus on tracking energy use for your entire house. Look for more information on how to monitor your individual appliances and heating and cooling systems at www.EnergyEfficiencyExplained.com.

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Step #1: Gather your utility bills from the past two (or more) years.

Energy bills go through natural cycles following the seasons: Gas, propane or home heating oil use increases in winter and drops in summer. Meanwhile, electric bills bottom out in winter, but soar in summer for air conditioning.

Climate changes and weather cycles also affect the amount of energy you use. Plus, we seem to collect more energy-guzzling electronic gadgets every year. All this makes comparing your energy use from month to month or year to year a tricky job.

Understanding your energy use is easier when you can look at a chart or graph, rather than wading through long lists of numbers.

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your energy efficiency improvements
in the coming months.

By making a quick baseline chart, called a **benchmark**, of how much energy your home has used over the past year, you'll be able to see and celebrate your energy efficiency improvements in the coming months.

Another benefit of tracking your bills is that you may discover a problem—a big water leak in your irrigation system, or an air conditioner that needs service—that might not be as obvious when you pay your bills from month to month.

Utility bills usually include your energy use history for the past 12 months. To go back more than a year, you can sign up for an internet account with the utility to get your records. Or just dig up your old receipts.

Find it online

I recommend that you go online and sign up for an account. Not only can you see your history, you'll also find suggestions about reducing your energy costs.

Since your total bill includes other charges, such as distribution service, supply service, system charges and state and local taxes, it's hard to follow your energy use over time. Some of these other charges, such as distribution service, relate to how much gas or electricity you used. Others don't, so there's nothing you can do to reduce that part of the bill.

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Step #2: Use a free on-line energy “calculator” to compare your home’s energy use with similar homes.

Now that you’ve collected your data, it’s time to put it to work. As a first-cut approximation of how well you’re doing energy-wise, find a free online home energy calculator. EPA’s Energy Star website, and almost every state energy commission and local utility website now host these calculators. To find your state’s energy website, go to <http://www.naseo.org/members/states/default.aspx>.

One of the best free energy calculators is one created by Lawrence Berkeley Laboratory, in California. You can find it at <http://hes.lbl.gov/>. You enter basic information on your home’s square footage, the number of people living there, the types of energy you use, and how much you’ve been paying for energy. Then the calculator shows you how your home compares with others in your area.

Knowing how your own energy use stacks up against others can be a powerful motivator for using energy more efficiently.

Knowing how your own energy use stacks up against others can be a powerful motivator for using energy more efficiently. I was very unpleasantly surprised when I entered our home’s info, and found that only one percent of homes in my zip code used more energy than ours did. That leaves a lot of room for improving our energy efficiency!

Step #3: Create a quick and easy spreadsheet of your utility bills with Microsoft Office Excel or another program.

Many people already use Quicken or some other financial program to keep track of their monthly bills. This kind of software can show how much you paid each month for electricity, gas and other utilities.

However, financial programs only allow you to enter the amount you paid, not the amount of energy you used. Since utility rates can—and will—change, you might not be able to accurately compare your energy use from year to year. And as I mentioned before, there are extra charges on the bill not related to the energy you used. So, if one of your goals is to limit your energy use, you need to track the actual energy consumed.

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A simple explanation of energy units

British Thermal Units (BTUs) are a measure of heat energy in a fuel. You can compare different fuels by comparing their BTUs.

Watts (named after James Watt, 18th century scientist) are a measurement of power. A kilowatt is equal to 1,000 watts.

Kilowatt-hours (kWh) are the units of electrical energy sold by the utility company. A kWh is one watt of power used for one hour.

A **CCF** is 100 cubic feet of natural gas.

Therms are another measure of the heat energy, typically used for natural gas. The heat content of the gas may vary, so the utility multiplies the total CCF of gas you used by a conversion factor to get the total therms on your bill.

Large corporations pay full-time energy managers to track and control all their energy use, because so much money is at stake. Professional building managers have several kinds of utility tracking software available. But there's not much out there for the average consumer (yet).

Create an Energy Tracker Spreadsheet

Until somebody comes out with a utility tracking software for consumers, you can use this quick and easy method to create a simple spreadsheet to track your energy use over time. Remember, I'm no software expert. I'm just sharing a basic method that almost anyone could use.

These directions work for Microsoft Office Excel 2003. If you're using a different spreadsheet program or a different version of Excel, you may have to change the directions slightly, but the basic concepts will stay the same.

(For all of you Excel experts, forgive me for a moment, while I bring the newbies up to speed. Just jump in wherever you need to.)

Finding Excel on your computer

To get into Microsoft Office Excel, click the cursor on the Start button at the bottom of your screen. Then hold the cursor over the All Programs button. This will open up a big list of all the software programs in your computer.

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Move the cursor to the Microsoft Office icon, which you can find on the list in alphabetical order. When you hold the cursor over the Office icon, another small screen will open up, listing all the programs included in Office. Move the cursor over to the list and follow it down until you get to Excel.

Click once on Excel, and the program will open up to an empty spreadsheet, which looks like a large grid. This is called Sheet 1. Sheet 1 is located inside Workbook 1 (or Book 1). Each workbook contains several sheets and you can insert more as you need them.

To change to another sheet, click on the Sheet tabs near the bottom of the screen. Use a separate sheet for each type of utility you want to track.

Saving your Excel file

Click on the Save icon (the square blue floppy disk icon) in the toolbar near the top of the screen. This will open up the “Save As” box.

Type in the name you want to give the entire workbook. Make it a name that’s easy to remember so you can find it later, such as Utility Bills. Excel workbooks show up in your “My Documents” list alphabetically; next to a green X icon (If you can’t find it, make sure you’re viewing “All Files,” not just Word files). Be sure to save the workbook every so often so you don’t lose your work.

Setting up your spreadsheet

Let’s use Sheet 1 to track your electric bills. Place your cursor arrow in the little box below the letter A, and next to the number 1. This box is called cell A1, which means “Column A, 1st row.”

Click on cell A1 and then type in the title for your spreadsheet. Notice that whatever you type into a cell also appears above in the “Formula box.” For your title, type “Monthly Electric Use.” Then press the Enter key and the computer enters that name into cell A1 and moves the cursor down to cell A2.

(Don’t worry if the title is too long to fit into cell A1. You can easily fix that later by highlighting two or three cells together in the row and clicking the Merge and Center button on the Excel toolbar.)

Entering your utility bill numbers

Now click on cell A2. Type the word, “Month,” and hit Enter. Your cursor will automatically move down to cell A3.

Beginning with your current month’s bill, type the name of the month into cell A3. Then press Enter. The cursor will enter what you typed and move down to cell A4. Type the next month’s name, hit Enter, and continue down to the last month in your year.

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Move your cursor back up and click on cell B2, which means “Column B, 2nd row.” Type “Elect. kWh” and hit enter. This will be your column title. Below that, enter the kWh of electricity you used for each month of the year, moving down column B.

Here’s a sample spreadsheet showing my home’s electricity use for one year:

Monthly Elect. Use	
Month	Elect. (kWh)
Apr-07	1264
May07	1124
Jun-07	1828
Jul-07	1686
Aug-07	2481
Sep-07	2864
Oct-07	2069
Nov-07	1464
Dec-07	1570
Jan-08	1740
Feb-08	1273
Mar-08	1568

To compare two or more year’s worth of bills, start a third column for a different year and add the utility numbers for each month. Once you’ve set up your spreadsheet, it will be easy add the new numbers as the bills come in. You don’t have to wait until the entire column is filled in to create a comparison chart (see Making a Yearly Comparison Chart).

Monthly Electricity Use (kWh)		
Month	2007-2008	2008-2009
May	1124	1588
June	1828	2003
July	1686	2376
Aug	2481	2320
Sept	2864	2096
Oct	2069	1559
Nov	1464	1535
Dec	1570	1199
Jan	1740	1341
Feb	1273	1235
Mar	1568	
Apr	1678	

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Entering gas and heating oil numbers

Next, you'll click on Sheet 2, where you will enter your natural gas, propane or heating oil use. Be sure to label the columns according to the units used for that type of fuel. For example, on your gas bill, you'll be charged for the number of therms (heat content) or hundred cubic feet (CCF--volume).

Propane and home heating oil are sold in gallons (volume) or in therms (heat content). Sometimes both heat content and volume appear on the bill. You will see a conversion factor, used to convert from one to the other.

You might want to use another Sheet to track your water use (in gallons). Water is only partly related to energy use, but if you're using water, you're probably using HOT water, which translates to energy. If you're on a well system, you're probably using electricity to pump the water out of the ground. You won't have a water bill, but your electric bill will reflect the energy used for pumping.

Heating Degree Days (HDDs)

For the very motivated, you might also create a spreadsheet for the Heating Degree Days. The utility has special ways to compare weather factors that increase or decrease your heating and cooling bills. They call them Heating Degree Days (HDD) and Cooling Degree Days (CDDs).

HDD is a way to compare outside temperature to demand for fuel to heat a building. It assumes that when the temperature goes below 65 F outside, you need to turn on the heat. Calculate by taking the sum of high and low temperatures for the day, divide by two and round to the next highest number. Subtract that number from 65. The remainder is the number of HDD for that day. My gas bill shows the total HDD for each month.

You'll notice that, even in summer, when there are zero HDD, you still use a little gas for your clothes dryer or stove. (Some homes also have a gas light in the front yard. But usually the gas going to this lamp is unmetered, so it's charged as a fixed amount every month, in a separate place on your bill.)

Making it pretty

Now comes the fun part. You can use the spreadsheet program to create charts that show your energy use in graphic form. This makes trends and comparisons easy, and gives you a better feel for how well your energy efficiency program is working.

In Excel, be sure you're on the Sheet that contains the data you want to chart. Use your cursor to highlight a rectangle containing the exact rows and columns of data you want. For this first chart, use just the data for a single year.

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To do this, click on cell A2 and drag the cursor down and across columns A and B until you reach the lower right hand corner of Column B, and all the data you want is highlighted (you should see a flickering, dotted line around the highlighted section). Be sure to include the names of the months in Column A, as well as the numbers in Column B. Leave off the title and column headings for now—you will add those later in the process.

Using the Chart Wizard

Next, find the chart wizard icon on the toolbar at the top of the screen. This icon looks like a tiny square chart with red, yellow and blue columns. If you're not sure which one is the correct icon, point your cursor at it, and the words "Chart Wizard" will appear.

The chart wizard does all the work
of setting things up.

Click on that icon and a small screen will pop up, showing different styles of charts you can choose. Try a few different types to see which shows your data best. To do this, select a chart type, and then click on one of the sub-types.

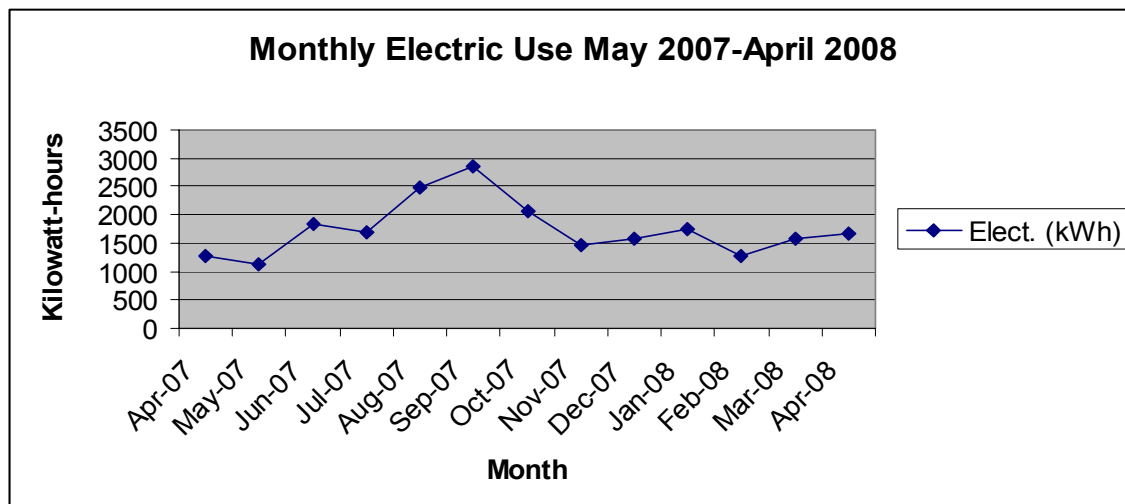
You can click on the Press and Hold button below the samples to see what your chart would look like in that style. Once you find the style you want, you'll continue to move through the chart wizard by clicking the Next button. Leave the Chart Source Data screen alone and click "Next."

Now you're on the Chart Options screen. Type into the title box, "Monthly Electric Use." Below that, in the x-axis Category box, type "Month." In the y-axis Value box, type "Kilowatt-hours." Click "Next".

On the Chart Location screen, click "Finish." A chart will appear, right on the same Excel Sheet as your data.

On the next page, you'll see a line-type chart I created using numbers from my own utility bills. Notice that the chart wizard does all the work of setting things up. It even creates a numbered y-axis that automatically covers the range of data and a legend box showing the units of energy you are charting.

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Make a Yearly Comparison Chart

It's just as easy to chart two or more columns of numbers. That way you can compare the amount of energy you used from year to year, and hopefully see results from your energy efficiency measures taking effect.

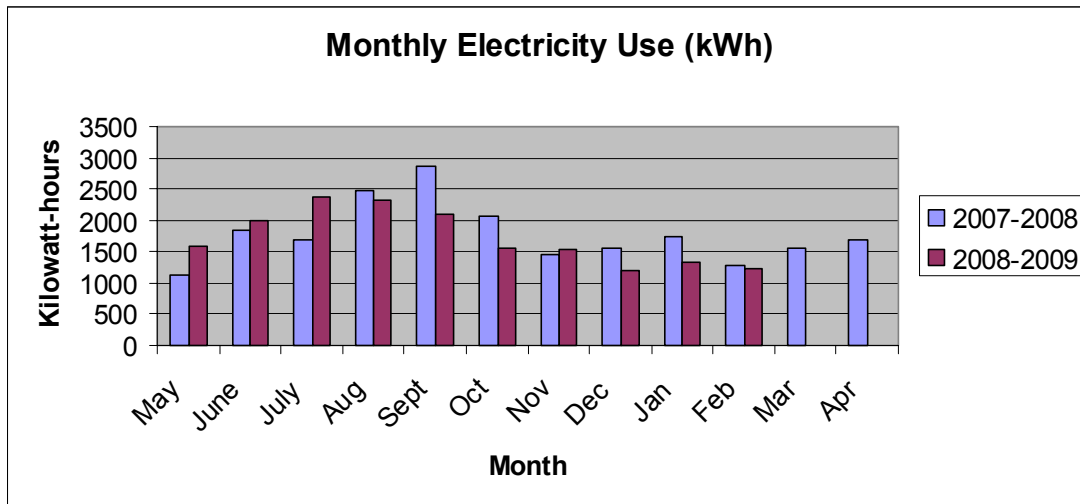
In Excel, each column of numbers is called a "data series." Data series 1 would contain the first column of numbers; data series 2 would contain the second column.

You don't have to start at January for this to work. Just set up your columns for 12 months each. Then create the comparison chart by highlighting all the columns of data that you want to show (including the months column).

Click on the chart icon and select the chart type and sub-type you want. In this case, as you follow the Chart Wizard through the process, you'll also be asked to type in labels for each data series. These labels will appear in a "legend" at the side of the chart. Label the series "2007" and "2008," for example, when comparing energy use for two different years.

On the next page, you'll see the chart that Excel created with the data from my spreadsheet comparing two years' worth of electricity.

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As you can see, energy use for 2008 in my home started out consistently higher than for 2007, but began to drop during the months of August and September. This shows how the 30+ energy saving light bulbs we installed in June/July dropped our electricity bills.

Comparing Apples to Oranges

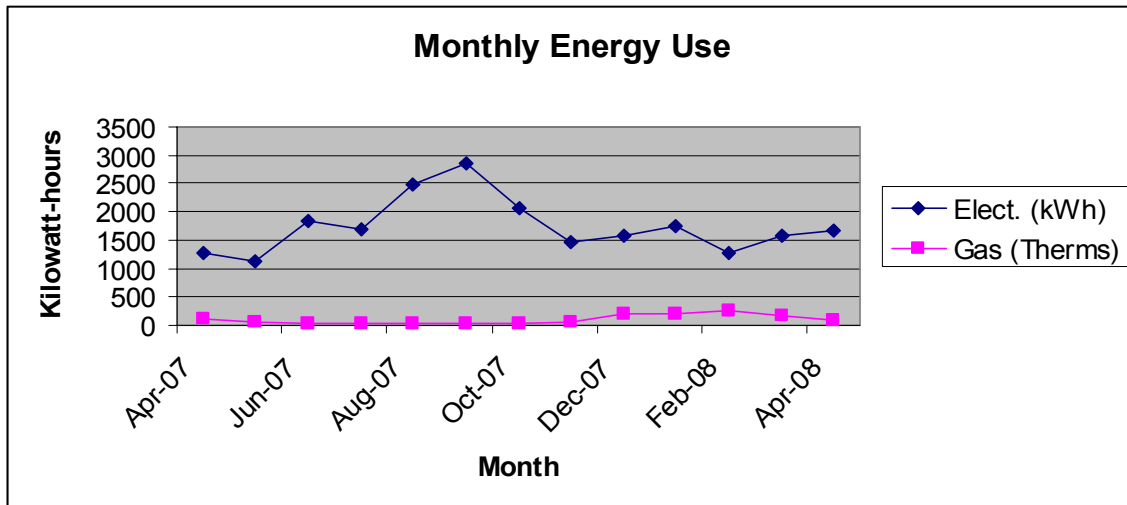
For the more adventurous Excel user, you could try creating graphs that compare one type of data (electricity use) with another type (gas use). By putting both utilities on the same graph you'll see one go up when the other goes down. And you'll also be able to spot long-term trends.

To create this chart, you need to copy and paste both sets of data onto the same Sheet. To add a new Sheet to your Workbook, click Insert on the toolbar. Then click "Worksheet" and Excel will open up a new, blank Sheet.

To copy the first data series, go back to the Sheet 1 and highlight the month and electricity data columns together. Click Copy. Now, go to the new Sheet, click in the upper left cell and then click Paste. The two columns from Sheet 1 should appear on the new sheet.

Now, go to Sheet 2 and highlight just the column of gas numbers. Copy that column, go back to the new sheet, and paste this second set of numbers next to the first one. Next, highlight all three columns—the months, the electric use and the gas use numbers. Once again, click the Chart Wizard icon, and follow through each step of the wizard. You'll get a chart that looks something like the one on the next page.

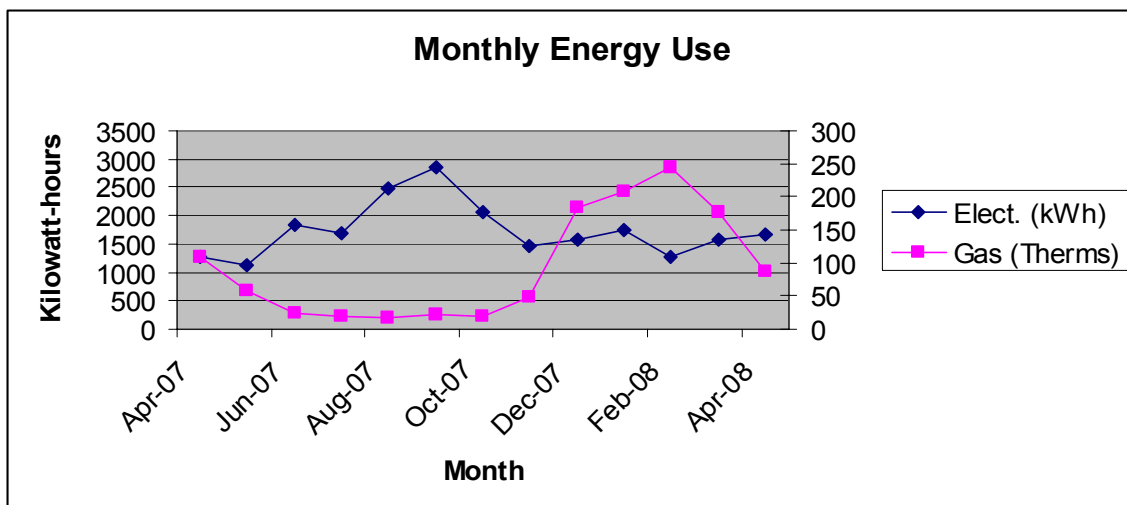
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Notice that it's hard to see the data for natural gas use. That's because the range of units used to measure different energy sources are completely different (0 to 3500 for kWh and 0 to 300 for Therms).

Using a secondary axis

One way to make the comparison of gas and electricity use easier is to create a chart with two axes—one on the left, for kWh, and one on the right for therms. This is called a secondary axis. Here is a sample chart using a secondary axis:



To create this kind of chart, first go ahead and make a simple line-type comparison chart using both the kWh and therms data, just like you did before. Be sure to use the line-style of chart. Then, once the chart is finished, point your cursor and right click directly

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on the line showing therms. Make sure you click on the line connecting the points, not one of the points itself.

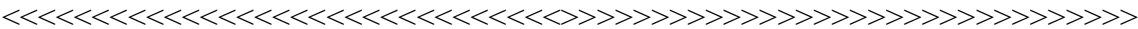
A shortcut box will pop up, giving you several options. Select “Format Data Series.” An option box will appear. Choose the “Axis” tab and click on the “Secondary Axis” button. Then click “OK.” The line showing your data will automatically reformat and a second scale that fits those numbers will appear.

Thinking through your home’s energy use

Thinking back, I can pinpoint changes in our household that changed our energy use:

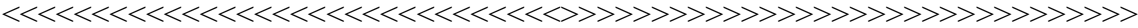
- As my kids have grown, we have a lot more video gamers and YouTube and MySpace addicts at our house compared to last year.
- The weather was cooler than average, so we used more heat and less A/C;
- We set our A/C thermostat a little higher this year, and tried not to fool with it;
- We used room fans to stay comfortable; and
- We added quite a few energy saving light bulbs during June/July.

Now it’s your turn to create some charts and watch your energy bills drop. Here’s to smaller energy bills, and a more energy efficient home!



Click here to sign up for a [Free Mini-Course](#) on Six Startling Facts You Need to Know before Changing another Light Bulb:

http://energyefficiencyexplained.com/energy_efficiency_explained_free_mini_course/index.htm



Holly Martin is the author of [The Energy Efficient Light Bulb Buyer’s Guide](#): Six Simple Steps to a Lower-Cost, More Environmentally Responsible Home. To order your copy, visit <http://www.EnergyEfficiencyExplained.com/>.

