

Remember you can always click on this video link for help with the sheet you are on.



A Guide to Flipped Energy Audit Calculator

Welcome, to the Flipped Energy Audit Calculator, a tool that was designed to help you and your students calculate energy costs and estimate energy savings. You can use this calculator by filling out the summary page and then going through the lighting, appliance, computers and HVAC sections. You can calculate the costs for just one classroom or one energy use category (like lighting) or you can use the calculator to do a full building audit. The calculator is designed to be filled out on the computer and can include as much or as little math as you want your students to do. If you want to be able to print out any of the sections so students can walk around collecting data please use the pink worksheets for printing.



If you have questions at any point in time you can always watch a video example for instructions by clicking on the video link in the top  right corner of each worksheet or e-mail astainthorp@ase.org if you still have questions.

Okay, let's get started.

Summary Sheet

On the summary sheet, we will be collecting information about the places being audited, the date of the audit, the cost your building pays for electricity and pollution measured in CO2 from the production of that electricity.

Please note that as we enter in lighting, appliance and computer energy use information the total energy costs and potential energy savings calculations will also show here.

- 1) First, remember to enter in your school name, date of the audit and who is doing the audit. Having the date the audit took place maybe useful later.
- 2) Next, add your energy costs
 - Cost per Kilowatt–Hour (ask school administrators or facilities staff or if you don't know use the national average)
 - Pollution emitted per Kilowatt (measured in lb. CO2)
 - To find this out click on the "Look Up Here" and enter your 5 – Digit ZIP code.
 - Record the CO2 emissions in your area and enter it into the calculator.

Summary of Energy Audit

Instructions: Please complete this sheet first. Input data in YELLOW cells ONLY. Do NOT type in non-yellow cells (these cells will autopopulate calculations for you).

About Your School:

Name of School	PowerSave DC
Date of Energy Audit	5/9/2012
Auditors	Ellen
Rooms Audited	The Office

About Your Energy Costs:

Cost per Kilowatt:	\$0.11	National Average = \$0.112
lb. CO2 Emitted per Kilowatt		Look Up Here

Enter Your 5-Digit ZIP code:

2 What Are the Emissions in My Area?

This chart compares the average emissions rates (lb/MWh) in your geographical area to the national average emissions rates (lb/MWh) for nitrogen oxide, sulfur dioxide, and carbon dioxide.

Category	Your Region's Emissions Rate (lb/MWh)	National Average Emissions Rate (lb/MWh)
Nitrogen oxide	1.511.77	7.92
Sulfur dioxide	1.72	1.059
Carbon dioxide	1059	1059

Remember you can always click on this video link for help with the sheet you are on.



Lighting Cost Sheet

In an average school lighting can represent 30% of the schools electricity use and it can often be the easiest place to start saving energy. On the lighting cost worksheet, we will be collecting information to calculate current energy use and costs for lighting across the school. There are many ways to save energy from lighting, these can include reducing light levels, reducing the amount of time the lights are on, using more efficient lighting and reducing the number of lamps. The calculator will also show you how much energy and money each action will save based on your recommendations.

Current Electricity Use Calculator

- 1) Enter the room number and fixture types. A fixture is the equipment that holds and powers the lamps or bulbs. Most schools have overhead fluorescent fixtures.
- 2) Remember to enter the type of lamp. There are three types of lamps.
 - T12: The least efficient bulb and the widest bulb
 - T8: More efficient and thinner bulb than T12
 - T5: The most efficient and thinnest bulb
- 3) Enter the Wattage per lamp. In the top left corner of the right worksheet, there is reference information or look on the bulbs for their specific wattage.



Reference Information

Watts per lamp
-T5 = 28 watts
-T8 = 32 watts
-T12 = 40 watts

- 4) Enter the number of lamps per fixture & the total number of fixtures in your room. In this picture there are two fixtures and each fixture has 2 lamps/bulbs.



- 5) Enter hours the lights are used per day & days used per year. Keep in mind that the lights may be turned on when the first person arrives at the school in the morning and stay on until the last person leaves, in some schools that can mean the lights are on for 12 to 16 hours a day. If you are not sure ask. Many schools in the United States average 180 days of instruction per year. But there may be people who use the school on the weekends, over the summer or other times of the year. Try to figure out how many days your school is open.
- 6) Once you have entered this information it will automatically calculate the total consumption (kWh) and cost.

Total kWh:	819.2
Total costs:	\$90.11

Potential Savings Calculator

- 1) Scroll to the right side of the excel sheet and you can now write down any energy saving recommendations you have. Some energy saving ideas might be;
 - Saving energy by getting more efficient lighting technology
 - Reducing the number of lamps per fixture
 - Minimizing the hours per day or the days per year the lights are on
- 2) If you are installing more efficient lamps enter the new wattage, if not enter the same wattage as before.
- 3) If you are **not** reducing the lamps per fixture, enter 0. If you are enter then number removed.
- 4) If you are **not** reducing the fixtures in the room, enter 0. If you are enter then number removed.
- 5) If you are **not** reducing the hours or days per year enter 0. If you are enter the hours or days that have been reduced.
- 6) Look in the top right corner of the right worksheet for the total consumption (kWh) and cost savings.

Total kWh Saved:	738.56
Total Dollar Savings	\$81.24

Remember you can always click on this video link for help with the sheet you are on.



Appliance Cost Sheet

Most people are not aware that certain appliances continue to draw electricity when turned off. We call this usage “Phantom Load”. On the appliance cost worksheet, we will be collecting information about the current electricity consumption and cost for appliances in your rooms. Turning off, unplugging or using a power strip for your appliances when not in use can save you money. This calculator will show you how much energy your appliances use and how much you can save based on your recommendations.

Current Electricity Use Calculator

- 1) Enter the name/type of appliance
- 2) Next enter both the in use and phantom load wattage of the appliance. There are two ways to do this.
 - Use a power monitor or [Kill a Watt](#). (Teachers and students who are in the Alliance’s PowerSave School program will be given power monitors. This gives you the most accurate information about appliance energy use.
 - If you don’t have a power monitor you can look for the label on the back that shows energy use information or go online to research the average energy use (<http://tinyurl.com/appliance-energy>) and the typical phantom energy use (<http://tinyurl.com/phantom-energy>).
- 3) If the appliance is always plugged in, enter Y for Yes. If not enter N for No.
- 4) Enter hours the appliance are used per day & the days used per year.
- 5) Enter the total number of the appliances.
- 6) Once you have entered this information the spreadsheet will automatically calculate the total energy use and cost and the potential savings.

Power Monitor



	kWh / Year	Cost / Year
Total (In Use and Phantom Loads)	0.96	\$36.97
Phantom Loads Only	81.6	\$8.98
In Use Only (No Phantom Load)	182.5	\$28.00

Potential Savings Calculator

- 1) Scroll to the right side of the excel sheet and you can now write down any energy saving recommendations you have. Some energy saving ideas might be;
 - Saving energy by getting more efficient appliances
 - Unplugging appliances to remove phantom loads
 - Minimizing the hours per day or the days per year the appliances are on
 - Reducing the number of appliances
- 2) If you are getting more efficient appliances enter the new wattage, if not enter the same wattage as before.
- 3) If you plan to unplug or eliminate phantom load from the appliance enter N and give yourself a pat on the back.
- 4) If you are **not** reducing the hours or days per year enter 0. If you are enter the hours or days that have been reduced.
- 7) If you are **not** reducing the appliances in the room, enter 0. If you are enter then number removed.
- 8) Look in the top right corner of the right worksheet for the total consumption (In Use & Phantom Loads) and cost savings

	kWh / Year	Savings / Year
Total (In Use and Phantom Loads)	237.5	\$26.13
Phantom Loads Only	0	\$0.00
In Use Only (No Phantom Load)	237.5	\$26.13

Remember you can always click on this video link for help with the sheet you are on.



Computer Power Management Sheet

Unlike the other sheets in the excel file the computer worksheet does not calculate the energy use but instead **estimates the energy use base on average computer energy use**. We did this because it is much quicker to estimate computer energy use than separately measure the computer and the monitor for every type of computer in the school. It does not show true measurements of energy use or savings. To more accurately measure energy use and savings for computers, use the Appliance Cost Sheet that is located in this workbook.

Potential Savings Calculators

- 1) Enter room name
- 2) Enter the number and type of computers
 - Desktop
 - Monitor
 - Laptop
- 3) Enter hours the computer is used per day & days used per year
- 4) Select ENERGY STAR or Conventional. ENERGY STAR computers have better savings and they will generally have a sticker.



- 5) Select a setting for when not in use
 - Active/Screen Saver
 - Standby
 - Off
 - Unplugged

- 6) Once you enter this information it will automatically estimate the total consumption(kWh) and cost savings

	Current kWh/ Year	Current Costs/ Year	kWh Saved/ Year (Conventional)	\$ Savings/ Year (Conventional)	kWh Saved/Year ENERGYSTAR	\$ Savings/ Year ENERGYSTAR
Total	7806.94	\$858.76	5893.19	\$648.25	6336.29	\$696.99

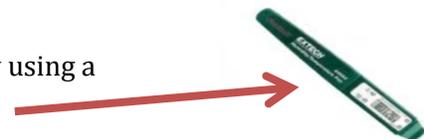
E	Current Costs		Savings CONVENTIONAL		Savings ENERGYSTAR	
	Yearly Estimated kWh Use	Yearly Estimated Cost	Yearly Estimated kWh Savings	Yearly Estimated Savings	Yearly Estimated kWh Savings	Yearly Estimated Savings
Setting when not in Use						
Active/Screen Saver	554.4	\$60.98	0	\$0.00	-8.1144	(\$0.89)
Standby	75.3798	\$8.29	0	\$0.00	16.2498	\$1.79
Unplugged	125.4	\$13.79	-29.6208	(\$3.26)	16.9872	\$1.87
Active/Screen Saver	7232.256	\$795.55	5893.1856	\$648.25	6304.7952	\$693.53
Standby	499.5792	\$54.95	0	\$0.00	11.4192	\$1.26
Off	75.1032	\$8.26	0	\$0.00	20.076	\$2.21

Savings are calculated by assuming that both conventional and ENERGY STAR computers are “off” when not in use. Additionally, there is a place to write your recommendations so that you can write ways to come up with better computer power management plans. Lastly, to learn more about our methodology for estimating computer energy savings please refer to the Assumptions and Methodology worksheet in the calculator.

Heating, Ventilation and Air Conditioning (HVAC) Sheet

Heating, Ventilation and Air Conditioning (HVAC) is very important in controlling your energy usage and costs. In many buildings HVAC energy use is responsible for close to half of the buildings overall energy use. However, HVAC energy use is very difficult to quantify and it is hard to determine specifics how temperature affects energy consumption. Therefore, we will not calculate the actual energy consumption and savings from HVAC in this worksheet, but we can use this worksheet to collect useful data.

- 1) Enter the room name or type
- 2) Enter the humidity level and air temperature, which you can find by using a humidity temperature pen



Remember you can always click on this video link for help with the sheet you are on.



3) Enter the type of thermostat. There are two types of thermostats.



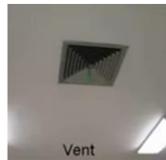
A programmable thermostat is designed to adjust the temperature according to a series of programmed settings. When using a manual thermostat, you have to adjust temperature when you leave and arrive back in the room.

4) What type of air conditioning unit is in the room? There are two types of units: wall units and vents



5) Enter the temperature set points and the number of hours that the room is at those set points. If you don't know this ask a facilities staff member.

6) How is the room heated? With a radiator or vents?



7) Is the temperature in the room uncomfortable at a certain times of year? Is it hot in the summer, cold in the winter or always cold?

8) Are there specific hot or cold spots in the room?

9) What energy recommendations do you have?

Ex) Change thermostat set points and insulate windows with plastic

Summary Sheet

After collecting as much information as you can, return to the summary worksheet. Here you will see the totals for all the energy consumption information you entered (lights, appliances and computers) & potential energy savings recommendations listed side by side. You can see how many kilowatt-hours are being used, how much it costs, the total pollution emitted based on that energy use and see energy use equivalents (like how many CFLs hours, hair dryer hours or homes) the building current uses and could save.

About Your Energy Costs:		About Your Potential Energy Savings:			
Cost per Kilowatt Hour:	\$0.11	National Average =	\$0.112		
lb. CO2 Emitted per Kilowatt Hour:	1059		Look Up Here		
Lighting Costs per Year:	\$59.14	Lightings Savings per Year:	\$29.57		
Lighting kWh Use per Year:	537.6	Reduced Lighting kWh per Year:	268.8		
Total Appliance Cost per Year:	\$36.97	Appliance Savings per Year :	\$24.92		
Total Appliance kWh Use per Year:	0.96	Reduced Appliance kWh per Year:	226.5		
Estimate of Computer Costs:	\$5,617.45	Estimate of Energystar Computer kWh Savings:	\$4,101.36		
Estimate of Computer kWh per Year:	\$617.92	Estimate of Energystar Computer Savings per Year:	\$451.15		
Total kWh used per Year:	538.6	Total kWh Saved per Year:	495.3		
lbs. CO2 Emitted per Year:	570335.0	Reduction in lbs. CO2:	524522.7		
Total Costs per Year:	\$96.11	Total Savings per Year:	\$54.48		
16.1568 Equivalent CFL hours	592.416 Equivalent Hairdryer Hours	0.0421639 Equivalent annual home electricity use	14.859 Equivalent CFL hours	344.83 Equivalent Hairdryer Hours	0.03877711 Equivalent annual home electricity use

Remember information is power. You can use the information that you calculated to influence students, teachers, parents, facilities and administrative staff to do their part to make a difference. Be creative and think about behavioral, operational and even equipment changes that can make a difference. **Join millions of other Energy Superheroes who have made their classrooms, schools and homes energy efficient.**