Watts Up with your electric bill?

ENSC 162 Solar Energy Lab

Purpose of the experiment

- To examine the power consumption of various light bulbs.
- Determine is "newer" high efficiency light bulbs are better.
- Examine the power usage of household appliances.
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Equipment List

- Vernier LabQuest interface
- Watts Up
- Light Sensor
- Light bulbs (various types)
- Household appliances

The Lab

Part I – Determining the Power Output

1. Plug the Light sensor into Channel 1 of the Vernier computer interface. Set the Light Sensor to the 0-150,000 lux range.

2. Open the file "Watts Up" in the *ENSC 162* folder.

Data Table

Part I – Power Output of Light bulbs

	Listed Watts (W)	Measured Watts (W)	Illumination (lux) at 3 feet
Incandescent			

Part II – Cost efficiency

	Electrical cost ($/kwH)	$0.08

	Watts (W)	Usage (hrs/day)	Electrial cost ($/day)
Light bulb			
Toaster			
Microwave			
Hotplate			
Fridge			

Part III – Appliance power usage

	Watts (W)	Lifetime (hrs)	Electrial cost over lifetime	Cost of bulb ($)	Savings over lifetime
Incandescent					

Data Analysis

1. Calculate the average current, voltage and illumination values for Part I.

Problems

1. **If all of our energy needs were to be supplied by coal, then at our present level of energy consumption, how long would our coal reserves last?**

   Current U.S. energy use is approx about: 98 x 10^15 Btu per year.

   One pound of bituminous coal provides about: 13,000 Btu,

   1Ton = 2000 lbs

   A.   1 ton releases _____ Btu

   B.   *(current energy use)* / *(answer from A)* = _____ tons/year

   Using the U.S. Geological Survey estimates:

   300 x 10^9 tons / *(answer from B)* = _____ years

2. **U.S. oil reserves are estimated at 23 billion barrels and we currently produce about: 6 M Barrels per Day. How long will these reserves last at this production rate?**

   A.   Yearly production is: _____bbl/year

   Lifetime will be:

   23,000,000,000 bbl / *(answer from A)* = _____ years