

Greening Law School Computer Labs



Rich McCue – June 2010
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Monday, July 19, 2010

My name is Rich McCue, and I work for the Faculty of Law and the Law Library at the University of Victoria.

Microsoft[®]



Microsoft[®]

Linux



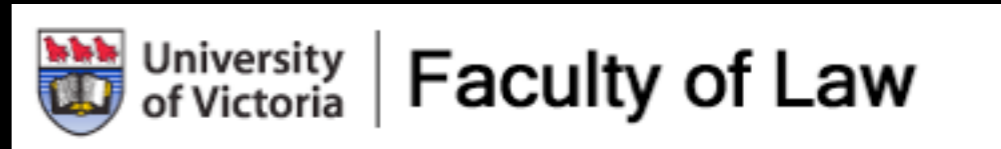
Linux

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I graduated from the Uvic Faculty of Business a few years ago...

LLB Degree

~~LLB Degree~~



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How many of you wanted to be a Super Hero when you were younger? I can't promise that you'll be a Super Hero after this session, but I will try to give you some tools so that you can be a Hero at your law school.









Measure

Measure

Implement

Measure

Implement

Educate

Measure



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How much electricity do your computer labs use? To be honest, I had no idea, until I measured last year... Before making any changes to our lab, it cost \$7 per day to run our 42 computers.

That doesn't sounds like much, but it adds up to \$2500 a year!

Measure

How much electricity do your Computer Labs use?



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kWh

kWh

Kilowatt hour



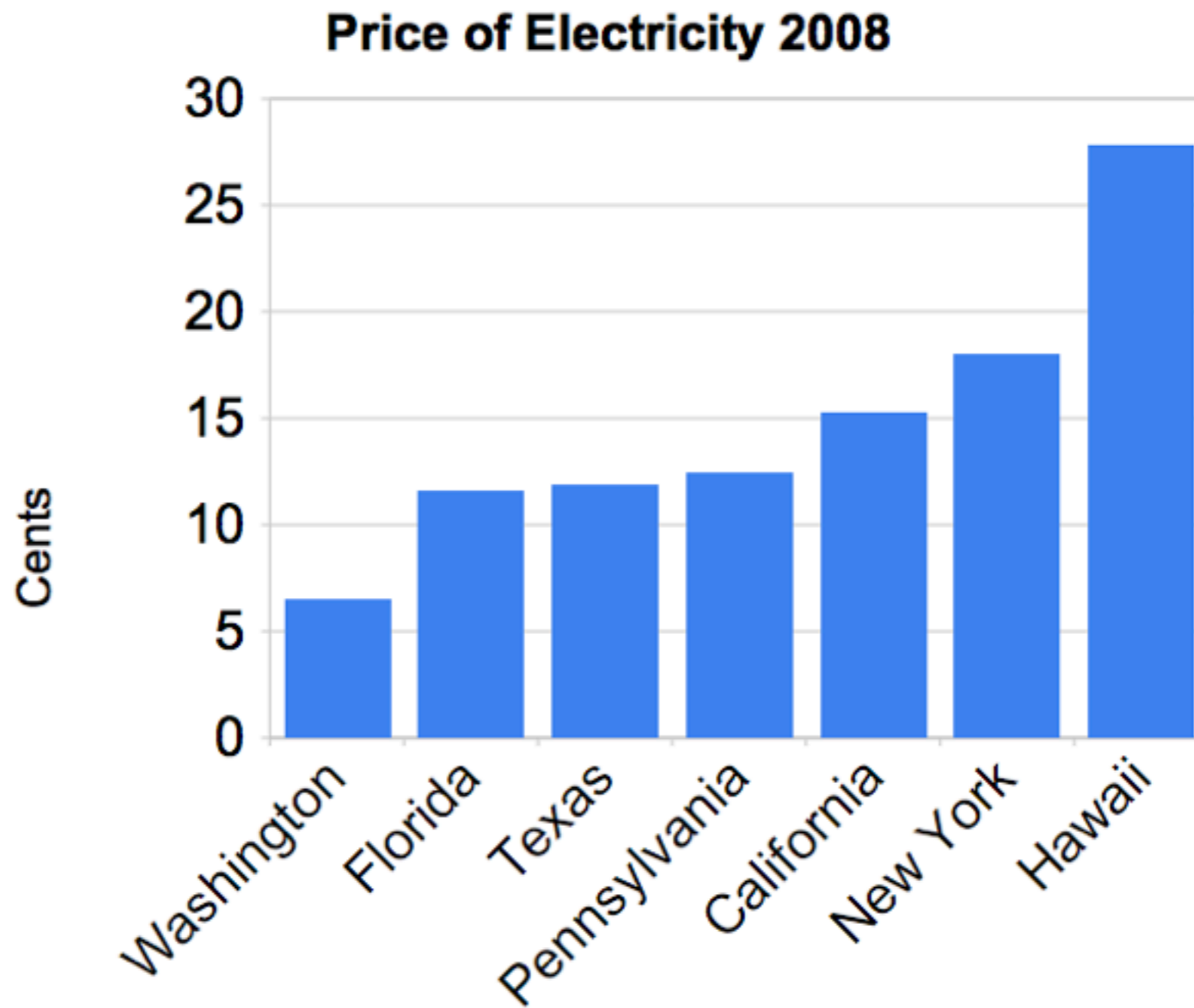
**1000 watts
per hour**



X 10 hours = 1 kWh

**100
Watt**

What does a Kilowatt Hour of Electricity Cost?



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Price of kWh varies widely across the country. Do you know what the price of electricity is in your area?

For my presentation I'll use the cost of electricity in Pennsylvania which is about \$0.12 per Kilowatt hour.



X 10 hours = \$0.12

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How do we Measure? We Measure everything piece of equipment using a [Kill A Watt](#) (Only \$20 on Amazon.com).

It can measure the power consumption of all types of equipment: printers, lamps, monitors, TV's...

How do we Measure?



How do we Measure?

Dell Optiplex 760



Dell Optiplex 760



\$0.25 / day

Dell Optiplex 760



\$0.25 / day

\$93 / year

iMac 27



iMac 27



\$0.24 / day



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iMac 27



\$0.24 / day

\$86 / year

Dell Latitude E5400



Dell Latitude E5400



\$0.06 / day

Dell Latitude E5400



\$0.06 / day

\$23 / year

MacBook Pro 13



MacBook Pro 13



\$0.05 / day

MacBook Pro 13



\$0.05 / day

\$19 / year

iPad



iPad



\$0.01 / day



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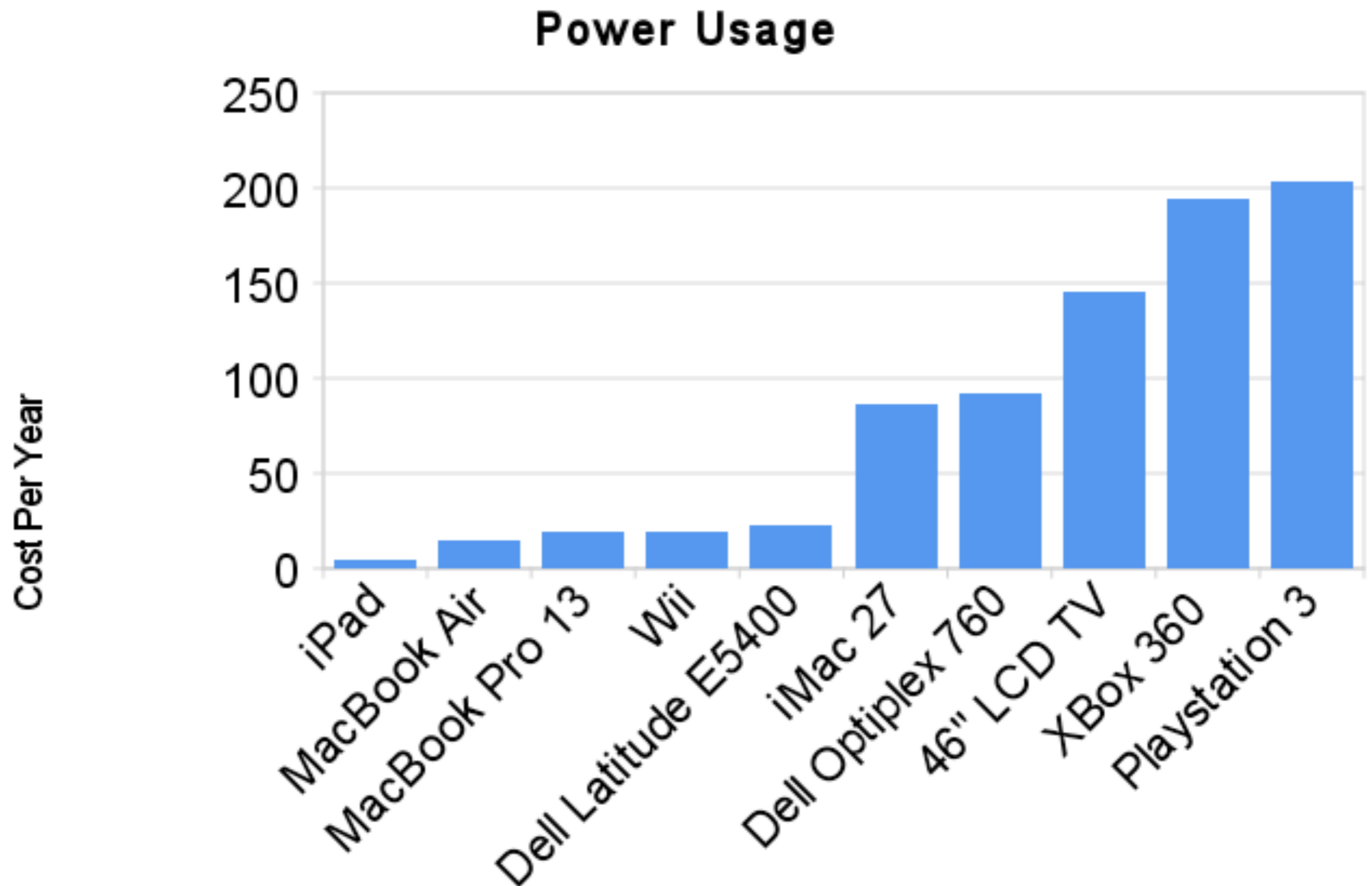
iPad



\$0.01 / day

\$4 / year

Relative Consumption



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Electrical usage across devices varies greatly. The iPad uses very little electricity... Laptops also use electricity sparingly, but desktop computers without power saving settings enabled use quite a bit of electricity. Most people don't know this.

When my kids are playing on our Xbox360 and the 46" TV, they use a lot of electricity: A combined 325 watts, as opposed to my 4 watts as I surf on my iPad ;-)



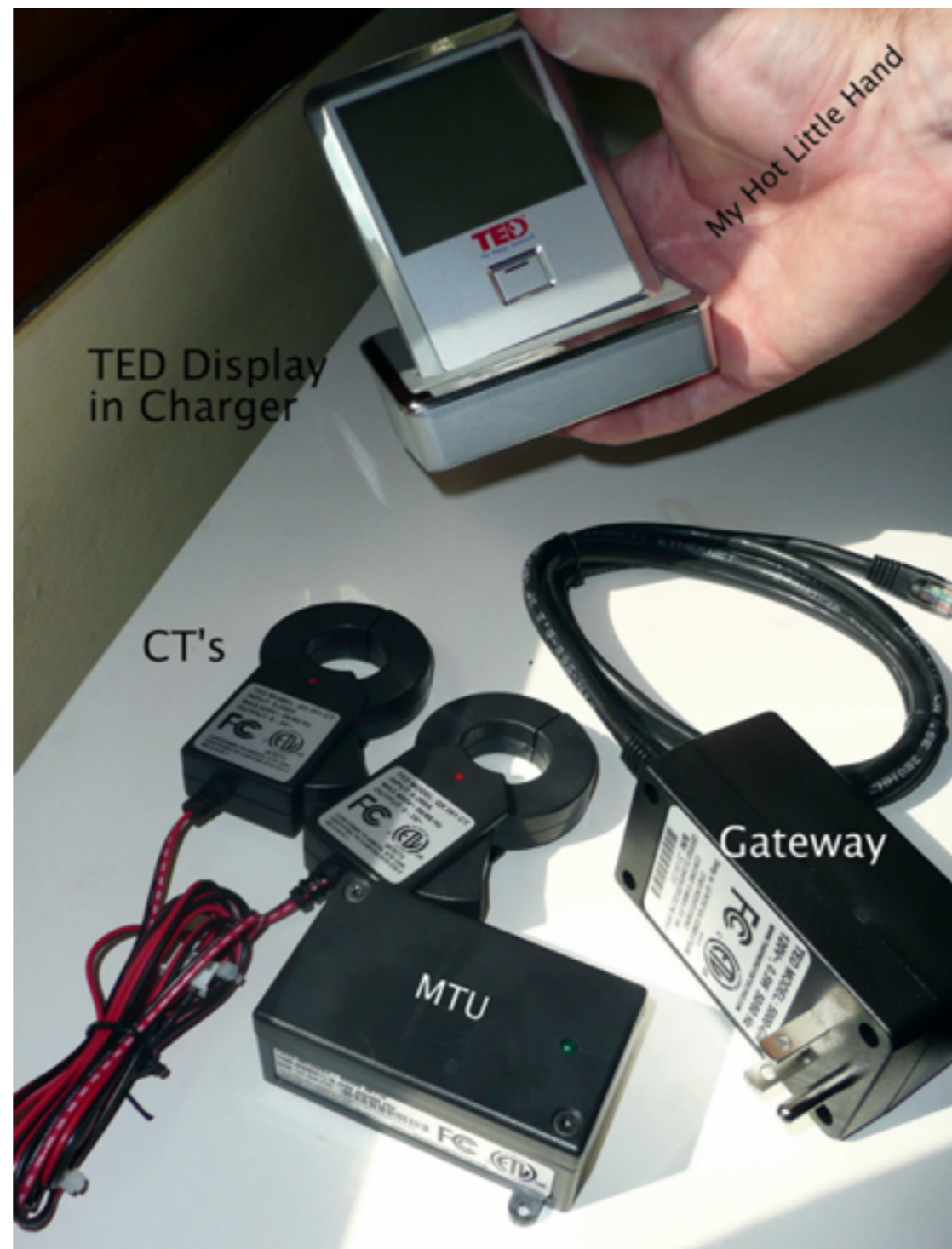
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We know how to monitor electrical usage for individual devices, but how do we monitor how much electricity the whole building is using, or each electrical panel is using?

The Energy Detective



The Energy Detective



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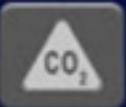
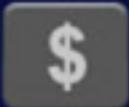
Measure the total usage of the building, or if possible parts of the building (most buildings have several electrical panels). The Energy Detective does a great job measuring the total usage in my home, and they are coming out with a commercial 3-phase version soon.

PRESENT READINGS

July 2 2009

6:44 PM

Days Left In Billing Cycle: 30
 Current Rate In Effect: \$0.10280
 Plan Type: Flat Rate



REAL-TIME KW USAGE

MTU 1 kVA: 0.384



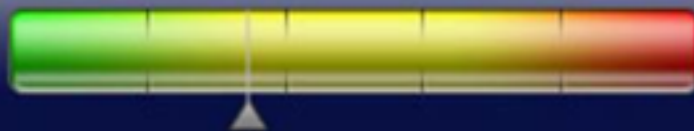
RECORDINGS

Peak kW Today: 5.767 kW @ 5:07 PM
 Peak \$ Spent Today: \$0.63 @ 6:44 PM
 Low Voltage Today: 120.2 V @ 5:34 PM
 High Voltage Today: 123.1 V @ 6:44 PM

Peak kW MTD: 5.767 kW on Jul 2
 Peak \$ Spent MTD: \$0.63 on Jul 2
 Low Voltage MTD: 120.2 V on Jul 2
 High Voltage MTD: 123.1 V on Jul 2

KWH USED SINCE MIDNIGHT

5 10 15 20



+ -

8.8 kWh

KWH USED THIS MONTH

400 800 1200 1600



+ -

8.8 kWh

PROJECTED KWH USAGE

400 800 1200 1600



+ -

2092.2 kWh

PRESENT VOLTAGE

108.0 116.0 124.0 132.0



+ -

123.2 volts

AVERAGE DAILY KWH USAGE

9 18 27 36



+ -

2.9 kWh

WEATHER

Smyrna, GA



89°

Partly Cloudy

[10-Day Forecast](#)

Wind: W 13mph
 Sunrise: 6:31 AM
 Sunset: 8:53 PM



Implement



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Implement everywhere that you have control! The number one thing that we did was to turn computers off every night. Because of a patch management tool that we previously used, we asked our faculty and staff to leave their computers on. For the same reason we left our Lab computers turned on 24 x 7. By doing just this alone we can reduce electrical consumption by computer by 60–70%

Implement



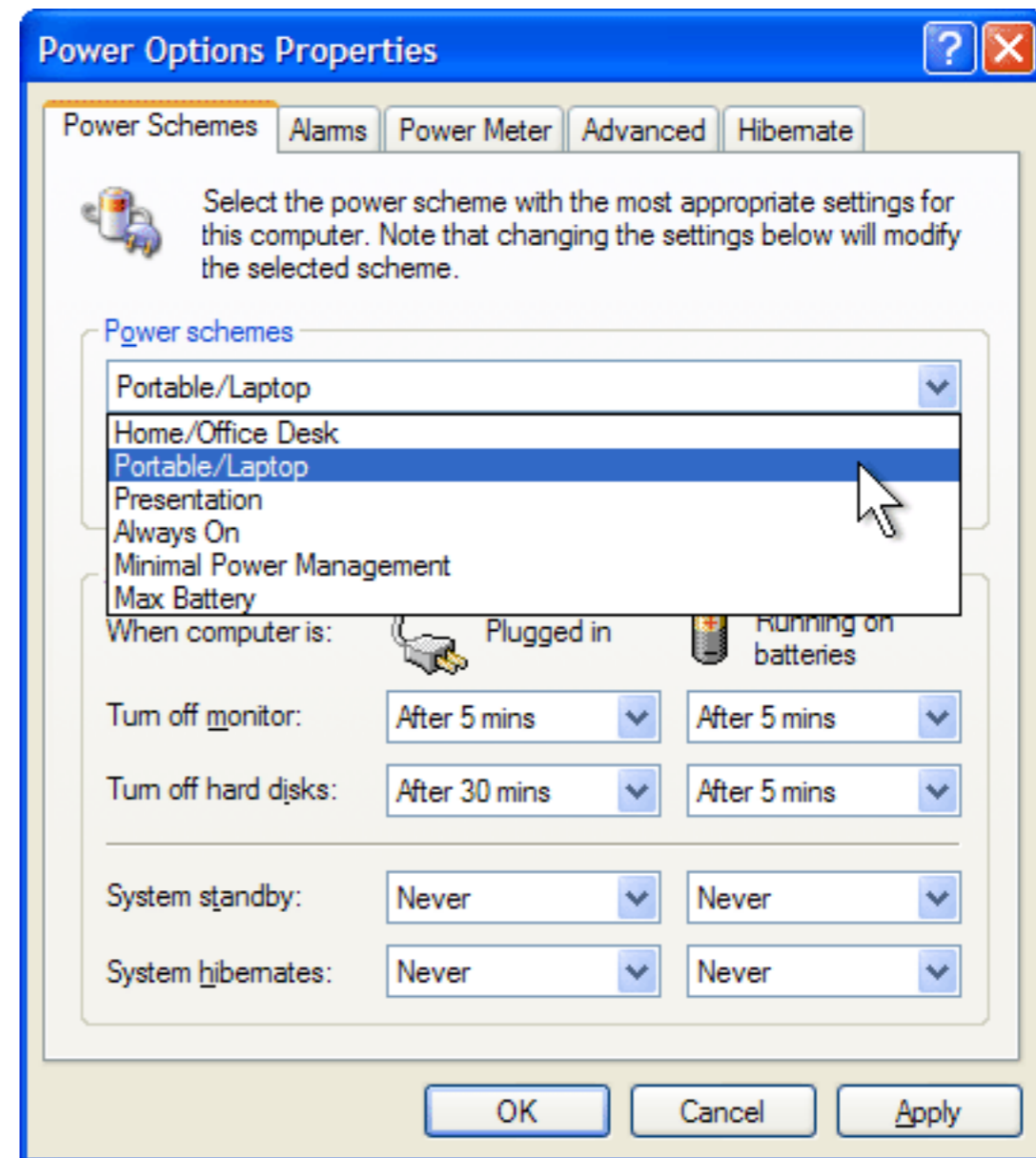
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Enable Power Saving Options



Schedule Lab Shutdown

If you use Ghost or other similar product, you can schedule shutdown and start up times globally.

If you don't use ghost like us, we use the "Scheduled Task Wizard" and a simple command line.

Schedule Lab Shutdown



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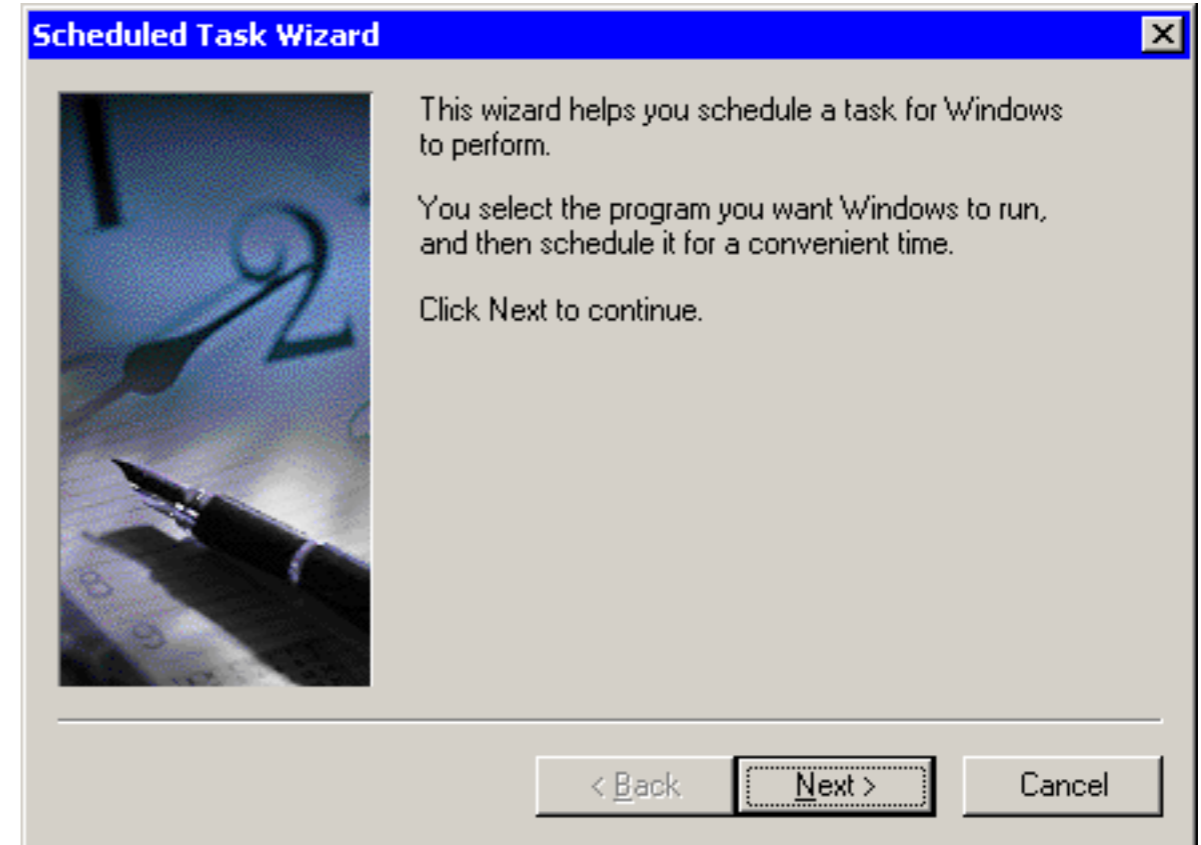
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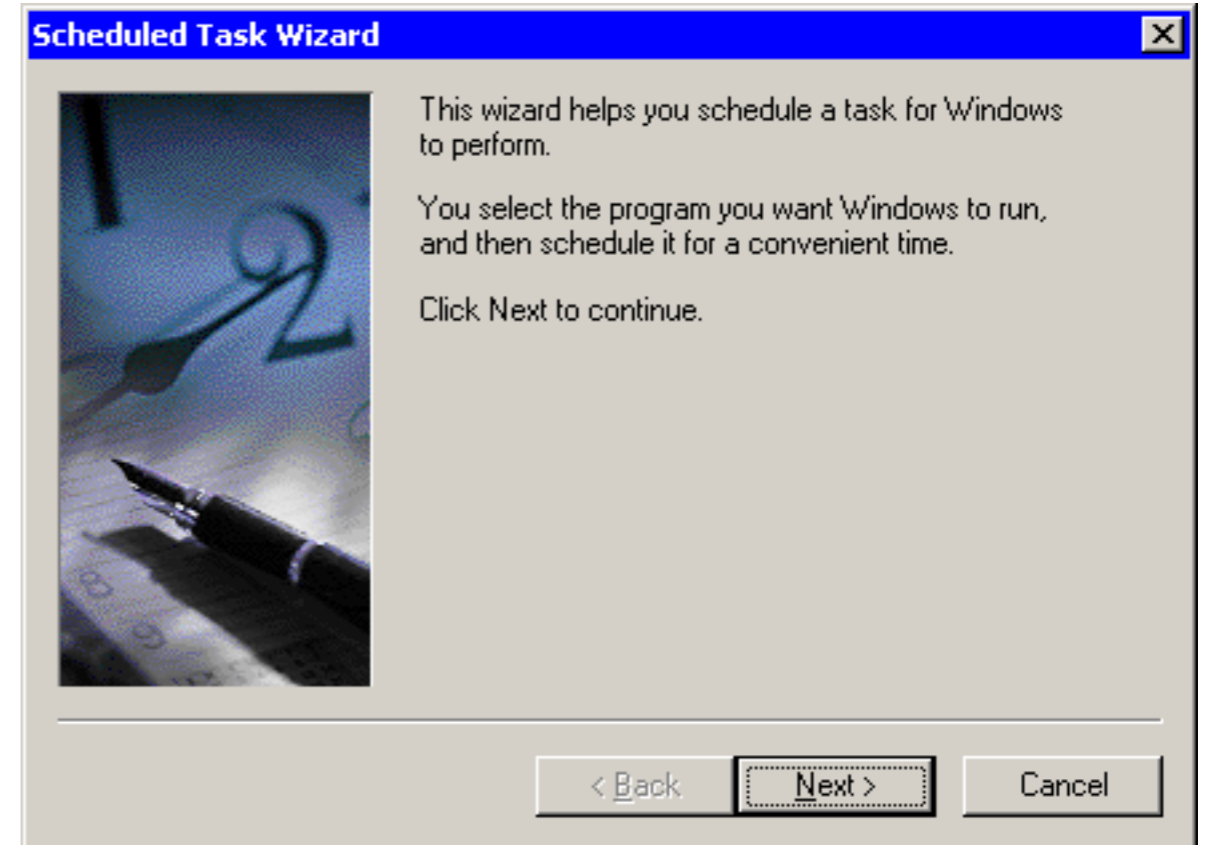
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Schedule Lab Shutdown



Schedule Lab Shutdown



```
c:\windows\system32\shutdown.exe -s
```



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Buy Energy Star equipment... make power consumption a consideration along with price...

Factor Energy cost into long term pricing.

Virtualize



vmware®



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Server use a lot of electricity. If you can reduce the number of “boxes” you are running, you can typically reduce your electrical consumption significantly. We’re in the process of virtualizing our servers as they come up for retirement.

Educate

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People can't make good decisions unless they have information. Example from home: Electric Hot water tank & dryer use the majority of the electricity in our home... I was worrying about turning lights off, when it was shower length and air drying cloths that I should have been worried about.

Most people are the same when it comes to office equipment. Maybe next time they should consider buying a laptop.

Educate



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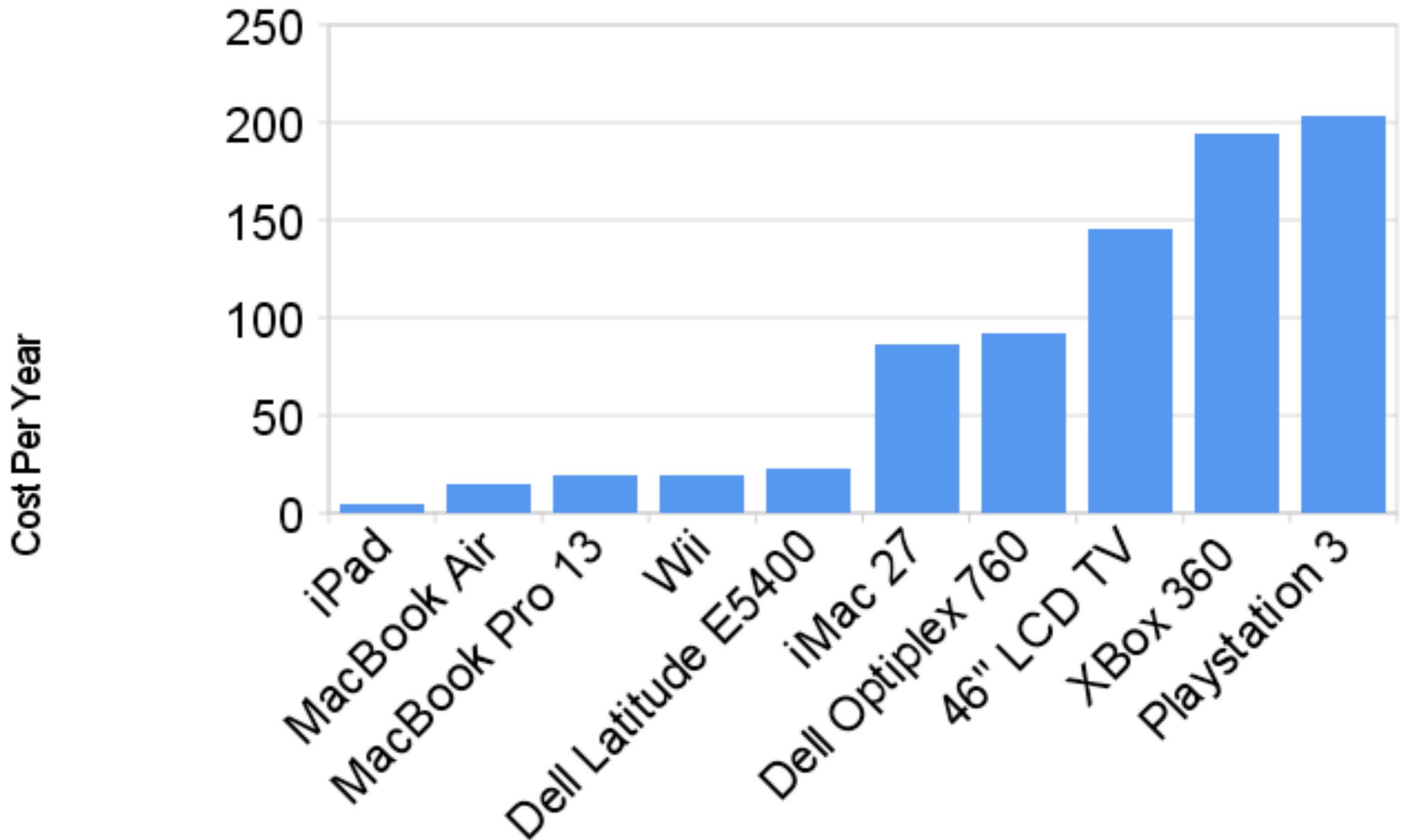
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Educate

Power Usage

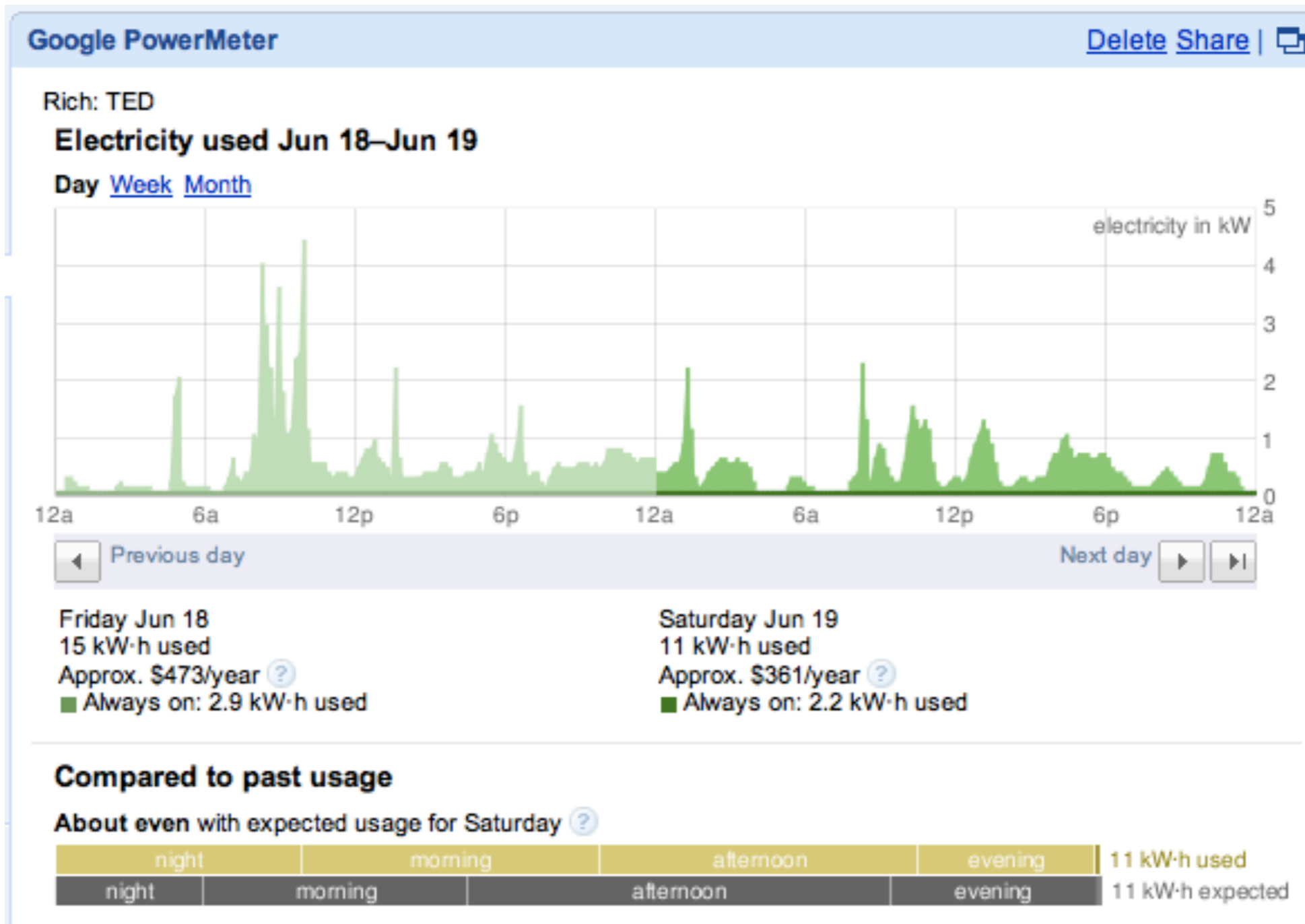


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Visibility



Let People Know



Tips for Faculty:

- 1. Shut down every night**
- 2. Enable Power Management**
- 3. Use a Laptop when possible**

Competition



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Once people know what they are using, then you can pit them against each other in a competition. Business School vs. the Law School... Just don't let the Business School set the rules.

Good natured competition can get people to focus in a manner that it is difficult to do in any other way.



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While there is not a direct link between electricity usage and the problems in the Gulf; if we used less energy of all forms, including electricity, we wouldn't need to import as much oil, or drill for oil in such difficult locations like the gulf...

Any other questions?

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