UPS Backup Costs

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An uninterruptible power supply (UPS) handles short power interruptions. Earlier this week, I experienced 4 power interruptions of about one second. In each case, my computer rebooted taking several minutes and then I had to retype my work. I'm sure I lost over an hour of productive work that day. I resolved to avoid that problem in the future by getting a UPS, although I knew that the UPS would consume some energy itself, as it helped me ride out these power interruptions. My needs were modest:

- Bridge very short power interruptions.
- Low cost
- Minimize electrical energy used by the device itself

I purchased an APC BE325R. This was my least expensive battery solution at $31.45 with tax at a local office supply superstore. As the smallest device of this type it that would fulfill my need and I figured it would also use the least energy itself. Here are the BE325R specs:

- Load capacity for battery backup is: 185W
- Battery lasts 2 to 4 years
- APC Site specifies run time for BE325 (similar model) (not in printed specifications)
  - Full Load (185 W): 1 minutes: 3.1 kWh
  - Half load (92.5 W): 8.1 minutes: 12.5 kWh
- Energy (power) used by the UPS itself: Not stated

TESTS

Armed with my "Kill-A-Watt" wattmeter, I had to find out what energy cost would be for the UPS itself. Here are the results:

Unloaded: 6 to 9 watts depending upon how long it was plugged in and the state of charge of the internal battery.

Loads are:

Computer: Dell Optiplex GX240, Pentium 4 CPU, 1.7 GHz, 2 display cards, 512 MB RAM, 2 hard drives, (40 GB, 20 GB), a DVD R/W drive, and a CD R/W drive.
Standby, Off, or Hibernate: 2 W
On and quiescent: 59 W
Active: Up to 81 W

2 LCD Displays:

Each in standby: 1-2 W (average to 1.5 W); Active: 25 W
Total: SB: 3 W; Active: 50 W

Total Load

Worst case: 81 W + 50 W = 131 W < 185 W rated
Off: 3 W (2 LCD) + 2 W (Computer) = 5 W.
Quiescent: 59 W + 50 W = 109 W

Measured Total Load
Off (Standby or Hibernate): 16 W; UPS uses: 16 W - 5 W = 11 W
Quiescent: 120 W; UPS uses: 120 - 109 = 11 W

Power loss run capacity
With quiescent load of 109 W: 1 minute, 36 seconds (1.6 minutes) until unit beeps continuously indicating that the energy is nearing exhaustion. I expect that it would have continued to run the computer a bit longer, but I didn't want to shut down the computer through another power loss.
Energy = 1.6 minutes x 109 W = 174.4 W-Minutes = 2.9 kWh

Electricity usage and cost:
Average load through year: 11 W
Month: 730 Hours; 8.03 kWh @ 15¢ / kWh = $1.20
Year: 8760 Hours; 96.36 kWh @ 15¢ / kWh = $14.40
For a household that uses 1000 kWh / month, that's 0.8% additional.
For our household at 400 kWh / month, that's 2% additional.

Annual costs:
Initial cost: $31.45
Assume battery lasts 3 years (average of 2 & 4). Cost for 1st 3 years: $10.48 / year
Battery replacement costs on APC site: $19 + $7 shipping + $1 tax = $29; cost for subsequent years: $9 / year
Capital cost: $10 / year (approx)
Electrical cost: $14.40 / year
Total annual cost: $24.40

Conclusions
I am using the UPS for now, as losing an hour's work would be quite costly. However, if our utility does not interrupt power often (the UPS beeps when that happens), I may decide that it's not worth the additional cost and environmental impact. Because the UPS uses a lead battery, I'd have to dispose of the battery at a hazardous waste collection point.