

Power Efficiency in Desktops and Servers

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May 2008

Why Power Efficiency?

- Make more efficient use of electric power
- Various programs and resources to promote power savings and efficiency
 - Energy Star 4.0 (www.energystar.gov)
 - Electrical Power Research Institute (www.epri.com)
 - 80 PLUS (www.80plus.org)

Power Efficiency

- I had to replace a failed power supply in a workstation
- Some of the new power supplies were labeled with “80 PLUS”, so I checked into it, then bought one

80 PLUS

- Goal: achieve 80% or better power efficiency at various load levels
- Estimated savings:
 - 85 kWh per year in desktop computer
 - 301 kWh per year in a server
- Website has good reference material for vendors, consumers and electric utilities



Technical Details

- An 80% efficient power supply is at least 80% efficient at 20%, 50%, and 100% loads whereas current power supplies range from 65-75% efficiency.
- 80% efficient power supplies are designed with active power factor correction (PFC). Active power factor correction uses an active circuit to help current and voltage correlate with each other. When this happens, apparent power and real power approach each other. Apparent power is the current drawn by a system, whereas real power is the current actually available for use by the system. If they are equal, then the power factor is 1.
- A .9 PFC means that 90% of apparent power is actually transferred to available real power. Power supplies that aren't power factor corrected tend to cause unpleasant variations in AC voltage that can affect or even damage other equipment on the same circuit.

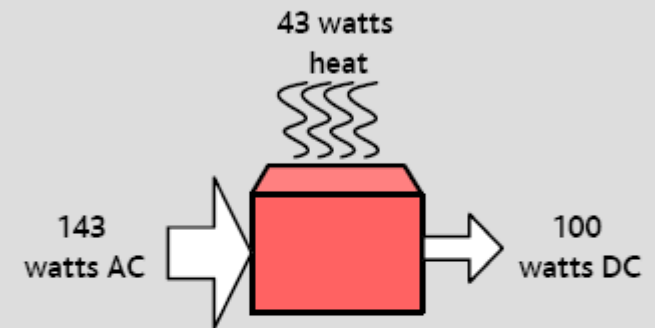
Reduced Heat Benefits

- Increases reliability because power supplies run cooler
- Increased comfort because of reduced cooling needs
- Lower overall costs due to higher reliability and lower cooling needs

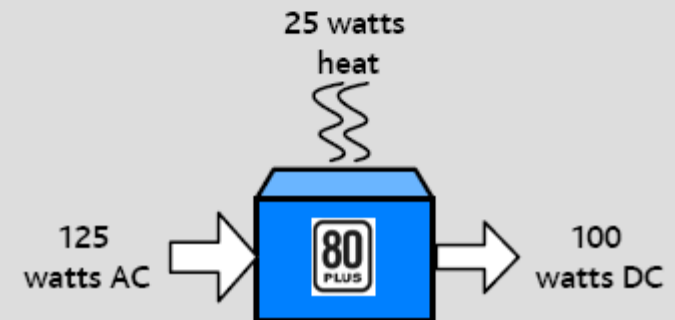


Heat Output Comparison of 80 PLUS™ vs. Less Efficient Power Supplies

Commodity 200W Power Supply



80 PLUS 200W Power Supply



Program Levels

Load Factor	80 PLUS	80 PLUS Bronze	80 PLUS Silver	80 PLUS Gold
20%	80%	82%	85%	87%
50%	80%	85%	88%	90%
100%	80%	82%	85%	87%



The Vendors

- All the major desktop and server vendors make some claims about “80 PLUS”
 - Some use power supplies that are “80 PLUS” certified
 - Some use power supplies that are 80% efficient or better but have not been officially certified
 - More statements are currently made about desktops than servers

Storage Systems

- Storage systems do not have the same loading factors as desktops and servers
 - Disk arrays spin the drives at full speed
 - Read and write operations add only incremental power consumption
- The storage system vendors I spoke with said that they are working on their plans in this area, but don't have any official statements to make yet

Current Status

- Some server vendors have some power supplies now that are 87% efficient and higher in some models of computers
- Most of the server vendors provide various claims about their own “green” initiatives and how they compare with others
- Some server vendors also provide software that helps monitor electric power usage

Futures

- The 80 PLUS organization is looking at the next level beyond 80 PLUS Gold, which would be in the 90% range
- The 80 PLUS organization is considering “datacenter” power supplies for future ratings
- Expect server vendors to get even better
- Expect storage systems to follow servers

Recommendations

- Avoid screensavers, use sleep mode
- Use power management tools
- Use 80 PLUS or better power supplies
- Replace CRT displays with LCD displays
 - Typical LCD displays use half or less power than comparable CRT
- Print duplex whenever possible
- EPA GPO tool to set screens to power off

Contact me

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