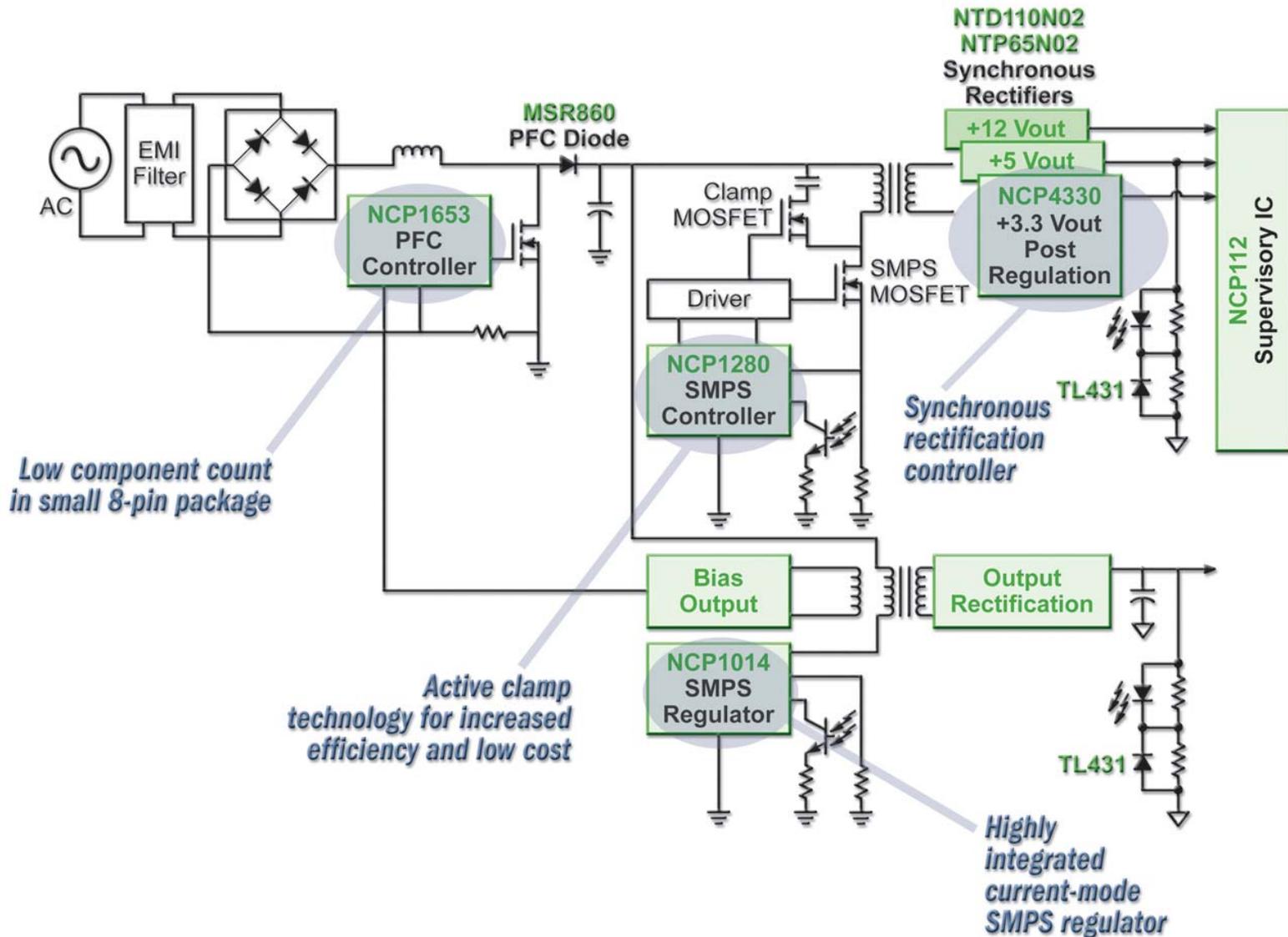


On Semiconductor Reference Design



ON, Texas Instruments, Philips, others enabling 80 Plus solutions with new silicon

Impacts of Moving to 80 Plus

- Lower circuit stresses
 - Temperature
 - Current
- Improved reliability
- Reduced fan noise
- Reduced energy waste at electrical outlet and in building distribution wiring (lower I^2R losses)
- Operating cost savings large enough to pay back extra manufacturing costs in about a year



Key Design Changes

➤ Add active PFC

- Reduces voltage and current stress at line extremes
- Reduces EMI filtering
- Improves reliability of a good design
- Cost impact: ~ \$1.50 @ 400W

➤ Add active clamp to main converter

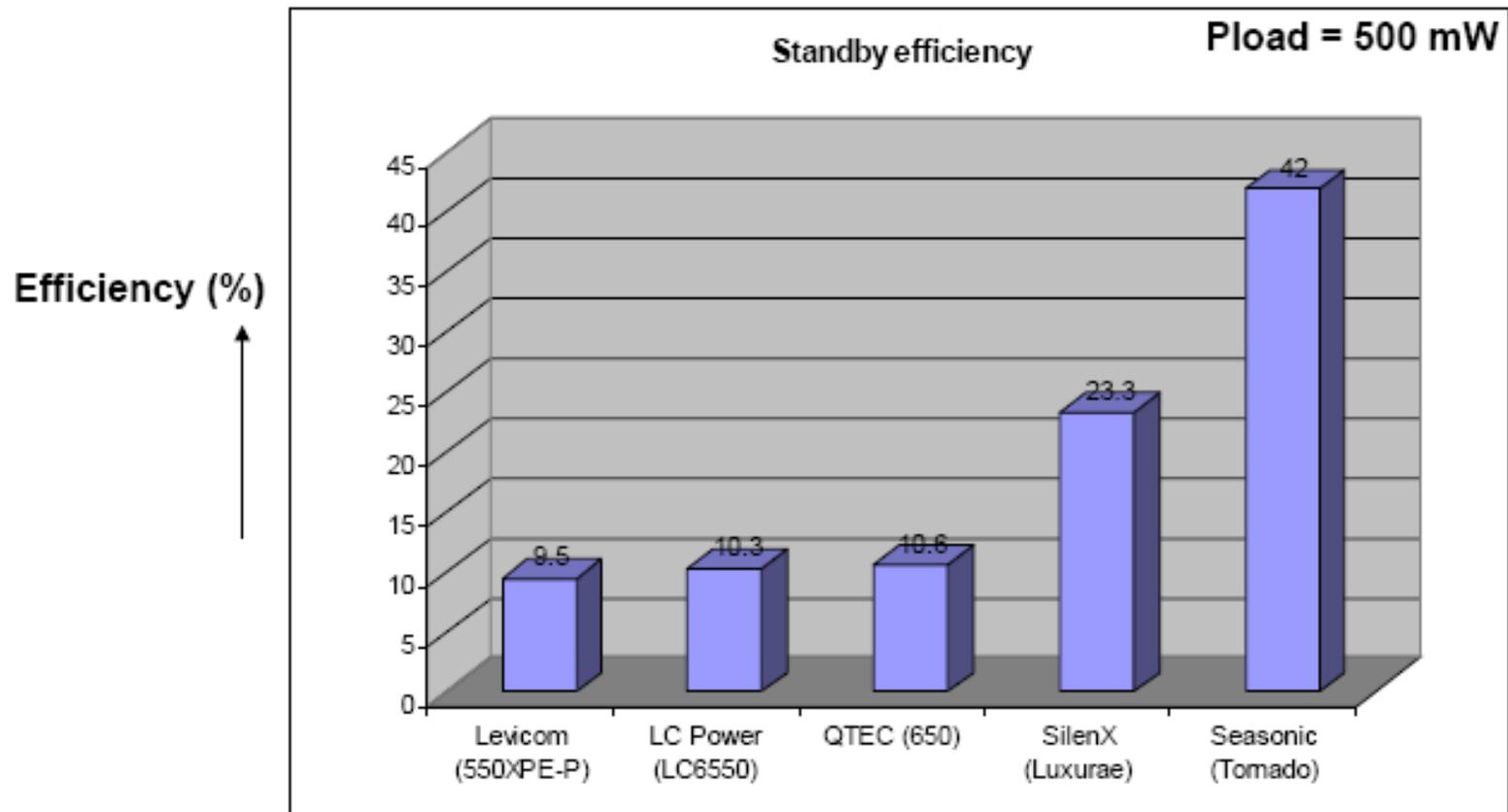
- Improves efficiency and increases parts integration
- Optimizes design to adjust for regulated input voltage
- Cost impact: ~ \$0.75 @ 400W

➤ Improve output regulators

- Add synchronous rectifiers
- Replace rectifiers with switches and add control IC
- Improves efficiency, especially at partial load
- Cost Impact: ~ \$0.75 @ 400W

Standby Efficiency Can Improve Dramatically in 80 Plus Designs

Standby mode (benchmark)



“Right Sizing” – Matching Power Supply Size to Load

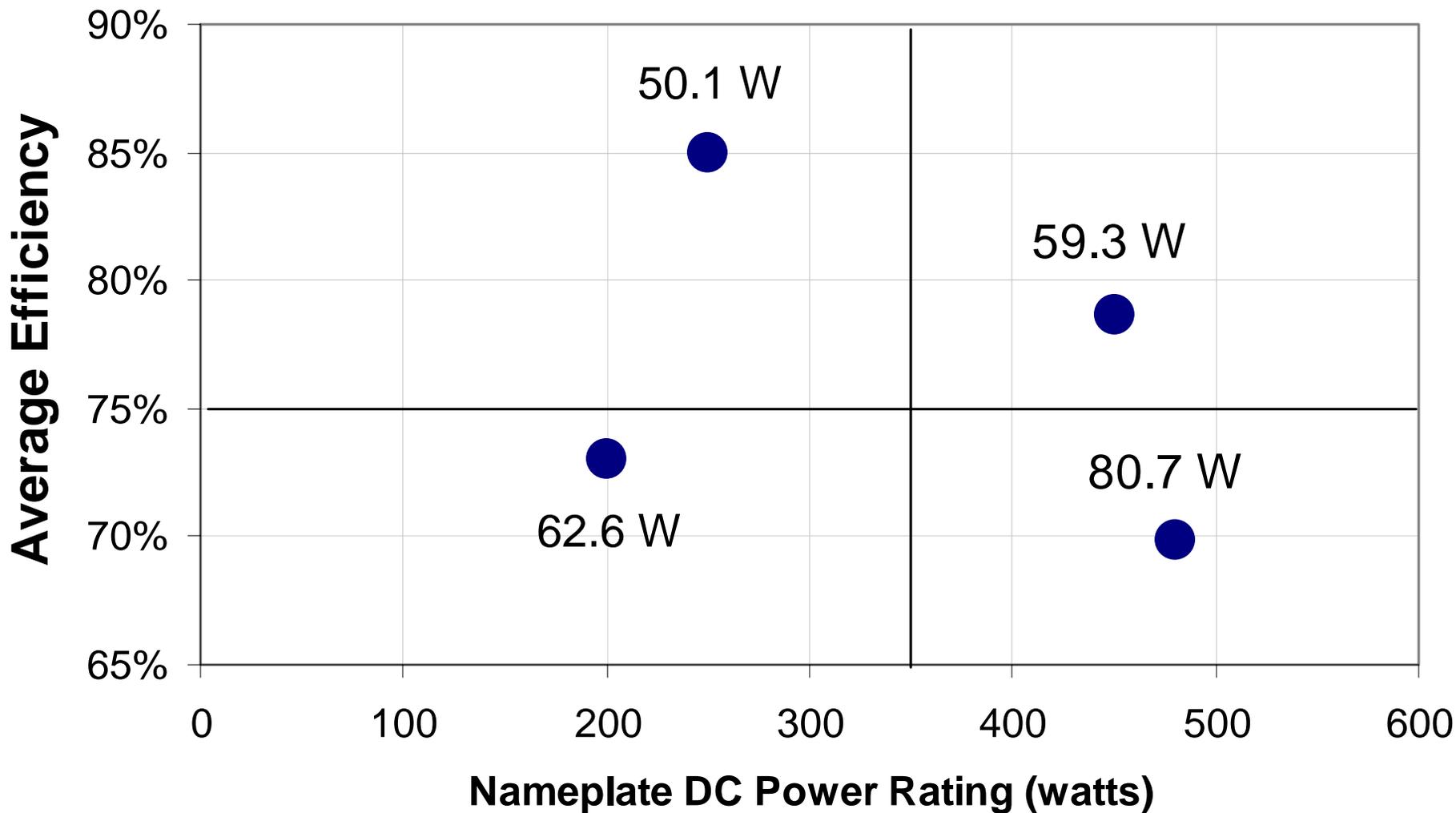
➤ Typical designs:

- Idle at 20 to 40% of rated power supply output – precisely where efficiency curve can drop sharply
 - Provide extra output capacity and heat dissipation capability most computers never need or use
 - Requires extra, unnecessary cost for larger fans and heat sinks

➤ “Right Sizing” a design can:

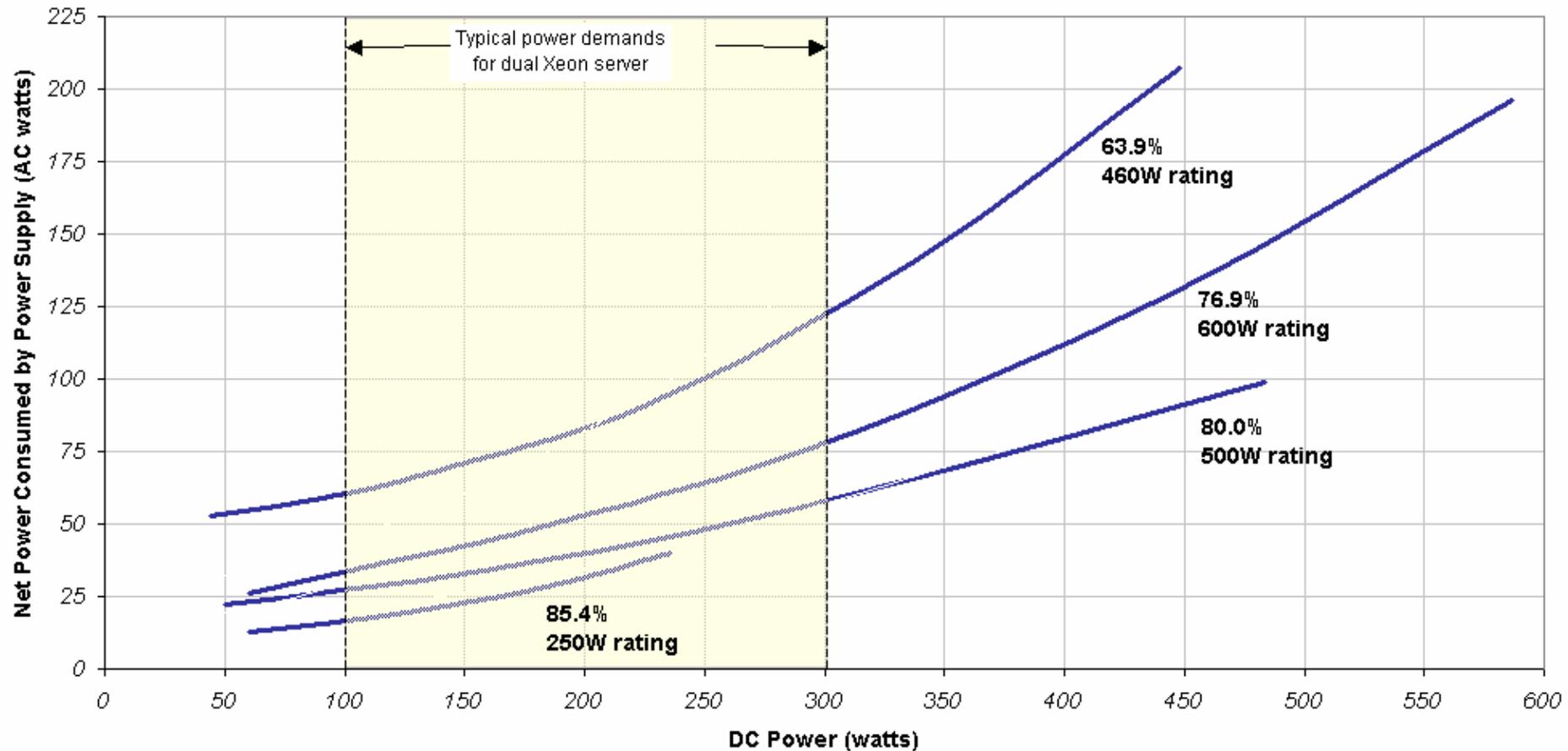
- Afford higher performance technology
- Reduce size and / or thermal stress
- Reduce operating costs AND purchase price

Effect of PSU Efficiency & Sizing on Idle State Power, Intel-based system



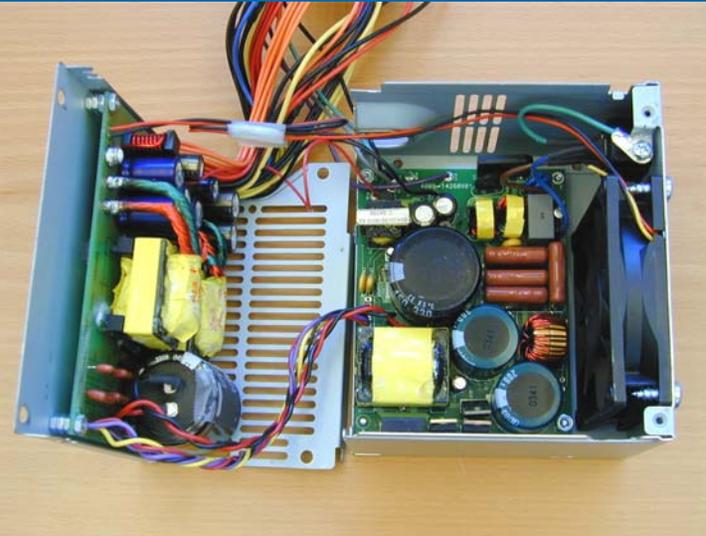
Efficient, properly sized power supplies can have 50 to 70% lower net power consumption (ac input watts - dc output watts)

Power Consumed Through Server Power Supply Inefficiency for a single power supply system

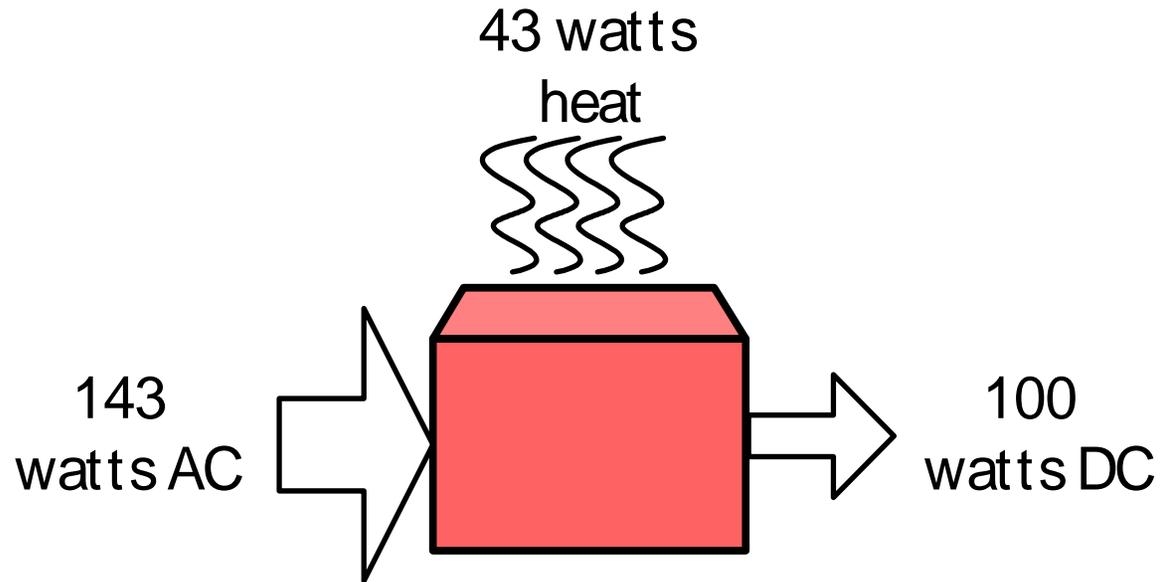




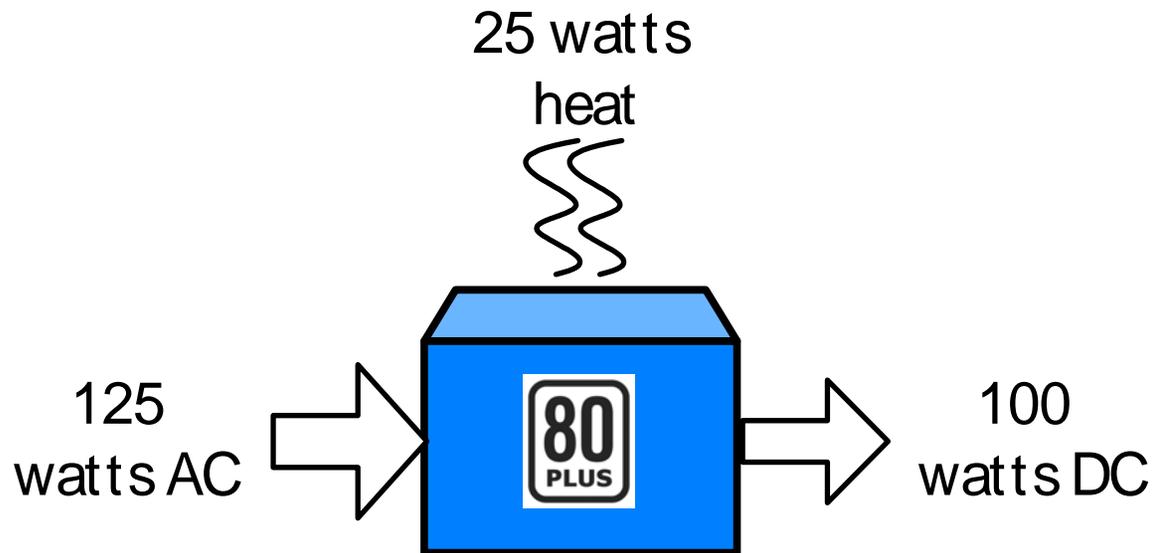
A Highly Efficient, Properly Sized Power Supply Wastes Only 25 Watts Running at Half Load, and Is Large Enough to Power Most Systems Sold Today



Commodity 200W Power Supply

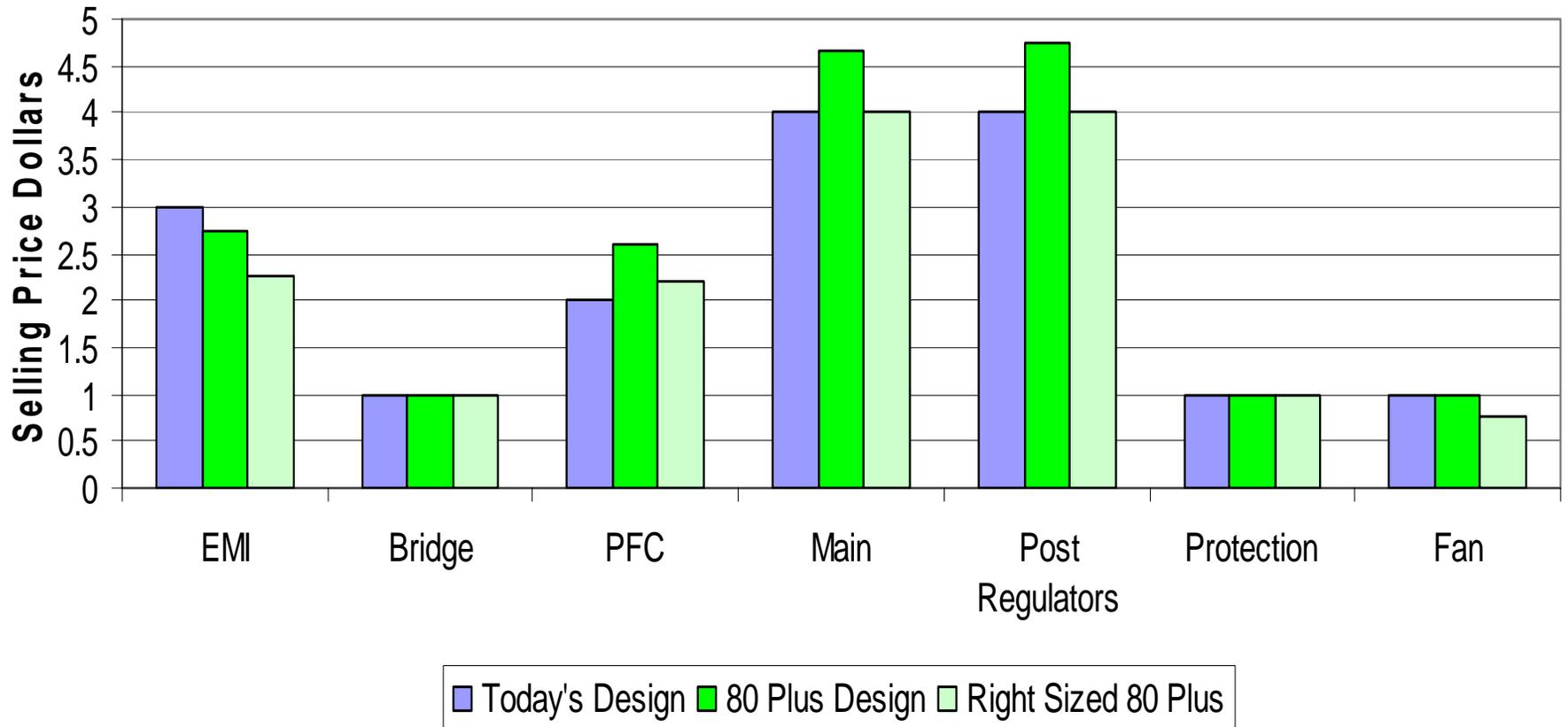


80 Plus 200W Power Supply



Right-Sizing Pays for Most or All of the Extra Cost of a Well-Designed 80 Plus Power Supply

Cost Comparison Today vs 80 Plus

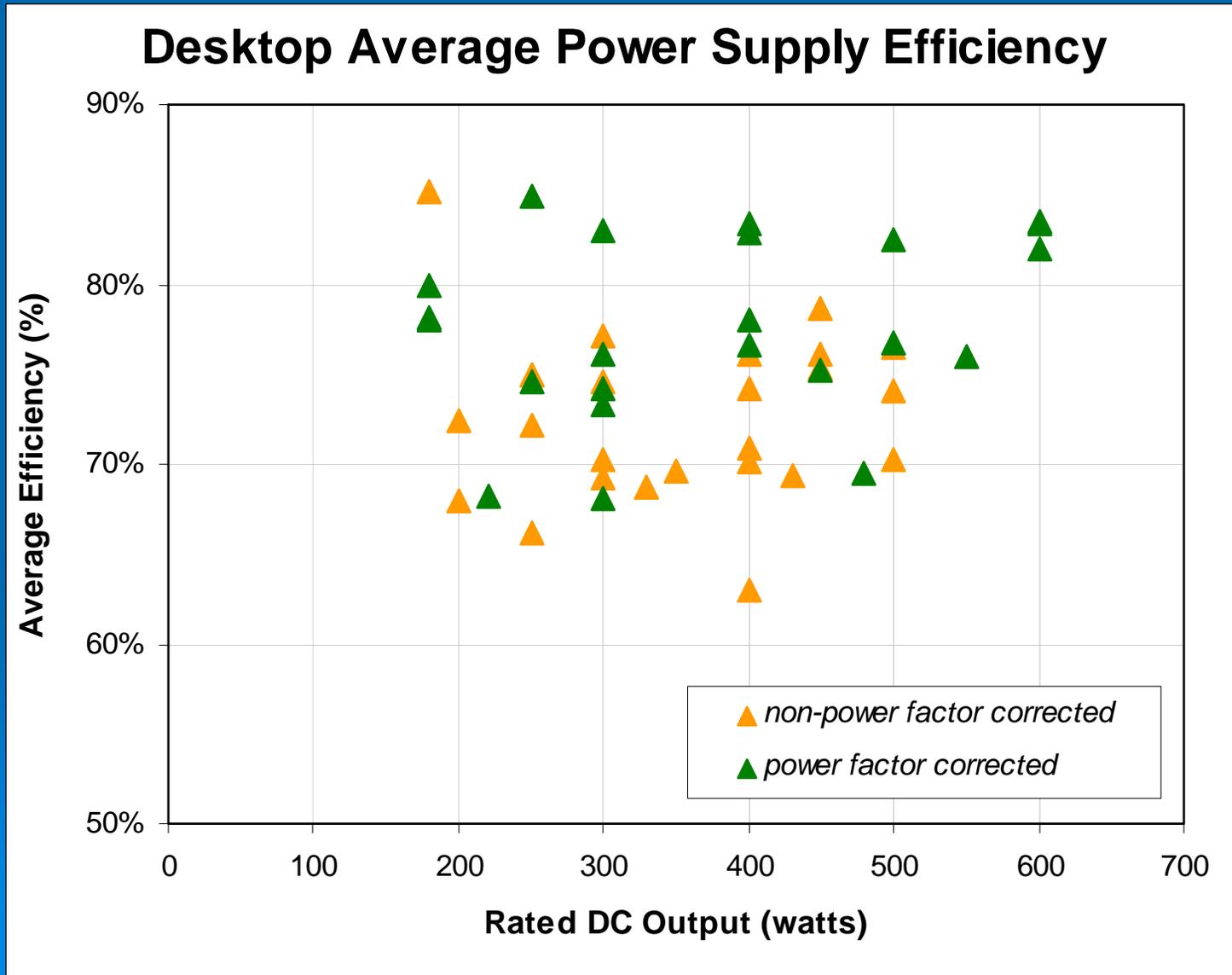


80 Plus Product Status

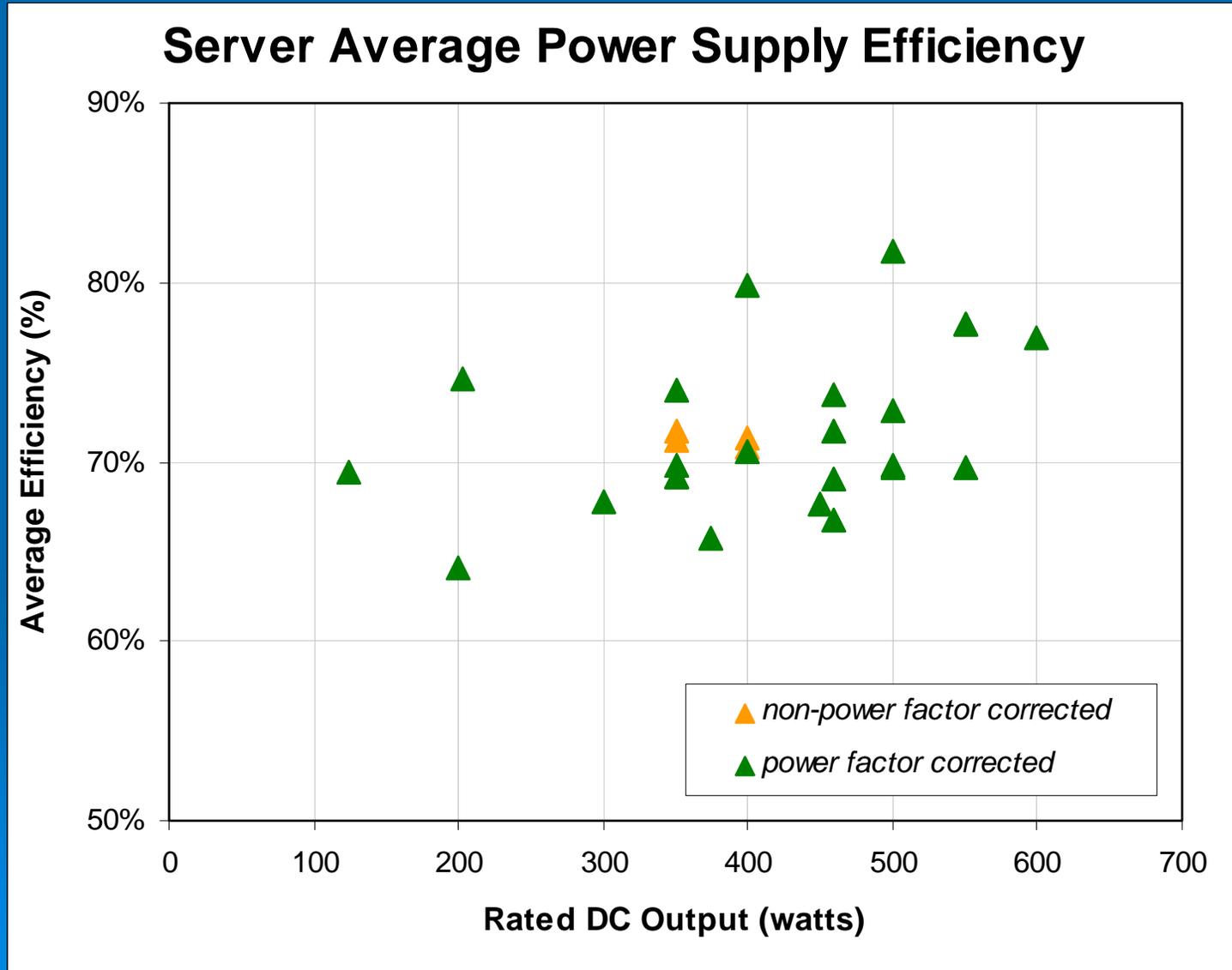
- Four models from Seasonic qualify - 300, 400, 500, 600 watts. Volume prices from \$27 to \$85 each. Seasonic announced it intends to qualify every model it makes by end of 2005.
- Acbel qualifying model in commercial production for roughly a year
- Celetronix pre-production sample met 80 Plus levels two years ago; PC manufacturers asked for less efficient, cheaper model instead
- Delta also built highly efficient design years ago; did not pursue it after PC manufacturers showed no interest
- Crown Young Industries recently qualified and is coming to market
- OnSemi reference design is openly available to any manufacturer
- Sparkle is less than 1% away from qualifying
- Efficient manufacturers exploring licensing & private label options with other manufacturers that don't have competitive designs
- 9 different VARs have already committed to offer 80 Plus power supplies in finished desktop systems – already purchased first wave of available inventory

www.80plus.org/wheretobuy.html

Update on Desktop Power Supply Efficiencies



Server Power Supplies Lagging Desktop Efficiencies



Summary

- Efficient, right-sized power supply designs can cut power conversion losses (and resulting heat output) by 50 to 70%
- Active power factor correction and high efficiency can improve performance and reliability through lower circuit stresses, lower cooling demands
- Manufacturer extra cost of an optimized, right-sized design is typically less than \$5; quotes higher than that are from power supply manufacturers without optimized designs or may not represent final quoted prices in a competitive bid
- Market is already delivering cost-effective solutions – major manufacturers lagging behind smaller VARs and system integrators in meeting the needs of customers that want them
- More utilities signing up each month to buy down the extra cost of 80 Plus power supplies and promote qualifying computer models to their customers