ENERGY STAR®: A Strategy to Improve the Efficiency of Power Supplies

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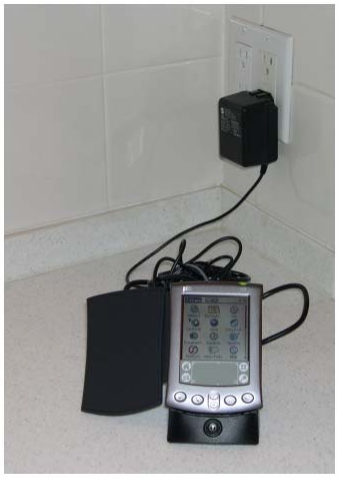
10 Billion Power Supplies in Use Worldwide (est.)

- Computers
- Printers
- Monitors
- Scanners
- PDAs
- Barcode scanners
- Servers
- Camcorders
- CD/DVD Players
- TVs/VCRs
- Set-top boxes
- Cell phones
- Cordless phones
- Power tools
- Modems
- Medical Equipment
- Avionics/Navigation Equipment
- Test and Measurement Equip.
- Appliances

… to name a few

2004 CE shipments expected to be nearly $100 billion – Consumer Electronics Association, Market Research, Jan. 2004

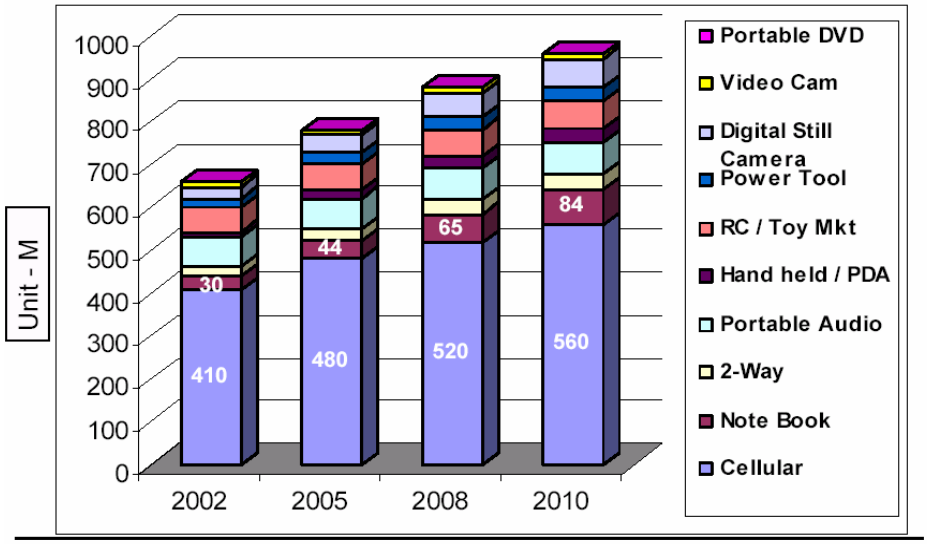
5 to 10 External Power Supplies in Average US Home



Palm Pilot

NETGEAR Wi-Fi Network Router

Number of Portable Products is Increasing…



Sources: Gartner Research, Internal Motorola, Strategic Analytics, Financial Analyst

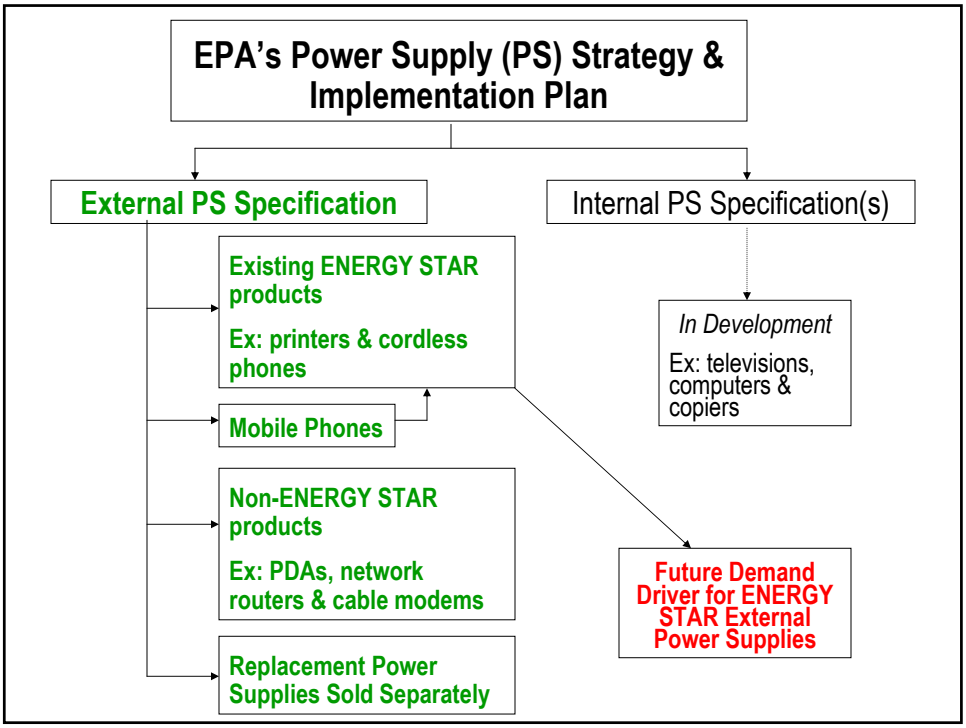
Large Opportunity for Energy Savings in US Alone

- *Active Mode* accounts for **nearly ¾** of all power supply energy use; focus to date has been on *Standby*
- Many current designs are **30 to 60% efficient**, but 90% or more is feasible
- Estimated savings of 32 billion kWh/year
  - Cut national energy bill by $2.5 billion/year
  - Reduce carbon dioxide emissions by more than 24 million tons/year
  - Displace the output of **seven large power plants**

EPA's Power Supply Strategy

Guiding Vision

- To transform the North American power supply market for key product segments by improving the **average efficiency** of **typical power supplies**
  - Different, but concurrent approaches to improve the efficiencies of external and internal ac-dc power supplies



Internal PS Strategy Builds on Recent Developments

- Intel's design guide requires OEMs to include internal power supply with improved efficiency
- Addresses both partial & full loading

Specification	20% Loading	50% Loading	100% Loading
2004 Required	60%	70%	70%
2004 Recommended	67%	80%	75%

- For More Information: www.formfactors.org

APEC 2004 Power Supply Announcements

1) Single, Standardized Test Procedure for External Power Supplies (EPS)

2) Draft ENERGY STAR EPS Specification
   - Proposed ENERGY STAR partnership with power supply manufacturers

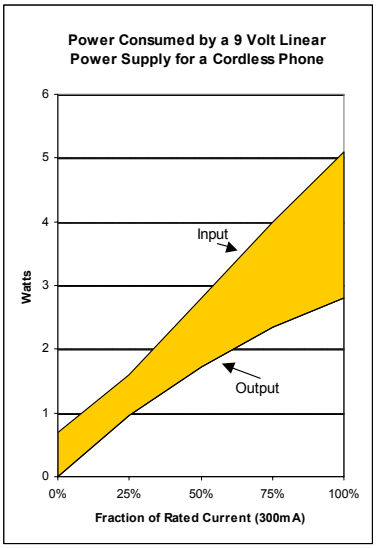
3) International Cooperation Between US and China

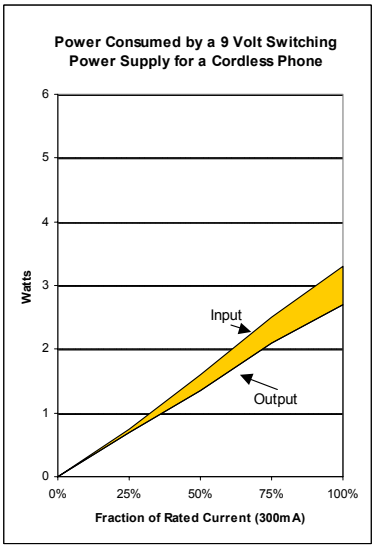
4) Design Competition
   - Will address both internal and external power supplies

Development of Standardized EPS Test Procedure

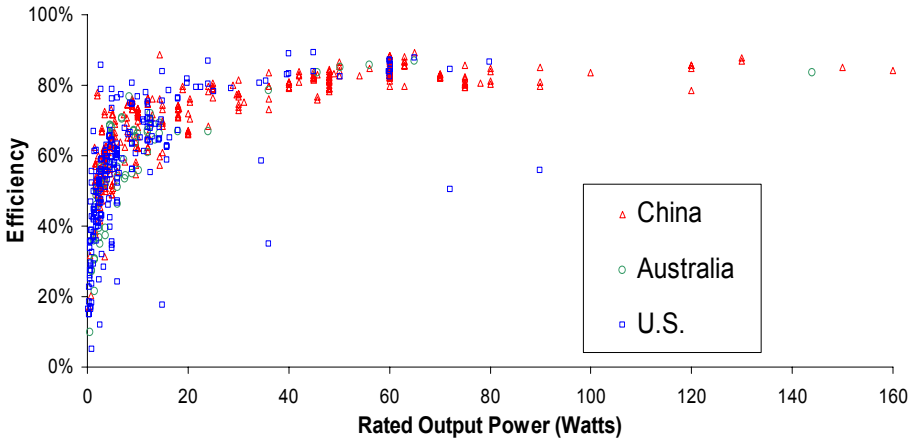
- January 2002: First power supply workshop in San Francisco
- Summer 2003: Draft test procedure first posted for comment
  - Built upon IEC 62301 and IEEE 1515-2000
- November 2003: Second power supply workshop
  - Refined standardized test procedure
- December 2003: Australia, Brazil, Canada, China, and US expressed support for single test procedure
- Final test procedure available at:
  - www.efficientpowersupplies.org &
  - www.energystar.gov/productdevelopment

Input vs. Output = Opportunity?





Range of Average External Power Supply Efficiencies



First Draft ENERGY STAR EPS Specification

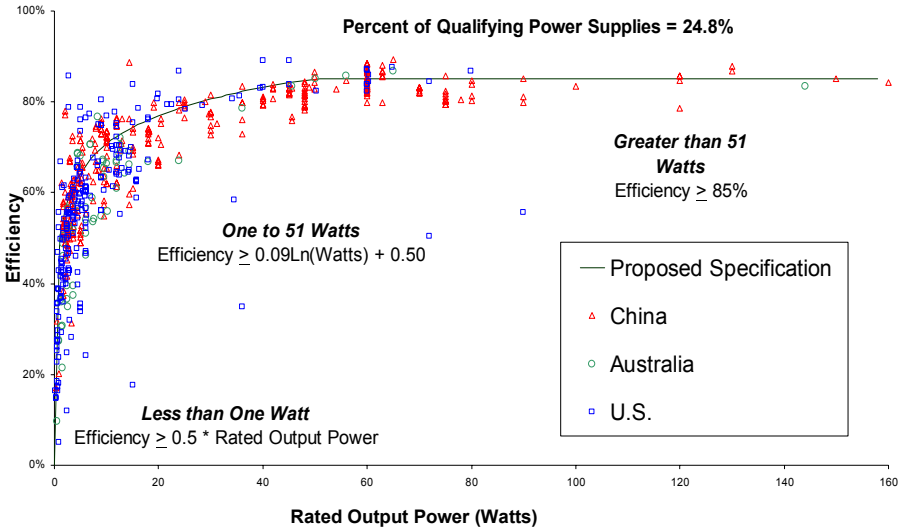
- Minimum performance levels are based on test results from 634 EPS models using newly developed test procedure
  - No battery chargers; under investigation
  - EPS models with wattage ratings $\leq$ 180 watts (subject to change)
- Technical specification consists of two parts
  - Active and No-Load performance thresholds
  - Models must meet both to comply
- Testing results
  - 24.8% of models meet or exceed Active thresholds
  - 26% of models meet or exceed No-Load threshold
    - No-Load levels = EU Code of Conduct Specification 1/1/05
  - 12% of models meet both thresholds

First Draft ENERGY STAR EPS Specification (cont.)

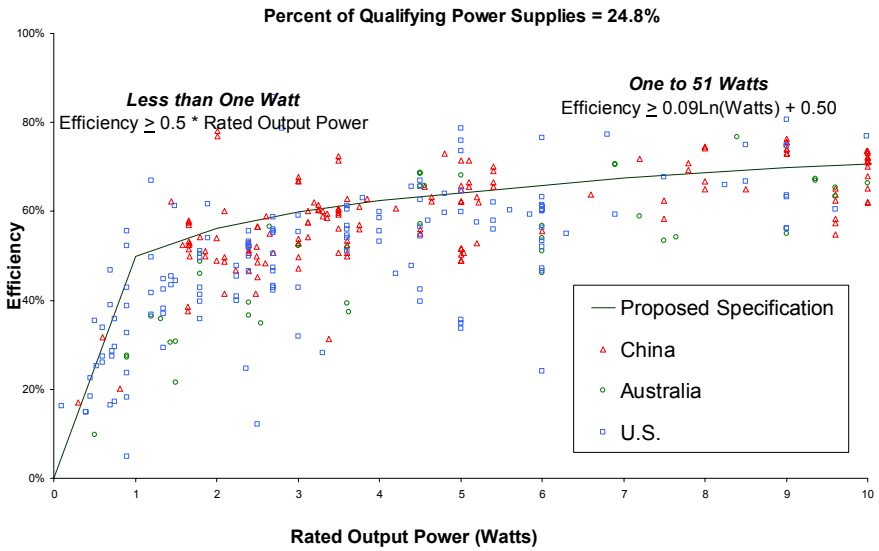
- Average Active Mode efficiency value is derived from measuring rated current output at 100%, 75%, 50%, & 25%
- Efficiency curve consists of 3 equations based on wattage range

Nameplate Output Power (P_{no})	Average Efficiency in Active Mode (expressed as decimal)
0 to <1 watt	$\geq 0.5 * P_{no}$
1 to 51 watts	$\geq 0.09 * \text{Ln}(P_{no}) + 0.5$
> 51 watts	≥ 0.85

Top Quartile of Power Supplies in Active Mode

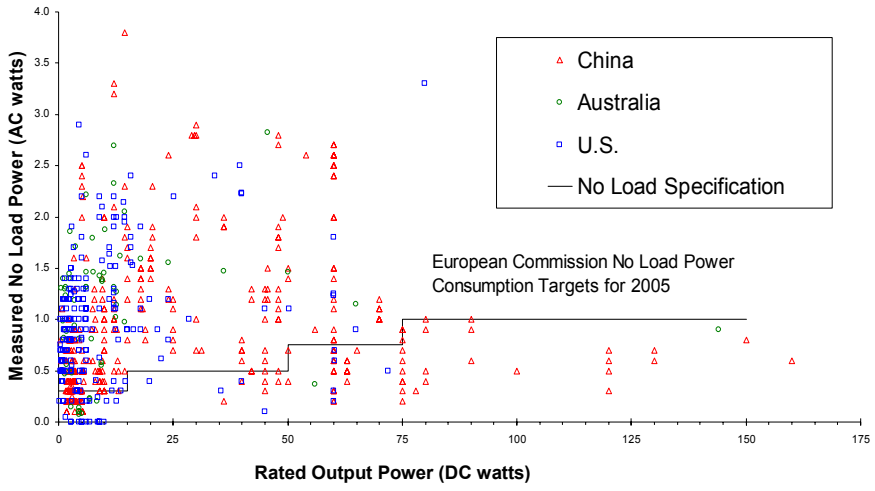


Close-up of 0-10W Units in Active Mode



Top Quartile of Power Supplies in No-Load

26% of measured power supplies qualify for 2005 no load power target
12% qualify for both the active and no load specifications



EPA Wants to Partner with Power Supply Manufacturers

1) Initially, partnership in ENERGY STAR will be offered to external power supply manufacturers
   - Interested manufacturers sign the ENERGY STAR Partnership Agreement (PA)
2) Power supply manufacturing Partners may submit qualifying EPS models -- provided they meet the following requirements:
   - Tested according to ENERGY STAR EPS Test Procedure
   - Meet performance thresholds for both Active and No-Load
3) Partners self-certify and submit test results for EPS model(s) to EPA
4) Partners must abide by the ENERGY STAR Partner Commitments

ENERGY STAR Partnership Agreement (PA)

Three Expected Commitments:

- Annual submission of available product models
- Annual submission of ENERGY STAR unit shipment or market penetration data (not sales)
- Use of the ENERGY STAR label
  - At this time, expected use of the label will be limited to wholesale business to business transactions
    - Label not permitted directly on external power supply
  - Further specific guidance forthcoming

Specification Time Line

- **Feb. 23**: APEC announcements & request for manufacturer test data
- **April 15**: Comments due to EPA on EPS Draft #1
- **Early May**: Stakeholder Meeting (Date and Location TBD)
- **Early June**: EPS Draft #2 released
  - Subsequent Drafts & Stakeholder Meetings to follow
- **Later 2004**: Target for Final Specification
  - EPA will sign up **Charter** power supply manufacturing partners
- On **effective date**, partners may begin to qualify and market EPS models

International Interest in Promoting Efficient Power Supplies

- Many countries share EPA's interest in implementing policy measures to encourage the design & sale of energy-efficient power supplies
  - Support for single Test Procedure
  - Support for voluntary high efficiency and mandatory minimum efficiency specifications
- EPA will harmonize, where appropriate, on voluntary specifications

Australian Government
Australian Greenhouse Office

PROCEL
PROGRAMA NACIONAL DE CONSERVAÇÃO DE ENERGIA ELÉTRICA

Natural Resources Canada
Ressources naturelles Canada

Energy Conservation Certification 中国节能标志

China and US Collaboration

- Home to significant share of power supply manufacturing capacity
- World's fastest growing market for power supplies
- Working closely with the China Certification Center for Energy Conservation Products (CECP) to:
  - Employ the same EPS test procedure
  - Harmonize specifications and timeline

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Energy Conservation Certification 中国节能标志

Design Competition

- Cosponsored by the California Energy Commission & US EPA
  - Endorsed by PSMA
- Three major competition categories to:
  - Address internal & external designs
  - Encourage ENERGY STAR partners to work with their vendors
- Competition will run throughout 2004
  - Winners announced at APEC 2005
- Visit www.efficientpowersupplies.org