

## Forging Ahead with Desktop PC Power Supply Efficiency Improvements Presentation Summary: ENERGY STAR® Section, Slides 1-5

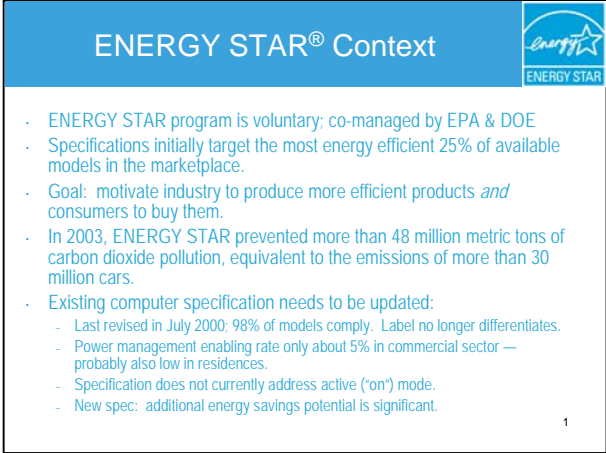
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### ENERGY STAR CONTEXT — Slide 1

ENERGY STAR is a voluntary program in which partnering manufacturers, retailers, and utilities agree to design, manufacture, sell, and promote energy-efficient products. ENERGY STAR qualified products represent the top performers in energy efficiency. In developing new specifications, EPA tries to capture the top 25% of the most energy-efficient models available in the marketplace. EPA's overarching goal in administering the ENERGY STAR program is to increase the availability and breadth of energy-efficient models in the marketplace and motivate consumers to purchase ENERGY STAR qualified products.

In 2003, ENERGY STAR prevented more than 48 million metric tons of carbon dioxide pollution (MMTC), which is equivalent to the emissions of more than 30 million cars. Since its inception in 1992, the computer program alone has saved 33 MMTC.

EPA regularly revisits existing ENERGY STAR specifications to determine their impact on the marketplace. It is EPA's hope that over time, the initial 25% market share of ENERGY STAR will increase as new energy-efficient technologies are made available and consumers begin choosing ENERGY STAR qualified products over standard models. Specifications are later revised when ENERGY STAR market share increases substantially, indicating that new performance levels are needed to effectively differentiate products.



The slide titled "ENERGY STAR® Context" features a blue header with the ENERGY STAR logo. The main content is a bulleted list of key facts and goals. A small number "1" is located in the bottom right corner of the slide's border.

- ENERGY STAR program is voluntary; co-managed by EPA & DOE
- Specifications initially target the most energy efficient 25% of available models in the marketplace.
- Goal: motivate industry to produce more efficient products *and* consumers to buy them.
- In 2003, ENERGY STAR prevented more than 48 million metric tons of carbon dioxide pollution, equivalent to the emissions of more than 30 million cars.
- Existing computer specification needs to be updated:
  - Last revised in July 2000: 98% of models comply. Label no longer differentiates.
  - Power management enabling rate only about 5% in commercial sector — probably also low in residences.
  - Specification does not currently address active ("on") mode.
  - New spec: additional energy savings potential is significant.

Generally, the following criteria are considered when determining whether to develop or revise ENERGY STAR product specifications:

- Significant energy savings can be realized on a national basis.
- Product performance can be maintained or enhanced with increased energy efficiency.
- Purchasers will recover their investment in increased energy efficiency within a reasonable time period.
- Energy efficiency can be achieved with several technology options, at least one of which is non-proprietary.
- Product energy consumption and performance and can be measured and verified with testing.
- Labeling would effectively differentiate products and be visible for purchasers.

EPA is revisiting the ENERGY STAR computer specification for the following reasons: (1) approximately 98% of computers available in the marketplace carry the ENERGY STAR, which is an indicator that the ENERGY STAR is no longer differentiating between standard and high efficiency products; (2) EPA has data that shows the power management enabling function is not being used as frequently as EPA would like (enabling rate 5% in commercial setting); and (3) the current specification does not address "active" mode (the mode that consumes the majority of energy in computers), which offers significant additional savings to the consumer and the ENERGY STAR program.

## EPA's INITIAL THOUGHTS — Slide 2

EPA is considering a two-tiered approach for the computer specification revision. EPA's initial thoughts for Tier 1 are to reduce "sleep" limits, set "off" power limits, and address active power via power supply efficiency. In Tier II, EPA plans to address the "network issue" with respect to computer power management and develop a more holistic specification, one that will recognize products that use energy efficiently across all modes. Two options that EPA is considering to address this more comprehensive approach are: (1) setting individual component efficiency requirements (prescriptive approach) or (2) use of a benchmark tool to measure computer performance and energy use and then create an efficiency metric for computers (performance approach).

**Note:** "Network issue" refers to the concern over what happens to the network, server, and other connected clients when a client goes into S3. Because the computer power management was never optimized for a networked environment, many users or IT administrators disable computer power management. Moreover, existing Wake-On-Lan and Remote Power On schemes do not function satisfactorily in a networked environment. The Network Interfacing Card (NIC) needs to be more "energy aware," as well.

## ENERGY STAR TIER 1, INITIAL IDEAS — Slide 3

For Tier I, EPA is considering using Intel's 2004 recommended efficiency levels for internal computer power supplies. The efficiency levels are as follows: 67% efficient at 20% loading, 80% at 50% loading, and 75% at 100% loading. If the computer uses an external power supply, such as a laptop, then it will be required to use an ENERGY STAR qualified external power supply. The ENERGY STAR specification for single-voltage external ac-dc and ac-ac power supplies can be found at [www.energystar.gov/powersupplies](http://www.energystar.gov/powersupplies) and [www.efficientpowersupplies.org](http://www.efficientpowersupplies.org). In the future, all ENERGY STAR qualified computers will come with a more efficient power supply.

Proposed updated power levels under Tier I:  
"sleep" levels

desktop, laptop, and workstations:  $\leq 5$  watts  
integrated computers:  $\leq 9$  watts

"off" levels


desktops and workstations:  $\leq 2$  watts  
laptops:  $\leq 1$  watt  
integrated computers:  $\leq 5$  watts

The proposed "off" mode levels will be adopted from the Federal Energy Management Program (FEMP) recommendations for standby power in computers.

If implemented, EPA expects that this new Tier I specification will result in an energy savings of 1-2 billion kWh/year (\$80 to \$160 million saved a year in utility bills).

EPA also proposes that an additional product type, low-end servers (1U and EPS 12V non-redundant servers), be covered by the ENERGY STAR computer specification.

### EPA's Initial Thoughts



Considering phased approach:

Tier 1  
Set sleep and off power limits, and address active mode via power supply efficiency.

Tier 2  
I) Fix the "network problem" with power management  
II) Seek more comprehensive approach; recognize products that use energy efficiently across all modes. Either:

**Prescriptive approach** – set component efficiency requirements for power supply, video card, etc.

AND/OR

**Performance approach** – use benchmark to measure performance of computer and measure energy use. Create efficiency metric.

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### ENERGY STAR Tier 1 Initial Ideas




- Efficient Power Supply
  - Internal PS – efficiency levels of 67% at 20% loading; 80% at 50% loading and 75% at 100% loading
  - External PS – must meet EPA ENERGY STAR external power supply specification. See [www.energystar.gov/powersupplies](http://www.energystar.gov/powersupplies) and [www.efficientpowersupplies.org](http://www.efficientpowersupplies.org) for additional information
- Updated Power Levels
  - Sleep – Desktop, Laptop, Workstation: < 5W; Integrated Computer: < 9W  
(achieved via Instantly Available PC (IAPC) and other technologies)
  - Off – Desktop: < 2W; Laptop: < 1W; Workstation: < 2W; Integrated Computer < 5W;  
Federal Energy Management Program (FEMP) "standby" levels

Potential Savings – 1 to 2 billion kWh/year worth about \$80 to \$160 million/year in lower energy bills

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## **TIER 2: FIXING THE “NETWORK PROBLEM” AND THINKING HOLISTICALLY — Slide 4**

It is becoming common practice for network administrators to ask employees to keep computers on 24 hours a day, 7 days a week so that security and other updates can be downloaded automatically. EPA would like to focus its efforts toward determining a way in which the power management feature can co-exist with 24–7 computer usage. Existing designs such as “Wake-On-LAN” (where computers stay connected and wake up when a signal is detected) and “Remote Power On” (where IT personnel can turn computers on from a remote site to download files) are currently not robust enough technically and cause network administrators to turn off power management. There is also an emerging trend in consumer electronics where continuous network presence is required, as well. EPA’s goal in addressing power management under Tier II is to ensure that all machines remain asleep and connected to the network when not being used by a client. If implemented, increased enabling of power management could result in additional energy cost savings of over \$1 billion each year. This may require internal redesigns such as smarter NICs that recognize when a computer is asleep. EPA hopes to work with industry stakeholders to develop a more robust network / power management environment.

Tier 2: Fixing the “Network Problem” and Thinking Holistically

**Context**

- Users and IT managers increasingly want PCs to be available 24/7 (office and residential); unrealistic to fight this
- Existing Wake-On-LAN and remote power on (RPO) schemes not satisfactory -- leads to rampant disabling
- More consumer electronics becoming like PCs and needing continuous network presence

**Goal**

- Most Tier II machines should be asleep most of the time – savings potential of more than \$1 billion per year
- Requires smarter NICs or very low idle power

**Why Benchmarking?**

- Need “real-world” instead of “peak-performance” benchmarking software
- Would recognize synergies in hardware and software design, promoting models that scale total power use closely to workload in real time

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The second goal of Tier II is to recognize those computers that use energy efficiently across all modes, through either a prescriptive or performance based approach. A performance approach using benchmarking to measure “real world” energy use as opposed to “peak performance” would recognize synergies in hardware and software design, promoting models that scale total power use closely to workload in real time, truly identifying the most energy-efficient computers. A prescriptive approach would set individual performance levels for specific energy-consuming components.

## **EPA’S NEXT STEPS — Slide 5**

Over the next few months, EPA would like to discuss the proposed Tier I levels with industry stakeholders. A Tier 1 first draft is scheduled for release in early 2005. It is EPA’s hope that a new Tier I computer specification can be finalized over the next year and become effective in early 2006. EPA is interested in receiving comments from stakeholders on both the levels set forth in this presentation for Tier I as well as the ideas proposed for Tier II.

Questions regarding EPA’s slides can be directed to Craig Hershberg, U.S. EPA, at [hershberg.craig@epa.gov](mailto:hershberg.craig@epa.gov) or (202) 343-9120.

EPA’s Next Steps

- Discuss Tier 1 ideas with input and participation from all interested stakeholders, including European Union (EU).
- Get stakeholder input on eventual tier 1 first draft and discuss target effective date for Tier 1 – early 2006 (?)
- Initiate research into Tier 2 specification – input on component efficiencies and benchmarking software welcomed.

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