PRELIMINARY DRAFT 1
February 23, 2004

ENERGY STAR® Eligibility Criteria for External Power Supplies

Objective
As a preliminary draft, this document highlights the key elements of an ENERGY STAR specification in order to elicit initial stakeholder feedback on the direction and efficiency levels EPA proposes. It does not present the complete partner commitments and product criteria required for participation in ENERGY STAR. This information will be included in future draft specifications and discussed in detail with stakeholders through meetings, conference calls, and general correspondence.

Scope
This preliminary draft specification targets **single voltage external ac-dc power supplies**. Ac-dc power supplies are designed to convert line voltage ac into the low voltage dc typically required by laptop computers, cordless and cellular phones, portable stereos, and many other consumer and office products. As the name implies, external ac-dc power supplies are contained in a separate housing from the end-use devices they are powering. This specification does not cover ac-ac or dc-dc power supplies, or any internal power supplies (those contained inside the product).

When final, this energy-efficiency specification will apply to external power supplies with wattage ratings less than or equal to 180 watts. (This upper limit is subject to change based on market conditions.) These types of external power supplies are used in a wide variety of end-use products, including those currently covered by ENERGY STAR, notably consumer electronics and office equipment. For existing ENERGY STAR product categories, the new external power supply specification will be phased in as an additional eligibility requirement when those specifications are revised.

For additional details and documentation, please visit the Power Supplies section of the ENERGY STAR Product Development Web site at www.energystar.gov/powersupplies.

Definitions and Test Procedure
The specifics for testing the energy efficiency of an external power supply model are outlined in a separate document titled “Test Method for Calculating the Energy Efficiency of Single-Voltage External Ac-Dc Power Supplies (February 13, 2004).” The test results produced by this procedure shall be used to determine if a model qualifies as ENERGY STAR. Key operational modes and product terms are defined on pages 3 and 4 of the test procedure. For a copy, visit www.energystar.gov/powersupplies.

For switchmode power supplies capable of operating at multiple voltages and frequencies, testing shall be conducted at both 115 volts @ 60 Hz and 230 volts @ 50 Hz, with the least efficient set of test values used to determine if products qualify for the Active Mode and No-Load specifications.

Energy-Efficiency Specification
To qualify as ENERGY STAR, a single voltage external ac-dc power supply model must meet ***both*** the Active and No-Load Mode requirements provided below.

Active Mode
To be eligible for the ENERGY STAR, an external power supply model must meet or exceed a minimum average efficiency for Active Mode, which varies based on the model’s nameplate output power. Table 1 below outlines the proposed equations for determining minimum average efficiency where P_{no} stands for nameplate output power and Ln refers to the natural logarithm.

Table 1: Proposed Energy-Efficiency Criteria for Active Mode

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

Examples to Illustrate the Proposed Active Mode Approach: Average Active Mode efficiency and ENERGY STAR qualification would be determined as follows.

- Calculate the model's single average Active Mode efficiency value by testing at 100%, 75%, 50%, and 25% of rated current output and then computing the simple arithmetic average of these four values, as specified in the Test Procedure.
- Based on the model's nameplate output power, select the appropriate equation from Table 1 and calculate the minimum average efficiency.
- Compare the model's actual average efficiency to the minimum average efficiency required by ENERGY STAR. If actual average efficiency is greater than or equal to the minimum average efficiency, the model has satisfied ENERGY STAR's Active Mode requirement.

To provide an example using the proposed criteria in Table 1, the minimum average efficiencies required of three sample power supplies are provided in Table 2 below. As shown in the last column, power supplies 1, 2, and 3 would meet the ENERGY STAR Active Mode requirement if they had average efficiencies of at least 25%, 77%, and 85%, respectively. Therefore, if Power Supply 1 in Table 2 had an actual average efficiency of 30%, it would qualify because it surpassed the ENERGY STAR minimum average efficiency of 25%.

Table 2: Examples of Minimum Average Efficiency in Active Mode

Sample	Nameplate Output Power (P_{no})	Average Efficiency in Active Mode (expressed as a decimal)
Power Supply 1	0.5 watts	0.5 * 0.5 = 0.25
Power Supply 2	20 watts	[0.09 * Ln (20)] + 0.5 = 0.769616 or 0.77
Power Supply 3	75 watts	0.85

No-Load Mode

The second half of the ENERGY STAR specification is the no-load power requirement, which specifies the maximum ac power that may be used by a qualifying external power supply in the no-load condition (i.e., the input of a power supply is connected to an ac source consistent with the power supply's nameplate ac voltage, but the output is not connected to a product or any other load). Proposed maximum power consumption levels for No-Load Mode are provided in Table 3, below.

Table 3: Proposed Energy-Efficiency Criteria for No Load

Nameplate Output Power (P_{no})	Maximum Power in No-Load[2]
0 to <15 watts	≤ 0.3 watts
15 to <50 watts	≤ 0.5 watts
50 to <75 watts	≤ 0.75 watts
75 to <180 watts	≤ 1.0 watt

[1] (a) "Ln" refers to the natural logarithm. The algebraic order of operations requires that the natural logarithm calculation be performed first and then multiplied by 0.09, with the resulting output added to 0.5. (b) An efficiency of 0.85 in decimal form corresponds to the more familiar value of 85% when expressed as a percentage.

[2] The proposed ENERGY STAR levels are consistent with those provided in the European Code of Conduct scheduled to take effect on January 1, 2005.

Using the ENERGY STAR Identity

Specific guidance on use of the ENERGY STAR term and mark will be provided in future correspondence. As EPA continues to explore the various labeling options, it is interested in receiving stakeholder input on this matter.

Effective Date

The date that manufacturers may begin to qualify and promote products as ENERGY STAR will be defined as the effective date of the agreement. EPA expects to finalize the specification in late summer 2004. The effective date will be determined in consultation with industry and other stakeholders.

Future Specification Revisions

EPA reserves the right to change the specification should technological and/or market changes affect its usefulness to consumers, industry, or the environment. In keeping with current policy, revisions to the specification are arrived at through stakeholder discussions. In the event of a specification revision, please note that ENERGY STAR qualification is not automatically granted for the life of a product model. To qualify as ENERGY STAR, a product model must meet the ENERGY STAR specification in effect on the model's date of manufacture.