Idle Data Analysis & Charts for the Draft 3 ENERGY STAR Computer Server Specification

10/31//08

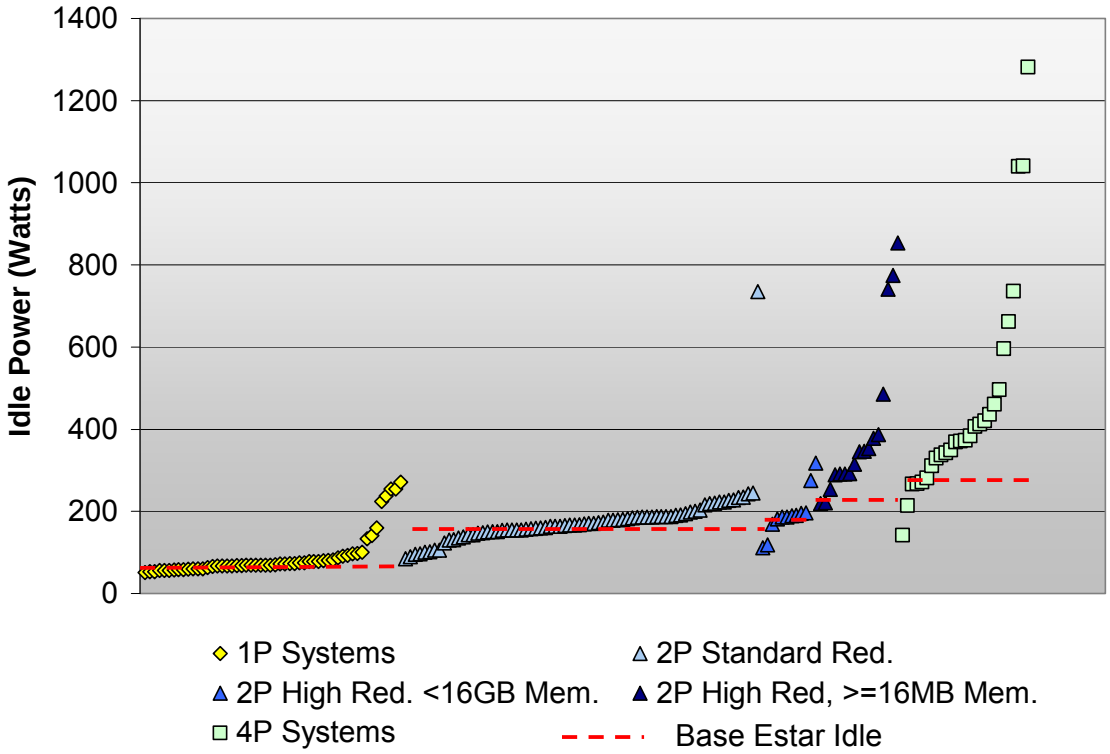
A. Idle Power Base Levels

Table 1 and Chart 1, below, show the proposed Idle categories, unit counts from EPA's Idle data set and the proposed Draft 3 base Idle specification levels. In addition to these base levels, EPA is proposing additional power allowances for extra hard drives and high memory configurations as discussed in Sections B and C, below. Table 1 also includes the qualification rate of the Idle data set among the categories, which are all reasonably close to EPA's target of 25%.

Table 1. Average Idle, Proposed Levels and Qualification by Category

Category Label	Redundancy	Proc #	Memory	Unit Count	Estar Level	Pass	Pass %
1P Systems		1		54	60	13	24.1%
2P Standard Red.	Standard	2		74	151	20	27.0%
2P High Red. <16GB Mem.	High	2	Low	12	169	3	25.0%
2P High Red, >=16MB Mem.	High	2	High	17	221	4	23.5%
4P Systems		4		27	271	7	25.9%
			Sum	**184**	***Sum***	**47**	**25.5%**

Chart 1. Idle Data Set by Category with Proposed Base Idle Levels



B. Additional Idle Power Allowances for Extra Hard Drives

Many stakeholders submitted data for Computer Server models in multiple configurations. In order to help determine the appropriateness of additional power allowances for multiple hard drives, EPA analyzed the data received to determine the incremental power from adding additional hard drives to a basic system. Chart 2, below, shows the increase in Idle power from adding one additional hard drive to eleven different model/hard drive combinations. EPA used this data, along with overall qualification rates from the Idle data set, to guide the development of additional power allowances for extra hard drives in a system. Chart 2 is overlayed with these proposed adders for additional drives.

While analyzing the idle data, EPA noticed that the qualification rate for products with two hard drives was extremely low, and therefore is proposing a larger adder (15 Watts instead of 8 Watts) for the second hard drive only. Even with this additional 15 Watts, the qualification rate for two hard drive systems remains low at 12.5%. However, EPA did not consider including an adder of over 15 watts for a single hard drive, as the available data shows that 15 Watts is a reasonable cap for the power consumption of a single additional hard drive. Chart 2 shows that only one extremely high power drive uses more power than 15 Watts. For additional hard drives above two, EPA is further driving efficiency in the hard drive by specifying an extra allowance of only 8 Watts, near the median of the data set. EPA believes this will drive the inclusion of high efficiency drives in Computer Servers with a large number of hard drives.

Chart 2. Incremental Idle Power from Additional Hard Drives

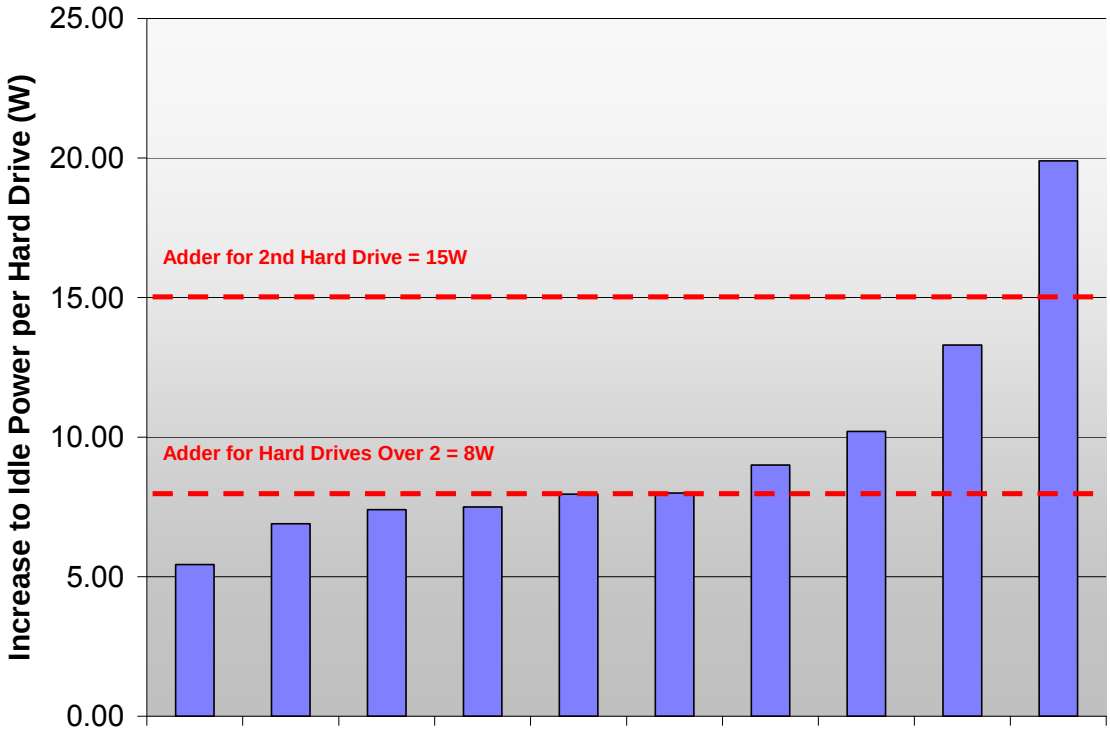


Table 2. Draft 3 Idle Data Set Qualification Rates by Hard Drive Number

	Count	Pass	Pass (%)
1	133	34	25.6%
2	16	2	12.5%
3	12	4	33.3%
>= 4	23	7	30.4%
All	**184**	**47**	**25.5%**

C. Additional Idle Power Allowances for Extra Memory

Similar to the hard drive analysis, EPA analyzed the data to determine the incremental power from adding additional memory, as shown in Chart 4, below. EPA believes this additional power allowance should be based on the amount of memory (i.e. installed GB) as opposed to the number of DIMMs because the amount of installed memory is what increases the performance and capability of the system, and this will give manufacturers greater flexibility in designing systems and picking appropriate DIMM sizes.

Because the base Idle specification levels already consider power for the lower memory configurations (≤ 32 GB) and because a number of models show very low (if any) incremental power for additional memory, EPA's proposed adder is less than the average Idle increase for additional GB of memory. In addition, when analyzing the Idle data set as a whole, the proposed 2 Watts/GB adder shows the greatest equality among the different memory bins (shown in Table 3, below). EPA also feels that new technologies such as memory sleep have the potential to drastically decrease the power use of additional memory in Idle in the near future. This approach allows EPA to give additional consideration for high memory systems while continually creating incentives to drive down the power use of memory in Idle.

Chart 3. Incremental Idle Power from Additional Memory

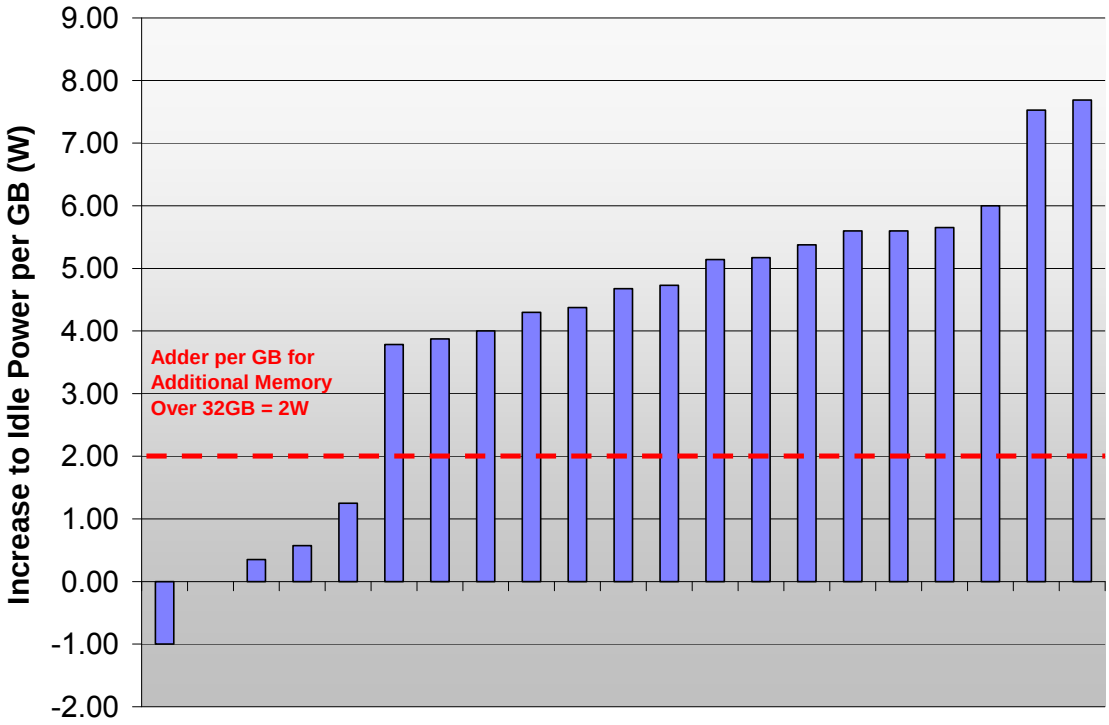


Table 3. Draft 3 Idle Data Set Qualification Rates by GB of Installed Memory

lower (>)	Upper (<)	Unit Co	Pass	Pass (%)
0	8	110	31	28.2%
8	16	44	9	20.5%
16	32	11	2	18.2%
32	64	11	2	18.2%
64	128	6	2	33.3%
128	1024	2	1	50.0%
	All	184	47	25.5%

D. Average Power Supply Loading at Idle

Chart 4, below shows data received by EPA with Idle as a percentage of the output power of the power supply. Units on the left represent systems with single power supplies while units to the right represent redundant systems with dual power supplies. The data clearly shows that the majority of systems (62.8%) are idling below 20% of the rating of the power supply, furthering EPA's interest in covering power supply efficiency at the 10% loading condition to ensure that the efficiency requirements cover the full operating range of the server and power supply.

Notes:

1. This data does not include any of the SPECpower_ssj2008™ data published to the SPEC website. This only includes data submitted directly to the EPA from manufacturers.
2. This data represents the Idle power input (AC power) as a percentage of the rated output power (DC power) of the power supply. To get a true measure of the loading on the power supply, you would have to directly compare Idle power output (DC power) to the rating of the power supply (DC power). Because DC power out is always lower than AC power in, the true loading on the power supply would be even lower than is represented in these values.

Chart 4. AC Idle Power as a Percentage of Rated Power Supply Output