

January 4, 2008

Katharine Kaplan  
ENERGY STAR Program  
U.S. Environmental Protection Agency  
1310 L Street, NW



Re: Comments on the ENERGY STAR (Version 4) Computer Specification Tier 2 Discussion Guide

Dear Ms. Kaplan:

Thank you for providing Sun Microsystems, Inc. with the opportunity to submit comments in response to the ENERGY STAR (Version 4) Computer Specification Tier 2 Discussion Guide. In addition, we appreciate your flexibility and understanding in granting Sun an extension of January 4, 2008 for comment submission.

Although the majority of Sun's comments over the past few years have been centered around workstations, we'd like to take this opportunity to focus our comments on the inclusion of Thin Clients in the Tier 2 specification.

### **Energy Efficiency and Beyond**

It is widely accepted that thin clients consume much less energy compared to the average PC. For instance, the Sun Ray 2 virtual display client only consumes 4 watts of power compared to a PC that generally consumes 80 or more watts of power. In addition to their own energy efficient operation, deployment of thin clients at customer sites has also been known to reduce cooling costs, noise levels and administrative costs while increasing the security of the network. For additional benefits of thin client deployment, we invite you to visit the following urls:

<http://www.sun.com/sunray/success.xml>.

Just to highlight, in the case study conducted at Oxnard University, deployment of thin clients resulted in a cost savings of 36 USD annually per TC for a total savings of 10,000 USD (based on 270 systems deployed).

<http://www.itpro.co.uk/news/109509/thin-clients-easier-on-the-environment-study-claims.html>

Switching from PCs to energy-saving thin client systems could save British businesses millions, as well as cutting carbon emissions, according to Germany's Fraunhofer Institute.

Researchers found that PCs use as much as twice as much electricity as a thin client-server system. "Energy consumption when in operation was up to 50 per

cent lower than for conventional PCs," said Dr Hartmut Pflaum, a Fraunhofer researcher. "While PCs consume about 85 watts on average, thin clients including their server get by with 40 to 50 watts." Reducing the amount of power used by the estimated ten million PCs in UK businesses could reduce carbon emissions output by 485,000 tons a year, as well as saving £78 million in electricity costs.

Thin clients access information held on servers but have no moving parts and little memory, so they use less power than traditional computers. As they're lighter, transportation is easier and more efficient, and as they're smaller, manufacture and disposal is easier on the environment, the study said.

The strategic director of worldwide marketing for IGEL Technology, who provided the hardware for the research, Stephen Yeo said "the impact on cutting CO2 emissions is impressive." According to Yeo, saving 485,000 tons of emissions would remove the equivalent impact of 85,000 UK homes.

### **Future of Thin Client Computing**

Industry is moving away from Desktop Computers to thin clients. Thin client shipments, IDC estimates, will more than double over the next five years to 7.2 million worldwide. In addition, Gardner says virtualization is obviating fixed hardware like Desktop Computers in favor of virtualized clients. As "stateless devices", thin clients, which allow most computing to be done on the back-end, have saved customers thousands of dollars on IT and administrative costs.

### **Evaluated as a Device, not a Compute Model**

One of the greatest features of a thin client is that most of the computing is done by back-end servers. This allows for increased network security, reduced administrative costs and IT maintenance costs. We understand that the EPA is interested in learning more about the energy load placed on servers and the datacenter as a whole apart from the obvious and significant energy savings afforded by thin clients over PCs on the client end. While we work to provide you with this data, we first have a few concerns that we'd like to share:

- If you include the server in a distributed computing environment, you are evaluating a compute model, not a device. If you include the server, you need to look at the combination of the server with the number of clients that it can support. The number of clients can be dependent on the workload and the specific server selected for that workload; for instance, file servers, print servers and application servers. In order to create an apples-to-apples comparison, you may need to dumb-down the configuration. This comparison may be interesting for an academic study, but would not provide accurate numbers and becomes meaningless for an enterprise.
- Most all PC desktops are also connected to servers for many of their

applications and workload just as thin clients are. In fact, PC's have not been stand alone devices for nearly 20 years now, especially in the workplace. The only question is one of degree and efficiency. In order to compare apples to apples, PCs would also need to be evaluated on their compute model. This would require an alteration to the BAPCo Energy Efficiency Performance Assessment Approach which is currently being designed and evaluated. In both instances (thin client and PC) workload is conducted both on the device itself and not on the server end. To be truly evenhanded, ENERGY STAR efficiency determinations should either focus just on the device for both the PC and the thin client, or they should include a focus on the back-end for both. To force the thin client to include the workload on the server end in Energy Star calculations while not examining this same energy use for the PC would create an ironic result -- effectively punishing the thin client for the efficiency of its model.

- Even though a good deal of the processing for a thin client model takes place on the back-end servers, the EPA is now looking into the possibility of developing a separate specification for servers. With that being the case, the goal of directing consumers toward more energy efficient solutions would seem to be covered on both ends even with a category for thin clients.

We think it makes more sense not to attribute the server load in evaluating the thin clients energy usage, and instead just measure thin clients energy use for a workload delivered from elsewhere. To include the server load, as we have expressed as a concern, becomes problematic in trying to compare apples to apples. Excluding the server also overcomes the problem that the BAPCo benchmark workload is targeted for Windows and Mac thin clients only and excludes servers running Linux or other operating system.

The non-traditional compute model of a thin client should not be counted against the energy efficiency of the device itself. Thin clients are extremely energy efficient devices and offer a number of other advantages and cost savings to customers. If the overall goal is on energy efficiency, deploying a thin client is just the beginning. Thin clients are also promoting the purchase of far more energy efficient servers to run their various applications. These two things combined, are pushing industry towards a more energy efficient environment overall. This is a goal that we believe the EPA should support.

### **Thin Clients as Desktop Computers**

Sun is not completely opposed to the idea of adding thin clients as a separate product category in the Tier 2 Computer Specification. However, before we examine thin clients as a separate category, we believe that their inclusion in the desktop computer category should be examined once again. In looking back at the definitions included in the specification, a thin client, evaluated as an independent compute device, meets both the definition of a computer and that of a desktop computer:

Thin Clients have:

- A CPU
- User input devices
- A display screen
- Main unit is permanently located; not portable
- Designed for a broad range of home and office applications

We believe that the EPA's reasoning in a different arena may also be instructive here. The EPA's own rationale for pursuing a specification at the component level for servers despite a broader department philosophy which agrees that greater efficiencies and opportunities for energy savings should ultimately be based on the data center as a holistic system, is based upon the premise that a specification for servers could nevertheless provide users with a useful incremental step toward the broader energy efficiency goals for the data center. Applying this same rationale to the thin client vs. PC dichotomy, it would seem to make sense to allow for inclusion of thin clients in the desktop category despite some question over how to quantify total back-end power draw with absolute precision because inclusion of thin clients would allow for the same type of incremental progress toward the goal of greater energy efficiency as found in the server/data center examination.

### **BAPCo Methodology**

In the Discussion Guide meeting held by the EPA, it was communicated that the BAPCo methodology currently is not capable of running on Linux with a Linux workload. We were told that this is being considered for the future in addition to open sourcing. In order for Sun Ray thin clients to be evaluated against other thin clients on an equal playing field, we recommend that the BAPCo software be open sourced so that we can modify for Linux configurations. This is especially crucial if the energy load is to be measured at the server level.

In addition to submitting these comments electronically, Sun would like to have the opportunity to discuss in further detail some of our comments put forth in this letter. In particular, working together at finding a solution to best compare and capture the energy efficiency of thin clients as a compute device and not as a compute model. If capturing the energy consumption at the server level is still a goal of the EPA, then perhaps we can work together to figure out how this can be done in a way that is fair to thin clients, since many other compute devices are also networked. In addition, we would like to make sure we are clear on the EPA's justification for excluding thin clients as a desktop category in the past, particularly given the operative definitions, and how we can work together to create a new category, if that is the chosen path.

Once again, we appreciate the opportunity to submit comments and look forward to our discussion.

Sincerely,

*Jenny McLaughlin*  
Jennifer McLaughlin, Sun Microsystems, Inc.  
Environmental Product Manager