

Cisco Energy Efficiency

Q. Why Cisco is talking about green now?

A. Cisco has a long history of environmental awareness and responsibility. As the leader in the networking industry, Cisco aims to reduce its effect on the environment and is committed to initiatives to address a wide range of “green” issues. Cisco is driving environmental initiatives in four primary areas:

- **Responsible operations:** Cisco has committed to reducing its greenhouse gas emissions 25 percent by 2012. This is an aggressive, absolute goal that we aim to achieve by relying heavily on information technology and the power of the network. Our plan is to use a combination of deploying information technology, reducing energy consumption in our facilities with the help of an IP-enabled building management system and analytics tool, improving the energy efficiency of our products, and purchasing a limited amount of renewable energy. Strides are also being made to better manage resources and waste, along with helping ensure Cisco’s supply chain adheres to the company’s environmental and diversity goals.
- **Product stewardship:** Cisco is committed to optimizing the functionality, accessibility, and performance of Cisco® products while minimizing their power consumption. Cisco has also instituted strong recovery and recycling programs.
- **Architecture:** Cisco is developing networking architectures and solutions to enable customers and employees to mitigate their environmental effects and achieve their green goals.
- **Employees:** Cisco is creating a corporate culture that inspires our employees to get involved, take action, and become catalysts for change.

In addition, we are leading discussions with regulatory and standards groups tasked with developing important metrics for technology and the environment. We are working with The Green Grid and GridWise Alliance, among others, to help increase product-level and system-level energy efficiency through public-sector and private-sector policies.

Given the ongoing and accelerating interest in green technologies, both from our customers and within the networking community, we feel it is appropriate to initiate some industry-level discussions about environmental standards, definitions, and regulations.

Q. What does Cisco mean by green IT?

A. There is no universally-accepted, standard definition of green IT. That is why Cisco has engaged in a series of discussions with our customers, regulatory agencies, and networking industry leaders. The networking industry as a whole needs a consistent, agreed-upon way to measure green IT claims, and care must be taken to help ensure apples-to-apples comparisons.

These industry trend discussions will center on the need for holistic evaluation of green performance and critical evaluations of any and all green claims put out into the market, as well as a call for standards with respect to green.

Q. Are Cisco products green?

- A.** As the leader in the networking industry, Cisco aims to be environmentally responsible and is committed to supporting initiatives and developing products that address a wide range of green issues. Many vendors have decided to label products as green based on a simplistic and proprietary set of metrics. Cisco does not support this approach to designating products as green.

Given the lack of a universally accepted standard definition for green IT, Cisco prefers not to designate individual products or solutions as green. We prefer to say that Cisco provides technologies, solutions, innovations, operations, and best practices that allow our customers to achieve their green goals.

Across the industry, numerous efforts are aimed at certifying products as green. All of these efforts cover certain aspects of environmental considerations. Although supportive of these more focused efforts, Cisco believes that for IT products and solutions to be designated as truly green, they must be matched against a comprehensive and standardized set of green evaluation criteria.

Q. What green goals does Cisco see being established by its customers?

- A.** Different customers will have different green goals. However, certain green goals stand out:
- Reduce energy consumption and costs
 - Increase energy efficiency of IT systems
 - Comply with industry and government regulations
 - Establish business practices that minimize environmental effects
 - Boost organizational reputation and perception

Q. How are Cisco customers measuring success?

- A.** Again, different customers use different metrics. The customers that seem to be driving the greatest success use many metrics to define success. Here, declining energy costs, rising telecommuting days, improved remote collaboration, regulatory compliance, more positive perception ratings, and improved resource utilization are just some factors considered when measuring success.

Q. We have sometimes heard the definition of “green” as “bits transmitted per watts expended.” What’s wrong with that definition?

- A.** This definition might apply in some cases, but is insufficient as a general definition of green.
- This is a simplistic transport-only method of measurement. Throughput/power ratios reflect only the efficiency of the lowest level functions of the network. While the networking industry might debate whether the most appropriate network model includes three or five or seven layers of functionality, all agree that network functions and features operate well above this transport level. Judging the efficiency of a networking device based on the power it uses to simply move bits across a link ignores critical higher level functions of the network: functions that are appropriately applied across the network based on a multitude of factors.
 - It is not conducive to apples-to-apples comparisons and does not take into account the larger picture of the overall network solution. Depending on which role a device plays in the network, it might have increased responsibilities and might replace several other devices.

So a one-size-fits-all measurement might not give a true picture of the energy usage or energy savings in a particular deployment.

- The definition focuses solely on per-platform energy usage and does not take into account other aspects of green practices. Other aspects would include such things as green manufacturing processes, network consolidation, virtualization, energy savings to be gained through collaborative technologies, the role of the longevity of platforms in avoiding e-waste, and responsible retirement of obsolete equipment.

Q. What are the benefits of a more holistic definition of green than just power considerations?

- A.** Any definition of green must take a lifecycle approach to products, from initial manufacturing processes through initial deployment, normal use, future evolution, and final retirement of obsolete equipment. There are green practices to be applied at each stage in this process. Thinking in lifecycle terms broadens the scope of potential green benefits. It also more directly reflects how customers actually use and benefit from the products in real-world situations.

Q. How should the networking industry define green?

- A.** There is no simple answer to this question, but recognizing the need for a universal, standard definition and evaluation criteria is an important first step. There are also existing and upcoming regulations that provide guidance to greener products.

Q. What should be the factors defining green networking?

- A.** The network is the platform that touches all aspects of business operations and can play a pivotal role to IT leadership in green practices.

As with the term “green” itself, there is no universally accepted, standard definition of green networking. Some of the crucial factors that must be taken into consideration when evaluating the relative greenness of a network include:

- Energy efficiency: How effectively do a device in particular and the network in general use energy in relation to the amount and complexity of the work they are doing and the services they provide? And one should also take into account the influence the network can have over connected resources being powered through the network using Power over Ethernet (PoE).
- Application enablement: Do the device and network enable applications or services that promote green operations or business practices? Can such practices offset the energy outlay required to run the device or network? Do integrated applications or services eliminate specialized devices requiring their own power and cooling?
- Lifecycle approach: From the time of manufacture through the time of responsible retirement from service, does each step in the lifecycle of the product display proper consideration for the environmental effect of the product? While it is deployed, is a device able to deliver value over a prolonged period of time? Will it adapt readily, while minimizing resource waste? Over what time frame?

Q. How does Cisco evaluate energy efficiency with respect to the network?

A. Evaluating energy efficiency and power conservation within the network involves several distinct, yet complementary activities. The following summarizes these activities, arranged in stages of implementation:

First Stage: Measure the Current Energy Usage of the Network

The most important step is to measure where energy is being used in the network. Energy use will vary not only according to application or network type. It will differ from any one individual network to another because of differing load requirements, differing physical infrastructure, and differing environmental factors. Measuring where the energy is being used will highlight the areas where the greatest energy savings can be made, as well as allowing accurate cost analysis.

Second Stage: Understand the Productive Network Functions Required

The next step in evaluating energy efficiency is to understand the productive functions required by the network, with special emphasis on functions required in defined places in the network. Attempting to implement energy savings that compromise the productive functions of the network will result in achieving conflicting business objectives. This is especially true because the network and its related networking functions have become vital to the success of all organizations, big and small, private and public, local and global. Here it is most important to understand the critical network functional requirements in order to fully understand how energy efficiency must take into account the full utility and effect of the network. After all, minor power-saving moves that result in major loss of network and business function are counterproductive and might actually restrict even greater potential gains in energy efficiency elsewhere across the business and the network.

Third Stage: Analyze the Network Architecture and Components

After analysis of the network energy usage and critical functions, enhancements to the network infrastructure, architecture, and components can be assessed. At this point, there might be some key components that can be identified as targets for replacement in order to save energy. In most cases, however, even more significant savings will require evolution of systemwide features. The most important step at this stage is to understand how the interaction of components throughout the network and supporting infrastructure affects the overall energy consumption, not only across the network, but also across all of IT and the business. This will invariably be the most complex step and will require cross-functional expertise. This will likely take the form of multiple initiatives and a systemwide requirements analysis that will lead to guidelines for use in evolving and upgrading the infrastructure.

Fourth Stage: Evaluate and Compare the Energy Efficiency of Components in Context

The last step is to fully evaluate the energy efficiency of individual components being selected for use with the network. It is important that this step be taken after the other three steps because it is necessary to understand the energy conservation opportunities, required network functions, and systemwide effects of the component under evaluation. Where multiple alternative devices are compared for energy efficiency, this must be done in the context of the first three steps to avoid negative results that can outweigh the benefits of the energy efficiency assessment.

Q. Why the emphasis on networking products? Aren't the power demands of servers and storage devices a much bigger green challenge to IT organizations?

A. Although servers and storage draw much attention because of their heavy power and cooling requirements in the data center, the network touches everything and therefore can be the backbone for driving green benefits across many fronts. Networking devices should operate

efficiently so as to minimize their load on the power/cooling infrastructure. Here, every bit helps. But beyond power efficiency, Cisco's vision is that the network will enable environmentally friendly business practices such as telecommuting, remote collaboration, and the use of collaboration technologies such as Cisco TelePresence™ conferencing. And networking devices that readily adapt to changing requirements over a longer period of time help reduce resource use and e-waste. Networking devices that need to be replaced every two or three years can make things worse, not better.

It is this holistic approach that will drive the greatest green analysis and reward from the network infrastructure.

Q. How should energy efficiency be measured? Which parameters should constitute a consistent methodology to determine and compare vendors' energy efficiency?

A. Energy efficiency is important in evaluating a network device. Simplistic measurements such as power supply efficiency or device power draw should be considered. However, these measurements only tell a small part of the story.

Take the analogy of mass-transit systems versus hybrid automobiles. There is no question that the total energy usage of a bus that can transport a large number of people will consume more energy than a small hybrid-powered sedan. Each is a different method of trying to address the same problem.

Similarly, a network infrastructure that delivers more service capabilities and drives more demanding and valuable business applications with better quality might consume more energy than a collection of devices providing for basic connectivity.

At the infrastructure level, how effectively the network supports business applications while decreasing the total cost of ownership is the key. Power efficiency at the individual device level is less important than at the infrastructure level, because customers are looking for a network platform through which to conduct business operations, improve productivities, and generate profits. Certainly, individual devices should be energy efficient, but they should also work to help ensure further green benefits through service integration, application enablement, and system longevity. These further green benefits include:

- Device consolidation and elimination
- Resource virtualization enabling optimum utilization and location
- Enablement of advanced remote collaboration tools such as Cisco TelePresence conferencing
- Worker mobility enabled through secure wireless connections
- Enhanced telecommuter productivity through secure unrestricted access
- Energy monitoring and management

Q. What is the right power rating metric for comparing equipment power usage?

A. First of all, it is important to examine equipment as it is to be used in a defined point in the network, providing for the services and features required in that point in the network. When comparing equipment power usage, the equipment under analysis must have similar core features, including port density, full PoE across the same number of ports, identical media types, as well as other hardware and software feature sets that match the requirements of the

defined point in the network under examination. Measurements must then be made under realistic circumstances and across a range of operating conditions (for example, network traffic load, features active, and so on). The suggested rating metric for comparing equipment power usage is kilowatt hours (kWh).

It is important to note that when measuring equipment level power usage, it must be plugged into the infrastructure and performing the typical set of functions required by that point in the network in order for the results to be meaningful.

Q. What about the energy usage numbers you publish in your data sheets and on your website? Can we use those?

A. The numbers published in data sheets or on our website represent the maximum power supply ratings of devices and the worst-case power draw for certain individual components. They are published as a service to our customers to help them with provisioning the proper power and cooling for networks and data centers with the appropriate safeguards. They do not represent the typical power draw during normal operations, which would be significantly lower. For example, we have found that typical power draws for some devices amount to up to 50 percent of the stated maximums on our data sheets.

Q. Unlike other networking companies, Cisco has not announced a green switch or router. Does Cisco lag behind other companies in creating such a device?

A. Given the lack of comprehensive metrics and standardized measurements associated with green IT products, Cisco does not currently support the labeling of products as green. However, one should not interpret this to mean that Cisco is not strongly focused on developing and delivering green IT solutions. On the contrary, Cisco is fully committed to leading the industry in providing products and solutions that deliver the greatest sustainability gains for its customers. And as a company, Cisco is also committed to a high level of environmental responsibility in its operations, culture, products, and customer solutions. We believe that, aside from embedding efficiencies and effective services into our products, information technology has the power to transform how the world addresses its environmental challenges.



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