

Green Computing and D-Link

The Green Movement and Specific D-Link Solutions Reduce Detrimental Impacts on the Environment

White Paper
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Abstract

Most agree that “green computing” is good. But how do we achieve green-ness, and what kinds of solutions help the environment? This brief offers a general overview of the green computing movement, the regulations and standards that are driving change, and specific D-Link solutions for adhering to energy consumption standards and enabling more flexible, less environmentally taxing work. The latter part of the document details D-Link’s new Green Ethernet™ technology that enables intelligent, automated power reduction on specific, green-optimized D-Link switches.

The Need for Green

Technology pollutes. Power consumption related to technology is rising rapidly. According a recent U.S. Environmental Protection Agency (EPA) report, the IT industry consumed approximately 61 billion kilowatt-hours of electricity in 2006. That's 1.5 percent of the total electricity consumed in the United States. The power bill is roughly \$4.5 billion. Servers and data centers deployed by the U.S. Federal Government account for about 10 percent, or 6 billion kWh, of the total consumption. The report estimated that IT power consumption could nearly double by 2011.

The proliferation of data centers requires the constant addition of servers and requisite cooling and ventilation equipment – which all consume copious amounts of electricity. Lead, mercury, cadmium, and other toxic elements in the materials that compose hardware endanger the health of humans and the planet.

Fortunately, technology also helps us heal the planet and protect ecosystems that support life. Better cooling, server and ventilation designs are helping reduce the amount of power needed for data centers dramatically. New computers, laptops, and networking products are being designed with safer materials and built-in recycling programs. And, the continued proliferation of networks enables workers to work remotely, travel less, and decrease burdens on transportation systems, and thus the environment.

Consumers, business leaders, and organizations of all kinds have developed a new enthusiasm for environmental consciousness. Awareness is at an all-time high. Across the globe, people are demanding more environmentally friendly products, standards bodies are creating and enforcing better design, disposal, and electricity consumption regulations, and technology manufacturers are delivering solutions that enable high-performance computing while satisfying ecological concerns.

Green is good. New initiatives are taking hold and quickly producing results throughout the entire IT industry.

Why Go Green?

There are several general reasons why green is good. Being green – purchasing green equipment, designing and building green solutions, paying attention to energy consumption, and disposing of and recycling hardware conscientiously – helps you:

- Save cash on energy costs
- Comply with government regulations
- Meet increasing customer demands for cleaner, more eco-friendly products
- Appeal to consumers and partners who want to patronize and associate with green companies

Those are direct benefits. The ultimate benefits are even more compelling. Caring for the environment and actively taking steps to protect it benefits:

- The planet
- The health of animals, humans and flora
- The health and prosperity of future generations

Green initiatives of grand or even seemingly minor significance help heal the planet, and make it beautiful and clean. Drinking water and food supply quality can improve. Fragile biological processes stay in check, food chains remain intact, and there is less impact on the planet's ozone layer.

Quick Definitions

EPA ENERGY STAR®: The voluntary U.S. electronics manufacturing labeling program designed to promote and recognize energy-efficiency in computers, monitors, climate control equipment, major appliances, lighting, and other technologies. Sleep mode was widely adopted due to the initial ENERGY STAR program that launched in 1992. A new ENERGY STAR specification for desktop computers went into effect on July 20th, 2007. The requirements are more stringent than the previous specification and existing equipment designs can no longer use the logo unless re-qualified. The power requirements are for 80% or greater AC power supply efficiency using the standards defined by the 80 PLUS Program.

E/Electronic Products Environmental Assessment (EPEAT): An environmental standard and rating system that makes it easier for computer purchasers to buy computers, laptops and monitors that meet stringent environmental criteria. The system was developed with funding from the U.S. EPA. The standard was adopted by the Institute for Electrical and Electronics Engineers as IEEE 1680 through an ANSI-accredited process.

RoHS (Restriction of Hazardous Substances): Adopted in February 2003 by the European Union and in effect since July 1, 2006, the RoHS directive restricts the use of six hazardous materials (lead, mercury, cadmium, hexavalent chromium [chromium xxx or Cr6+], polybrominated biphenyls [PBB], and polybrominated diphenyl ether [PBDE]) in the manufacture of various types of electronic and electrical equipment. The directive is closely linked with the Waste Electrical and Electronic Equipment Directive (WEEE) (see below).

Electrical and Electronic Equipment Directive (WEEE): European Union directive which sets collection, recycling and recovery targets for electrical goods and is part of a legislative initiative to solve the problem of huge amounts of toxic e-waste. Manufacturers became financially responsible for compliance to the WEEE directive in August of 2005. By the end of 2006 – and with one or two years' delay for the new EU members – every country has to recycle at least 4 kg of e-waste per capita.*

*The United States Congress is considering a number of electronic waste bills including the National Computer Recycling Act introduced by Congressman Mike Thompson (D-CA). This bill has continually stalled, however. Several states have passed their own laws regarding electronic waste management. California was the first state to enact such legislation, followed by Maryland, Maine, Washington and Minnesota. More recently, legislatures in Oregon and Texas passed their own laws.

Source: Wikipedia.org

History

The term “green computing” was probably first coined shortly after the U.S. Environmental Protection Agency (EPA) launched the ENERGY STAR program in 1992. ENERGY STAR is the labeling program designed to promote and recognize energy-efficiency in computers, monitors, climate control equipment, major appliances, lighting, and other technologies. It generally covers power consumption-related issues.

Recent sustainability trends have fueled a broader interpretation of the term. The current definition is much broader and refers to the efficient use of computing technology – via e-waste reduction, regulatory compliance, telecommuting policies, virtualization of server resources, cost accounting of energy use, thin client solutions, and more.

Regulations and Initiatives

Government agencies across the globe have implemented various standards and regulations to encourage green computing. ENERGY STAR, RoHS, WEEE, and EPEAT are just a few of the more well known initiatives (see sidebar “Quick Definitions”).

ENERGY STAR regulations help reduce energy consumption and emissions by encouraging the widespread adoption of green office equipment, LED traffic lights, and fluorescent lighting. Most computer users are familiar with the ENERGY STAR logo on monitors and the power management states used for reducing energy on laptops and desktops. The typical states include idle, where the operating system is running without programs, sleep, where nothing is running but the computer can resume operation with a quick re-start, and stand-by, where the computer is off but maintains approximately two watts of power to resume boot. In a recent report, the EPA estimated that the program saved approximately \$12 billion in energy costs in 2005.

ENERGY STAR directives for networking power management are more relevant to D-Link’s products. Products that meet these requirements typically employ Wake Event and Wake On LAN (WOL) features. A Wake Event happens when a user, programmed or external event or stimulus causes the equipment to transition from Sleep or Standby to the active mode of operation. Events include mouse movement, keyboard activity, buttons pressed on equipment chassis, and stimulus initiated by remote control, and other network

equipment or modems. Wake On LAN events enable devices to waken from Sleep or Standby mode when directed to by a network request.

EPEAT helps consumers and organizational purchasing agents identify desktop and laptop computers and monitors that are designed for reduced impact on the environment. EPEAT-registered computers contain lower levels of cadmium, lead and mercury than traditional computers, and they are more energy efficient. The hardware is also easier to upgrade and recycle. Like the WEEE directive in Europe, EPEAT requires participating manufacturers to offer safe recycling options for products that are no longer in use.

RoHS and WEEE enforce hazardous substance reduction in the European Union. The regulations require the replacement of heavy metals and flame retardants like PBBs and PBDEs in electronic equipment with less toxic materials. Manufacturers are required to implement programs for gathering and recycling old equipment, as well.

Energy and waste reduction efforts are also driven by the private sector. Companies like Yahoo! plan to become “carbon neutral” in the near future, for example. This refers to carbon trading programs that allow companies to pay an outside company to reduce their greenhouse gas emissions, instead of reducing their own.

In addition, various state regulations are in effect in the U.S. Some states, like Texas for example, require tech companies to offer free recycling programs.

Three Primary IT Avenues to a Greener World

There are plenty of ways to be green. In the IT world, the solution falls into three general categories, discussed in detail below.

1. *Improve Energy Efficiency, Reducing Carbon Footprint*

Manufacturers like D-Link are producing new products that require less power. Product development teams are creating electrical circuit and power consumption designs that minimize power waste and design power-saving features into software, firmware, and hardware. Intelligent designs optimize computing devices for wake, stand-by, and power-down states. New designs require less cooling, as well. In addition, energy-efficient manufacturing processes reduce emissions and save energy.

2. *Reduce e-Waste*

By reducing the amount of toxic waste materials in manufactured products and using more recyclable materials, manufacturers are reducing negative environmental impacts. Two percent of the trash landfills in the U.S. are electronic waste. However, 70 percent of overall toxic waste comes from dumped electronic equipment. Newly designed recycling programs are optimized to better

manage the lifecycle of products. Companies are offering recycling options, so consumers can be assured that their equipment will be appropriately recycled and disposed of after they are finished using it. Large organizations are already including disposal and recycling components in their hardware RFPs. These steps will go a long way toward shrinking and cleaning up landfills, re-using valuable materials, and reducing e-waste.

3. Enable Lifestyle Changes that Lower Impact on the Environment
Network connectivity and mobility reduce the need to commute to meetings and appointments, saving travel time, fuel, and wear on the world's travel infrastructure. Similarly, IP video solutions reduce the need for in-person meetings and support personnel on the premises for surveillance. State-of-the-art wireless solutions allow people to work conveniently almost everywhere. The proliferation of Wi-Fi hot-spot and WiMax networks will only extend this trend.

Power Saving Tips

- Lower electricity consumption by manually or automatically turning off monitors
- Use LCD monitors that consume less power than CRT monitors of the same size
- Use a laptop. They consume less power than desktops, and many have connections for full sized monitor, keyboard, mouse, and speakers

D-Link Solutions

D-Link spends significant resources and time pursuing green computing initiatives and designing energy-saving, waste-reducing features into our products. Many of our products feature ENERGY STAR compliance, which allows our customers to save energy and more easily manage the power demands of their D-Link equipment. We maintain strict compliance with existing governmental standards for energy conservation and waste reduction. We also take things a bit further, designing green computing features into our products before government mandates and industry standards commence.

Many of our solutions enable remote work and mobility, bringing people closer together without needlessly spending fuel, and consuming travel and infrastructure resources. Our routers, switches, IP cameras, VoIP solutions, and wide range of Wi-Fi solutions enable flexible working arrangements and teleconferencing, for example.

New Networking Standards for Lower Power States

D-Link networking equipment features advanced power management capabilities that go beyond the IEEE Energy Efficient Ethernet Standard. The IEEE standard aims to reduce power consumption in switches by automatically powering down, idling or moving to different transfer rates. D-Link executives do not expect products based on the IEEE standard to arrive until 2012, so the

company has pushed its own internal initiative to include advanced power management, auto-sensing, and state-detection features in all our switches, routers, access points, cameras and storage devices.

More specifically, D-Link products designed with our new Green Ethernet™ technology are arriving year-end 2007. The technology enables smart, automated power consumption reduction on our DGS-2208 8-Port 10/100/1000 desktop switch and our DGS-2205 5-Port 10/100/1000 desktop switch. When nodes, like servers, clients and storage systems, are attached to these specialized switches, they can automatically detect power-down events and stop sending ping packets to the nodes, thereby saving power. The switches also detect cable length and adjust power consumption accordingly. With the DGS-2205, maximum power savings is 44%, and normal day power savings is 27%. With the DGS-2208, maximum power savings is 80%, and normal day power savings is 40%

D-Link is the first company to market with this advanced technology. D-Link EMEA has already shipped Green Ethernet™ products that adhere to RoHS regulations and include green, recyclable packaging.

Certified Wireless USB Adapters – Faster than Bluetooth While Requiring Less Power than Wi-Fi

D-Link and IOGear announced Certified Wireless USB adapters that plug into USB ports. Wireless USB uses ultrawideband (UWB) technology, which enables short-range connections (15 to 30 feet) at much faster speeds (up to 480Mbps at 10 feet and 110 Mbps at 30 feet) than Bluetooth while consuming much less power than Wi-Fi. The adapters are the first products to receive Wireless USB Certification from the USB Implementers Forum.

Eventually, the adapters will connect to a new generation of peripherals that will also carry embedded wireless USB. Currently the products are used with legacy USB peripherals connected to wireless USB hubs. The adapters can be used to connect to a conventional USB printer plugged into a wireless USB hub, for example.

Regulatory Compliance

D-Link is an ENERGY STAR partner for end-use products incorporating single voltage external ac-dc or ac-ac power supplies. D-Link supports the European Union's RoHS directive. We also support local programs for the recycling, reuse, and reclamation of consumer goods, including our products and packaging.

The safety and integrity of our products is key to our relationship with our customers. Certain chemicals and substances become labeled as "Hazardous Materials" due to government, industry and

consumer concerns. When those issues are raised and materials are identified, D-Link is the first to acknowledge those bans and guarantee the safety of our products for the end-user.

Committed to the Planet

D-Link's commitment to green issues and initiatives pervades every corner of our organization. We back up our green talk with strategic initiatives as well as personal dedication to environmental practices at work and at home. We want to clean up the planet, protect the health of fragile ecosystems, ensure clean food and water supplies, and make the world a better place for generations to come, just like you.

For more information on D-Link's green products and practices, please visit <http://www.dlink.com/corporate/environment/>. Our green programs are constantly evolving, so check back to see new developments.

