

Good morning!

I am here representing the Office of Technology and Electronic Commerce in the U.S. Department of Commerce's International Trade Administration.

The mission of our office and other ITA industry offices is to advocate for a domestic and international trade environment that supports U.S. competitiveness and innovation.

Green IT Initiative Objectives

Energy Efficiency and Conservation



Reduce energy consumption and costs

- Improve U.S. industry's competitiveness with foreign firms
- Deal with global warming
- Reduce U.S. dependence on fossil fuels

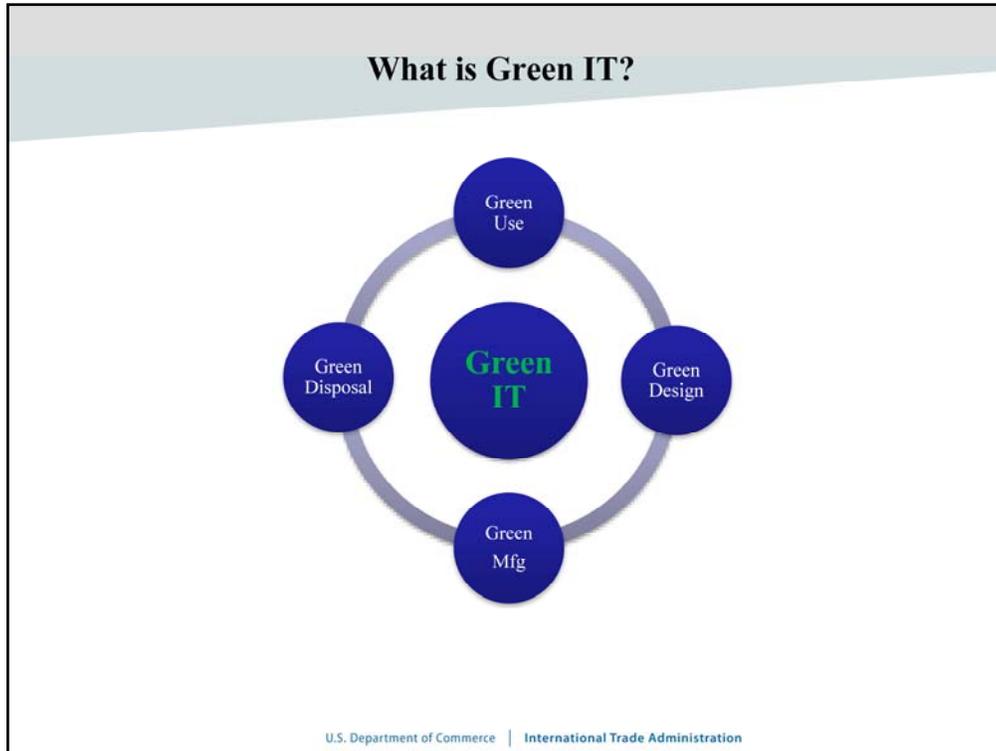
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As the first speaker in this session, I am going to present an overview of what our office found in researching Green IT last year and why we believe greening IT infrastructure is worthwhile for U.S. manufacturers. This effort is a part of a larger Sustainable Manufacturing (SMI) underway in our agency which I will briefly discuss at the end of this presentation.

Our objectives in undertaking a Green IT Initiative are:

To help U.S. companies, particularly smaller enterprises, to assess, manage, conserve and reduce the energy consumption of their IT infrastructure and thus become more cost competitive with foreign firms and

To contribute to U.S. efforts to deal with global warming and to reduce dependency on fossil fuels, particularly those from foreign sources



I would like to start out by answering the question “What is Green IT?” and defining this broad concept for you.

The goal of Green IT is to make the entire IT lifecycle greener by addressing environmental sustainability along the following four complementary paths:

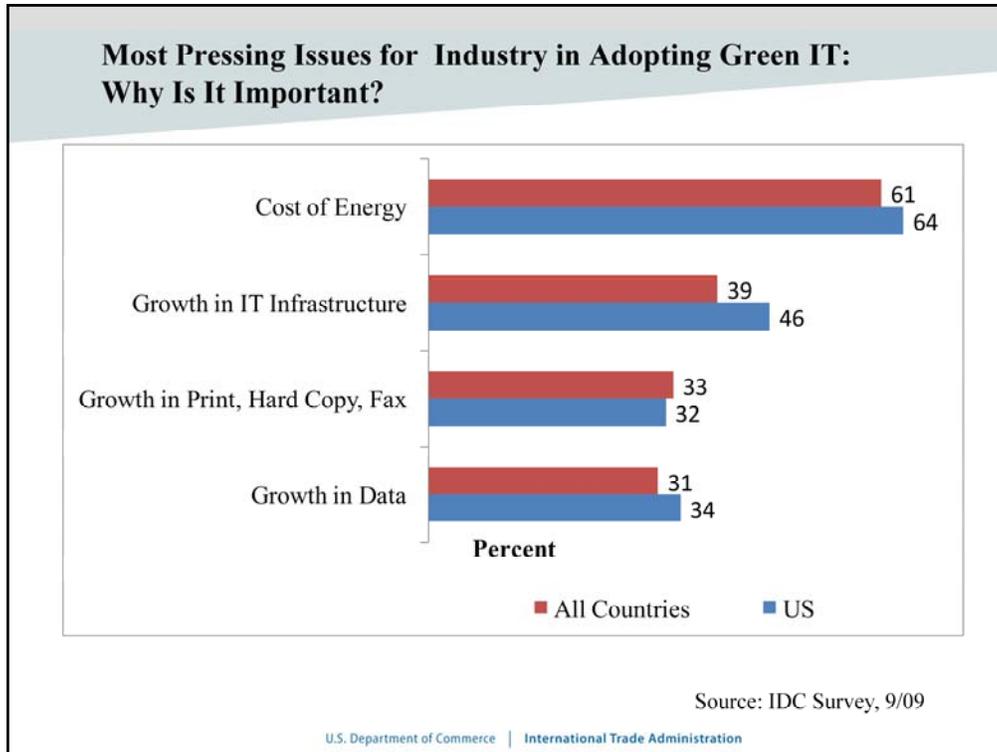
Green use — reducing the energy consumption of computers and other information systems as well as using them in an environmentally sound manner

Green disposal — refurbishing and reusing old computers and properly recycling unwanted computers and other electronic equipment

Green design — designing energy-efficient and environmentally sound components, computers, servers, cooling equipment, and data centers

Green manufacturing — manufacturing electronic components, computers, and other associated subsystems with minimal impact on the environment

Our office’s current initiative is focusing on green use although we do deal with the issue of green disposal in our trade policy work.



Why has Green IT become a significant concern for U.S. industry?

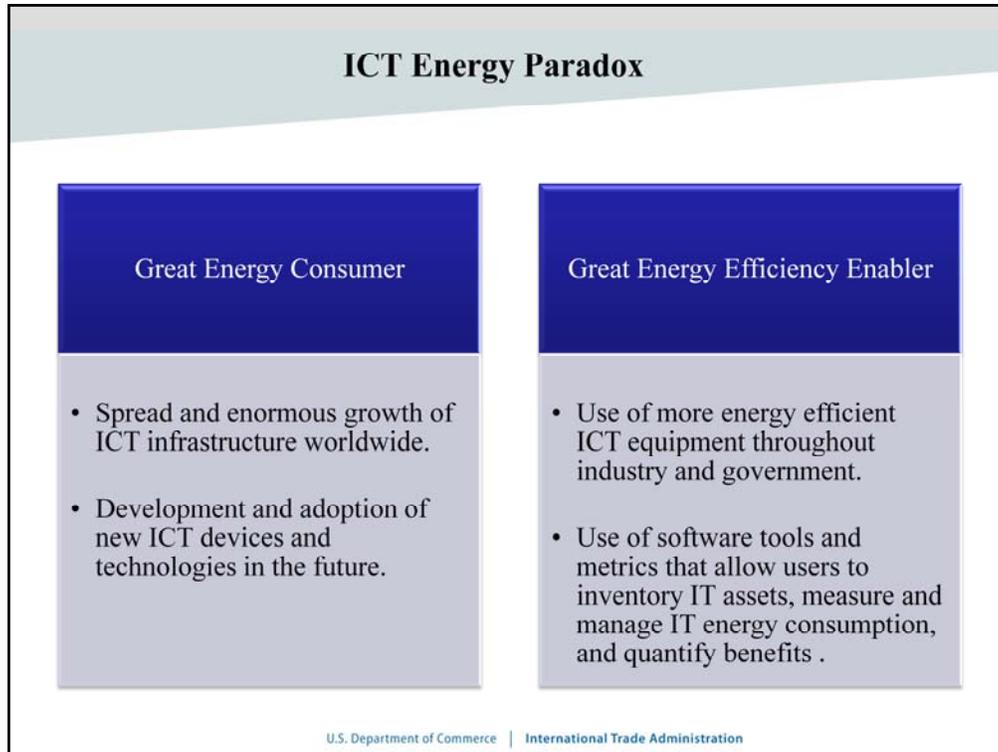
A May 2009 survey of North American companies conducted by Symantec, a leading IT security software supplier, revealed that 97 percent of respondents had discussed a Green IT strategy that included increasing their Green IT budgets and reducing energy consumption, cooling costs, and carbon emissions.

Their Green IT projects were primarily targeted at the data center, but were growing in other areas such as corporate desktop environments.

International Data Corporation (IDC) surveyed 1,653 firms around the world later in the year to evaluate what were the most pressing issues motivating them to adopt a Green IT strategy.

Not surprisingly, the top reason was the cost of energy followed by the growth in corporate IT infrastructure.

Indeed, IDC has estimated that the annual cost of IT energy will surpass that of IT equipment within the next 5 years.

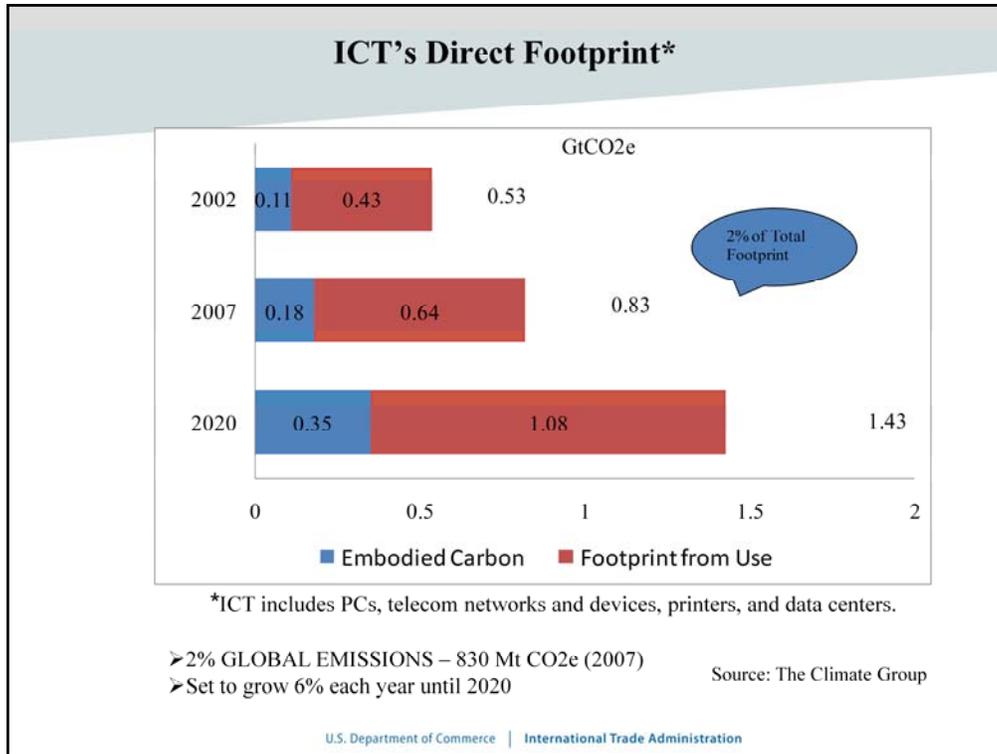


I think that it is important to understand ICT’s role as an energy consumer and an energy efficiency enabler---the phenomenon that some have called “the ICT Energy Paradox.”

According to the American Council for an Energy-Efficient Economy (ACEEE), the ICT Energy Paradox is one in which more attention tends to be paid to the energy-consuming characteristics of ICT rather than to the broader, economy-wide, energy-saving capacity that emerges through their widespread and systematic application.

ICT has played and will continue to play a critical role in reducing energy waste and increasing energy efficiency throughout the economy. From sensors and microprocessors to smart grid and virtualization technologies, there is a strong correlation between efficiency, productivity, and energy savings.

And while discrete technologies have successfully enabled significant energy savings, system-wide energy savings have also emerged from the growing ubiquity of ICT systems and technologies.



In terms of its environmental impact, some studies indicate that the manufacture and use of ICT currently produces 2-3% (approximately 0.86 metric gigatons) of the world's CO₂ emissions, equivalent to the carbon output of the entire aviation industry.

The ICT sector's global carbon footprint is set to nearly double to 1.43 gigatons (Gt) by 2020, based on business as usual (BAU) projections made by the Climate Group.

PCs and their associated peripherals and printers will account for 57% of this ICT footprint followed by telecom infrastructure and devices at 25% and data centers at 18%.

Annual Electricity Use of ICT (2005)

ICT Equipment	World Consumption (Billion kWh)	U.S. Consumption (Billion kWh)
Data Centers (includes cooling)	112.5	45
PCs & Monitors	588	235
Modems/routers/etc.	167	67
Phone Network	1.0	0.4
Total ICT	868	350

Sarokin, D. et. al., *Energy Use of the Internet*, 2007

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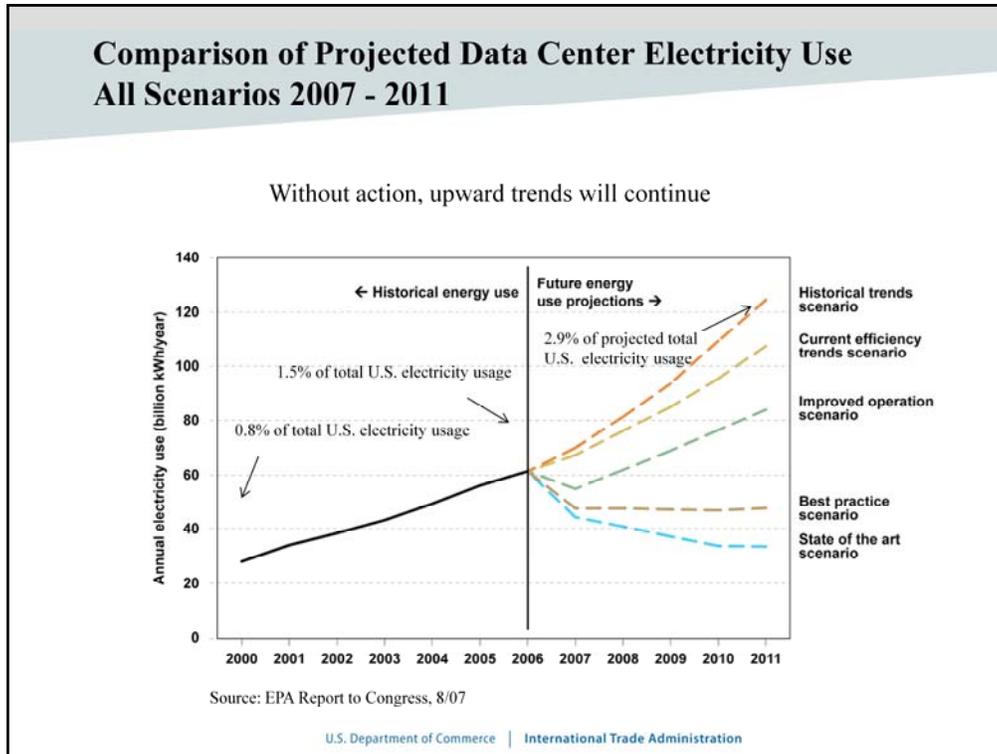
According to a study of the energy consumption of the Internet conducted back in 2007, ICT equipment makes up about 5.3% of global electricity use and 9.4% of total U.S. electricity demand.

As was the case with ICT's carbon footprint, PCs and monitors consume far more electricity than data centers and communications equipment.

The International Energy Agency (IEA) predicts that the energy consumed by ICT worldwide will double by 2022 and increase three fold by 2030 to 1,700 terawatt hours (tWh). This will equal the current combined residential electricity use of the United States and Japan.

This consumption will require the addition of nearly 280 Gigawatts (GW) of new generating capacity between now and 2030, presenting a great challenge to electric utilities throughout the world.

Comparison of Projected Data Center Electricity Use All Scenarios 2007 - 2011

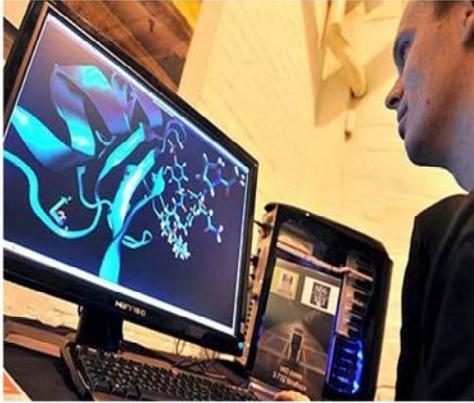


In 2006, servers and data centers used 61 billion kilowatt hours (kWh), or more than 1.5 percent of all the electricity generated in the United States, at a cost of nearly \$4.5 billion, according to the Environmental Protection Agency (EPA). kWh consumption was twice the 2000 level.

EPA projections show that U.S. data center energy use alone could almost double to more than 100 billion kWh by 2011 for a cost of \$7.4 billion and will account for 2.9 percent of U.S. electricity production. This share is projected to rise to 12% by 2020.

Compared to current efficiency trends, a combination of improved operations, best practices and state-of-the-art technologies in servers and data centers in the United States could have resulted in annual savings of approximately 23 to 74 billion kWh, \$1.6 billion to \$5.6 billion in electricity costs, and 15 to 47 million metric tons of CO₂ emissions by 2011.

ICT Energy Use and CO2 Emissions: PCs



- Average desktop PC wastes nearly half of the power it consumes.
- 90% of desktops do not use power management settings.
- Upgrades to Energy Star-qualified home office products would save Americans \$200 million in annual energy costs.

Sources: IE/ASE, A.D. Little, EPA

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In the typical PC environment, the average desktop/monitor combination uses up to 2000 kWh of electricity annually of which 500-1000 kWh can be reduced through simple power management. Laptops are more efficient, consuming far less energy each year.

A Harris Interactive study finds that half of U.S. workers fail to shut down their PCs at night. EPA estimates also show that 90 percent of enterprise desktop PCs do not use power management capabilities.

The EPA estimates that Americans would save \$200 million in annual energy costs if they purchased Energy Star-qualified home office products, such as computers, printers, monitor/displays, copiers, and faxes,.

Best Practices for Reducing/Managing IT Equipment Energy Use: Data Centers



- Develop strategic energy management plan with realistic energy reduction goals
- Install “smart” energy meters
- Upgrade to more energy-efficient power supply units and servers
- Virtualize/consolidate existing servers, storage and applications
- Consider powering down/retiring underutilized servers
- Use more energy-efficient solid state drives and technologies, such as deduplication and compression
- Store rarely used data on slower hard drives or tape
- Shift computing workloads to data centers where electricity is cheapest and/or particular applications (SaaS) and data storage to the Cloud

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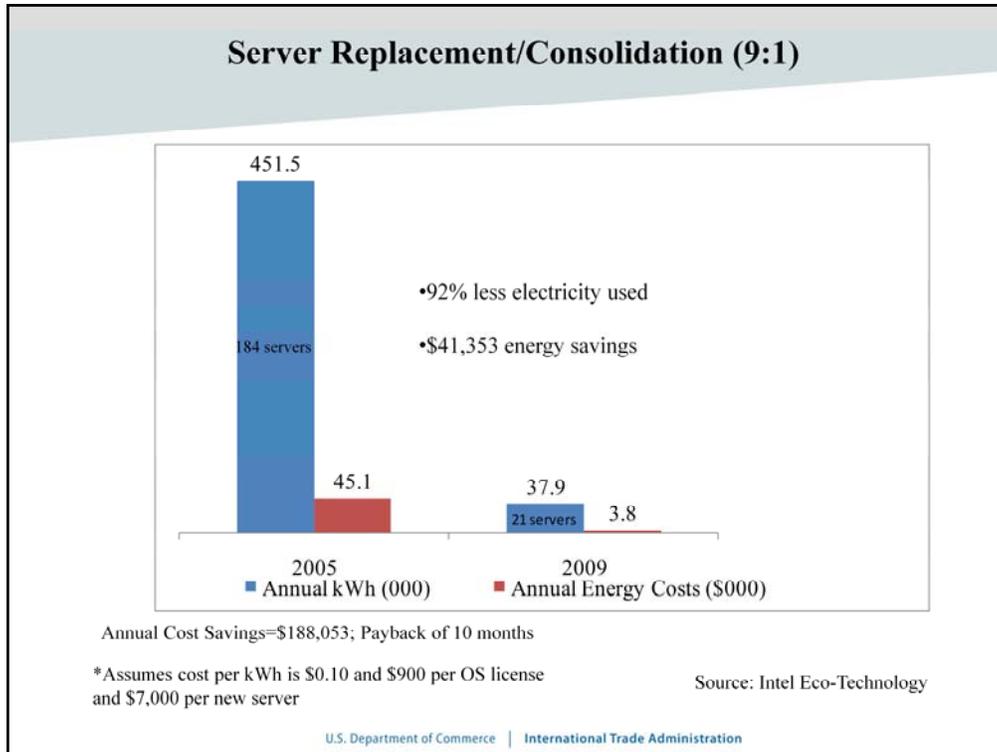
Here is a list of some best practices that government and private sector energy-efficiency experts recommend for data centers.

At the top is the suggestion that companies considering greening their IT infrastructure should begin this effort by developing a strategic energy plan with realistic reduction goals.

A number of the energy-efficiency measures listed involve costs such as upgrading to more energy-efficient computers and peripherals and implementing virtualization technologies.

Others have to do with less costly practices such as powering down and retiring underutilized servers.

As I will show in the next slide, adopting these best practices will very often bring savings that can offset the costs of implementing them and significantly reduce electricity consumption.



Server replacement and consolidation is one of the most effective energy-efficiency best practices.

In this example, 184 servers that were installed in 2005 have been replaced by and consolidated into 21 new more energy efficient systems, with greater computing capability, resulting in a 92% reduction in annual electricity consumption.

The costs of new hardware and the operating systems licenses in the first year total \$165,900. However, the consolidation cuts the costs of operating systems licenses by \$146,700 and brings electricity cost savings of more than \$41,000. The payback on employing this best practice is around ten months.

Best Practices for Reducing/Managing IT Equipment Energy Use: PC Environment



- Turn off desktops when not in use
- Purchase power monitoring and management hardware and software
- Upgrade to more energy-efficient power supply units
- Upgrade to more energy efficient (especially Energy Star) IT equipment---replacing PC installed base of desktops with laptops or thin clients, CRT monitors with LCD models, and laser printers with ink-jets
- Virtualize/consolidate desktops and applications
- Use web-conferencing and collaboration tools

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These practices deal with energy-efficiency in the PC environment.

As in the case of the data center, there are practices that firms can adopt without spending much money. They include turning off PCs at night and using free or inexpensive power management software.

Upgrading to more energy-efficient PCs, peripherals, and power supplies may be costly.

However, most companies have to refresh their PC installed base every 3-5 years anyway as their capacity and data processing needs expand with their business operations.

The next slide presents PC upgrade/replacement and power management scenarios and the electricity and cost savings they could achieve.

Replacing Typical 4-Year-Old PCs: Potential Savings through Use of LCDs and New Systems with Power Management Technology

PC System	Annual kWh	Total kWh for 1000 PCs	Annual Cost (kWh x \$0.10)	Annual Savings
Old Unmanaged Desktop w. CRT	1015	1,015,000	\$101,500	
Old Unmanaged Desktop w. LCD	938	938,000	\$93,800	\$7,700
New Unmanaged Desktop w. LCD	655	655,000	\$65,500	\$36,000
New Managed Desktop w. LCD	229	229,000	\$22,900	\$78,600
New Managed Laptop	38	38,000	\$3,800	\$97,700

Source: Intel Eco-Technology

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This slide shows exactly what the annual energy costs and savings would be if an installed base of 1,000 old desktop PCs with CRTs were replaced with an equal number of LCD monitors, new more energy-efficient desktop and laptop PCs, and power management technology.

Again, the electricity cost savings are significant when new managed desktop and laptop systems are introduced.

Use of managed desktops with LCDs drops the annual electricity cost down to \$22,900 and brings an annual savings of \$78,600 over the cost of the energy used by the older, unmanaged systems with CRTs.

The annual electricity cost of the new laptop PCs is even lower---\$3,800---and the annual savings are nearly \$98,000.

Green IT To-Do List:

10 Easy, Low/No Cost Ways to Save IT Energy and Cut CO2 Emissions

- Use free energy calculators/tools to determine your IT electricity consumption and carbon footprint and to establish a Green IT plan/program for your company.
- Unplug or responsibly retire unused servers, PCs, monitors, and printers.
- Unplug laptop and telephone chargers when not in use.
- Employ power management techniques by adjusting settings to “standby or sleep” mode when PCs and printers are inactive during business hours (decreasing screen brightness, disabling screen savers).
- Turn off PCs and peripherals at the end of the day.
- Connect computers to a power strip and turn off the strip after shutting down components.
- Set printer settings to default at double-sided (duplex) and greyscale (black and white) copies; use print preview and “shrink to fit”, switch to draft mode to increase printing speed.
- Increase use of the Internet and your website by placing information on web pages, wikis, and blogs instead of making paper copies.
- Periodically delete unwanted or duplicated emails, remove attachments from emails, and empty out the deleted items folder to reduce storage space required and thus the energy consumed by computer storage.
- Allow each employee to telecommute one day a week.

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I know that many of companies may not be able to afford a major investment right now in Greening IT installations so I am providing you with a list of 10 easy, low or no cost ways to save IT energy and to cut down on CO2 emissions. Here are some of the results a firm can expect:

The use of power management will bring at least a 20% reduction in electricity consumption and could result in average savings of \$50 per year for each PC, according to the Department of Energy (DOE).

That means that simple power management of the 108 million desktop PCs in U.S. organizations could net around \$5.4 billion. It would also eliminate nearly 20 million tons of CO2 each year, roughly equivalent to the impact of 4 million cars.

Finally, turning off desktop PCs at the end of the business day provides additional benefits since it slashes energy use 30-50%.

Presidential Executive Order 13514 (October 5, 2009)



- Requires target from U.S. Government agencies for reducing CO2 emissions by 2020;
- Ensures 95% of new IT purchases are Energy Star or FEMP-compliant;
- Implements best practices for energy-efficient servers and data center management.

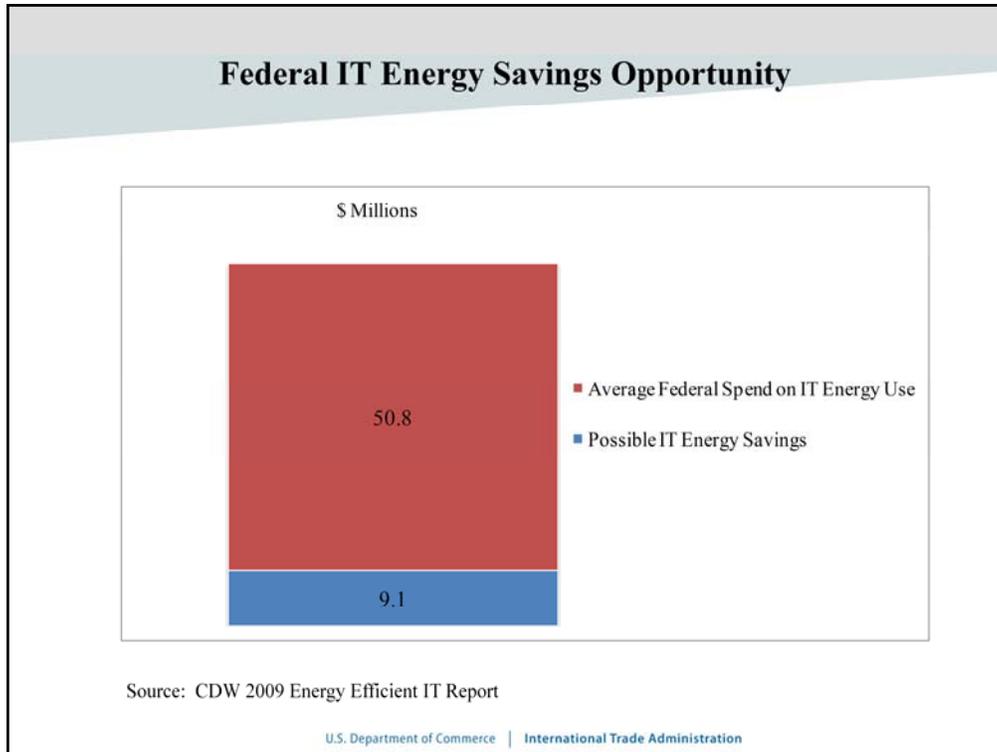
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In wrapping up this talk and as a lead in to the next presentation, I want to provide you with a brief overview of green IT efforts within the U.S. Government.

President Obama signed an Executive Order late last year that requires Federal Government agencies to set an example for the nation by significantly reducing their greenhouse gas emissions and energy use by 2020.

The order mandates they ensure that 95% of new IT equipment purchases are Energy Star or Federal Energy Management Program compliant and are certified by the Electronic Product Environmental Assessment Tool (EPEAT).

It also requires them to implement best practices for energy-efficient servers and data center management including power management policies.



What has been the progress of Federal Green IT efforts thus far?

A CDW survey of 150 Federal IT managers in mid-2009 found that nearly half of them have reduced their energy costs for powering PCs and other IT equipment by at least 1% or more.

They noted that each of their agencies spend on average nearly \$51 million annually on electricity for their IT infrastructure which represents about 13 percent of their total IT budget.

These managers believe that their agencies could actually cut their power costs by 18%, saving \$9.1 million a year, if they implemented all the available best practices such as purchasing Energy Star IT equipment, using power management, and virtualizing servers, PCs, and storage.

Major U.S. Organizations Involved in IT Energy Use and Efficiency

- **American Council for an Energy-Efficient Economy (ACEEE):** nonprofit dedicated to advancing energy efficiency
- **Alliance to Save Energy (ASE):** non-profit coalition of business, government, environmental and consumer leaders that supports energy efficiency
- **The Climate Savers Computing Initiative:** nonprofit group of eco-conscious consumers, businesses and conservation organizations dedicated to improving the power efficiency and reducing the energy consumption of computers
- **DOE:** USG agency that offers data center energy use software tools
- **EPA:** USG agency that develops voluntary IT equipment specifications designed to improve energy performance, develops building energy performance benchmarks for data centers, and offers energy savings calculators
- **Green Electronics Council:** focuses on special issues of electronics and sustainability and manages EPEAT, the green “electronics” certification and purchasing system
- **Green Grid:** global consortium focused on developing and promoting energy efficiency through user-centric models, metrics, and standards
- **Uptime Institute:** focuses on data center facilities, the IT and facilities interface, and how both functions affect the cost, reliability and energy consumption of computing; also provides metrics

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Those of you who are interested in receiving more information and assistance on greening an IT infrastructure should contact the following non-profit industry groups and government agencies.

(Mention some of these organizations)

Many of these organizations provide metrics and software tools for conducting an IT asset inventory, measuring both total IT and individual device energy use, and monitoring and managing IT power consumption

Selected Software Tools/Calculators

- DOE/EPA offer U.S. companies and organizations online calculators for desktop computers, monitors, fax machines, and copiers that allow non-data center IT users to enter information on utility rates, annual energy consumption of these devices, and their life cycle costs and to estimate the energy cost savings obtained from buying more efficient Energy Star products.
- ICT vendors have similar calculators that allow users to determine the energy consumption and costs of various computers, peripherals and networking equipment or to compare the energy cost savings of their products versus their competitors. Many of them also calculate a company's carbon footprint.
- Software firms and IT consultants have tools that allow users to inventory IT assets, measure and manage IT energy consumption, and quantify benefits .

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Here are more specific examples of public and private sector offerings so that you have a better idea of what is available to help you in your Green IT efforts. **(Review examples)**

Those products from U.S. Government agencies are free of charge and available on their websites.

Information on IT Energy Use and Efficiency (Websites)



- www.aceee.org (ACEEE)
- www.ase.org (Alliance to Save Energy)
- www.climatesaverscomputing.org
- www1.eere.energy.gov (DOE Energy Efficiency & Renewable Energy)
- www.energystar.gov and www.epa.gov/epp/tools/index.htm (EPA)
- www.thegreengrid.org
- www.gesi.org (Global e-Sustainability Initiative)
- www.epeat.net (Green Electronics Council)
- www.energy.cs.ucsb.edu (UC Santa Barbara Institute for Energy Efficiency)
- <http://uptimeinstitute.org>

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This slide provides the web addresses of the organizations I have recommended as good sources of information and assistance for you on IT energy use and efficiency.

The U.S. Department of Commerce's Sustainable Manufacturing Initiative

Goal - Identify U.S. industry's most pressing sustainability needs and challenges and coordinate public- and private-sector efforts to address industry's sustainability priorities.

Priorities - Addressing the "triple bottom-line":

- People: sustaining, creating jobs in old and new fields
- Planet: energy efficiency, pollution prevention, waste reduction
- Profits: company competitiveness, profitability

Green IT – Using ICT to make firms more energy efficient; and, connecting ICT firms to USG resources that support sustainable business practices.

The SMI Sustainable Business Clearinghouse – Free, online database of nearly 800 federal and state level programs and resources that enhance sustainability and competitiveness.

Visit www.manufacturing.gov/sustainability to access the Clearinghouse and learn more about what the SMI can do for you!

Finally, I also suggest that you check out my agency's Sustainable Manufacturing Initiative for information that addresses the broader greening of operations that a company should consider, including Green IT.

As noted on this slide, the SMI has established a Sustainable Business Clearinghouse that is a free, online database of nearly 800 federal and state level programs and resources that enhance sustainability and competitiveness. The database has the DOE and EPA websites I mentioned previously

I hope that you found my presentation useful.

I will do my best to answer any questions you may now have.

Please feel free to contact me at Tim.Miles@trade.gov if you want a copy of my presentation or would like to discuss our office's Green IT initiative further.

Thank you!