This is "IT and MIS", chapter 7 from the book An Introduction to Sustainable Business (index.html) (v. 1.0).

Chapter 7

IT and MIS

Technology holds increasing promise in helping organizations become more efficient and environmentally friendly. In addition, sustainability requires transparency of social, environmental, and economic impacts (in an effort to prevent or expose illegal or unethical practices while increasing trust), and this transparency requires access to information. These needs put information professionals in a central position to help further the company's sustainability goals, either through technology or through management of information.

7.1 Information Technology

According to a recent study,McKinsey & Company (2008). the carbon dioxide (CO_2) emissions of the U.S. information technology (IT) industry already exceed the emissions of entire nations, such as Argentina, the Netherlands, and Malaysia. At the current pace, emissions are expected to quadruple and the IT industry is expected to exceed the airline industry in emissions by 2020. The research shows that the U.S. IT industry is increasing its energy usage at a rate of 10%–20% annually. The study estimates that at this rising rate of energy usage, the United States will need to build 30 new coal-fired or nuclear power plants by 2015 solely to support the nation's IT usage.

The Smart 2020 reportGlobal eSustainability Initiative (2008). estimates that IT has the potential to reduce worldwide global emissions by 15% by 2020. According to this report, the greatest global opportunities for IT to help reduce emissions are in the areas of smart motor systems in China's manufacturing industry, smart logistics in Europe's transport and storage industries, smart building technologies in North America, and smart grid technologies in India.

In order to address growing concerns over the environmental impact of the IT industry and to take advantage of opportunities, the proactive and sustainability-focused business will develop green IT strategies. Green IT strategies are not only proactive and environmentally friendly but can also ultimately reduce the company's energy consumption and costs.

There are a number of suggestions for green IT strategies. For example, the same McKinsey & CompanyMcKinsey & Company (2008). study suggests that most companies could double energy efficiency of data centers by 2012. The researchers propose automobile CAFE-type industry standards (corporate average fuel economy [CAFE] standards require an automaker to meet minimum average fuel efficiency across its entire fleet of manufactured vehicles). These CAFE-type industry standards would be used for measuring efficiency in conjunction with the following suggestions: creating an energy-efficiency dashboard, sealing cable cutoffs, turning off and removing excess hardware, increasing temperatures, virtualization, and upgrading equipment.

Greening the data center is often the starting point of green IT strategies. The first step in your green IT strategy is to know current energy usage, where energy is used and by what specific equipment, what usage is efficient, and what usage is wasteful. There are a number of IT-enabled energy-reduction systems (such as

EnviroCube or EnerSure monitoring devices or Verdiem software tools), smart metering, and other technologies that can ultimately reduce cooling costs and electricity consumption. As if that is not incentive enough, the U.S. Environmental Protection Agency (EPA) is currently developing an ENERGY STAR rating for data center infrastructure, and the European Commission has developed a Code of Conduct for Green Data Centers. We will now look at some specific green IT strategies designed to increase efficiency and decrease energy consumption.

Storage

Storage resource management (SRM)[1] helps identify underutilized capacity, removes or reassigns unused storage, identifies old or noncritical data that could be moved to less expensive storage, removes inappropriate data, and helps predict future capacity requirements. SRM can increase storage utilization and decrease power needs. Companies that have used SRM have experienced utilization improvements of 30%–40%.Harrison (2008).

Storage virtualization[2] allows the work of several storage networks and devices to be integrated to appear as one virtual storage site. Storage virtualization can improve storage utilization by allowing storage to be assigned where it is needed.

Another tool is **continuous data protection**[3], which offers continuous or real-time byte-level backup of changes to documents. This often requires less storage space than traditional file-level backups.

Yet another option for reducing storage costs is **storage tiering**[4]. Tiered storage assigns categories of data to specific types of storage media. The categories are company-defined based on levels of security and protection, usage, performance, or other considerations. This process can be automatically managed through software programs. The benefit of tiered storage is that it allows companies to increase utilization rates and decrease power consumption and cooling costs.

Servers

One green IT approach being used is **server consolidation**[5], which reduces the number of servers used by running multiple applications on each server. Another approach to reducing energy usage and increasing energy efficiency is **server virtualization**[6]. Similar to storage virtualization discussed earlier, server virtualization allows virtual machines to run on one piece of hardware, at both the server and PC level.

1. A method of increasing storage utilization and decreasing power needs to increase efficiency and decrease energy consumption.

2. A method of increasing storage utilization by integrating several storage networks into one virtual storage site.

3. A method of increasing storage utilization by offering continuous or real-time byte-level backup of changes to documents.

4. A method of increasing storage utilization and decreasing power consumption by assigning categories of data to specific types of storage media, which can be automatically managed through software programs.

5. A means of reducing energy usage and increasing energy efficiency by reducing the number of servers used by running multiple applications on each server.

6. A means of reducing energy usage and increasing energy efficiency by allowing virtual machines to run on one piece of hardware, at both the server and the PC level.

Cloud computing[7] is an option that allows access to computer technology via the Internet without your company purchasing or managing the technology. Cloud computing can be used with data centers, networks, configuration, software, hardware, infrastructure, platforms, services, and storage. Cloud computing can ultimately reduce costs while increasing utilization and efficiency. The FTC and computing professionals are beginning to address security issues in this new arena of cloud computing.Condon (2009).

Desktops

Green PCs are designed to minimize the use of electricity and to meet the Environmental Protection Agency's ENERGY STAR standards (new ENERGY STAR standards for computers were updated in 2007). One example is thin clients, diskless machines that consume a fraction of the power of standard desktop machines. The average desktop computer uses 4 to 8 times more energy than a thin client.Naegel (2009). Another option to consider is a laptop rather than a desktop. Laptops consume approximately 5 times less energy than desktops.Chua (n.d.). Lastly, the use of an ENERGY STAR–rated LCD monitor will reduce energy consumption.

Ideally, desktops should use 4 watts of energy or less in sleep mode and 50 watts or less when idle. For laptops, the ideal is 2 watts or less in sleep mode and 14 to 22 watts or less in idle mode.Chua (n.d.). However, the EPA estimates that fewer than 10% of computers are set to use the sleep or hibernation mode.Chua (n.d.). This power-saving feature can easily be set up on your computer through the Control Panel's power options, although turning off your computer at the end of every workday is the best choice. Employees could also use a desktop device, such as EcoButton, to put the computer into sleep mode. Smart power strips can also conserve energy by turning off items after a period of inactivity. Smart strips are useful for printers, monitors, computers, and other items that can be powered down at the end of each day.

In addition to energy efficiency, green PCs are designed to contain fewer toxic materials (such as lead) in production and shipping and to contain more components that are made from recycled parts and that can again be recycled at the end of the machine's usefulness. The EPA's Electronic Product Environmental Assessment Tool allows you to compare computer models before making a purchase. See Note 7.8 "Greener Printing From Your Computer" for tips on how to be more environmentally friendly when printing from your desktop.

7. A means of accessing computer technology via the Internet without needing company investment in technology.

Greener Printing From Your Computer

Before you print that next document, here are some ways you can achieve greener printing from your computer.

1. **Make sure you are using an ENERGY STAR printer** (and computer). You may think this one's a no-brainer and you've got it covered, but wait . . . did you know that computer standards were revised in 2007 and new printer standards take effect this year? If your computer is older than 2007 and your printer is older than 2009, it may no longer meet ENERGY STAR standards, even though it met the standards that were in place at the time it was manufactured. If you should decide to upgrade, don't forget to recycle the old one!
2. **Change the margins**. Studies at both Penn State University and Michigan State University found that changing margins can save paper. The Penn State study suggested that changing all university printer default margins to 0.75" (adding 19% more print space to the page) could save the university over $122,000 a year, and Michigan State estimated a savings of $67,512 a year.
3. **Use paper with recycled content**. Although both the Penn State and Michigan State studies found that switching to recycled content paper was more expensive, this has not been the case in my consulting experience. Many businesses that are not under contractual purchasing agreements do have the flexibility to comparison shop. A recent client was able to save 10% on paper costs by switching from virgin fiber to recycled content paper. Other "green" options are to look for unbleached paper or, better yet, tree-free paper!
4. **Recycle and buy recycled**. Recycle your paper, toner cartridges, and ink-jet cartridges. And don't forget to buy recycled, too!
5. **Install software to manage and reduce paper usage**. Print management software programs (such as PaperCut, GreenPrint, and many others) can reduce printed pages and printer waste.
6. **Use vegetable-based ink toner**. SoyPrint is an environmentally friendly alternative to petroleum-based toner. Look for additional vegetable-based toners and ink-jet cartridges to hit the market soon.
7. **Change the font**. A Dutch company has created Ecofont, a new font that requires up to 20% less ink.Retrieved from

> http://www.ecofont.eu/english.html Ecofont is free to download and use.
>
> By utilizing a combination of these suggestions, students at the University of Arkansas at Little Rock found that the College of Business could save 39% to 43% per year in paper and ink costs.Barakovic et al., 2009. Above all, as your company upgrades computing equipment, seek out recycling centers or take-back programs for monitors, desktops, laptops, and other electronic items.

E-Recycling

Many electronic items (monitors, computers, keyboards, televisions, external hardware devices, calculators, cell phones, and virtually anything that requires power for operation) can be donated to charitable organizations or repaired for continued use. For those electronics that cannot be repaired, **electronics recycling**[8] (or e-cycling) is an option. The EPARetrieved March 23, 2009, from http://www.epa.gov/epawaste/conserve/materials/ecycling/donate.htm and Earth911 Web sites are the most comprehensive sources for finding where, what, and how to recycle in your local area. By donating unwanted electronics to charities or by recycling nonworking electronics, the sustainable business is doing its part to reduce electronics waste and divert it from the landfill.

8. The donation of unwanted electronics to charities or the recycling of nonworking electronics to reduce the amount of electronics waste in landfills. Commonly referred to as e-recycling.

7.2 Information Systems

In addition to the technology behind greening your computing operations, there are numerous software programs, or management information systems (MIS), to support corporate sustainability performance and to aid in executive decision-making tasks. MIS exist to measure any number of performance indicators related to social, environmental, and economic impact that are important to your company. Specific MIS can track carbon or greenhouse gas emissions (referred to as enterprise carbon accounting software), energy usage, compliance with voluntary and regulatory standards (such as ISO standards), environmental performance, supplier performance, or other sustainability indicators identified by your company. In addition to tracking sustainability-related performance indicators, software programs exist that are integrated with the Global Reporting Initiative (GRI) framework (see Chapter 8 "Accounting") for ease in reporting sustainability performance.

Prior to selecting software programs, you should be clear on what principles, standards, measurement and accounting tools, reporting, assurance, and stakeholder engagement protocols the company is following (see Chapter 8 "Accounting" and Chapter 9 "Next Steps: Sustainability Strategy"). Your company should select an appropriate MIS that supports the corporate conduct standards it is pursuing, measures and tracks the indicators of those standards, provides accessible data, and allows ease of reporting data progress on the standards (see Chapter 9 "Next Steps: Sustainability Strategy"). If the company does not subscribe to any particular voluntary or regulatory corporate conduct standards, the MIS should then meet the unique needs of the company for measurement, tracking, and reporting self-selected indicators.

An excellent resource for staying abreast of sustainability-related news in IT and information systems is Greener Computing. Other resources for computing professionals are Computer Professionals for Social Responsibility, the Green Grid, Climate Savers Computing Initiative, Green Computing Impact Organization, and the Green Electronics Council. For technology administrators, the Green ICT Strategies Course is free open-source courseware sponsored by the Australian Computer Society.

IT and MIS are both in a central position to help the organization reach its sustainability goals. That is, IT can help the organization operate in a more efficient and environmentally friendly manner, while MIS can serve an important role in transparency and gathering information for monitoring and reporting sustainability performance.