

“Green it- a Solution Towards Growth with Sustainability”

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INTRODUCTION

Green computing, Green IT or ICT (Information, Communication, Technology) Sustainability is the study and practice of environmentally sustainable computing or IT. San Murugesan noted that this can include "designing, manufacturing, using, and disposing of computers, servers, and associated subsystems—such as monitors, printers, storage devices, networking and communications systems efficiently and effectively with minimal or no impact on the environment."

The goals of green computing are similar to green chemistry i.e. to reduce the use of hazardous materials, maximize energy efficiency during the product's lifetime, and promote the recyclability or biodegradability of defunct products and factory waste.

Many corporate IT departments have green computing initiatives to reduce the environmental impact of their IT operations. Green ICT and its services present opportunities to deliver low carbon footprints and mitigate carbon emissions because of the unique ability to make energy consumption and green house gas emissions visible through its products and services.

ORIGIN

In 1992, the U.S. Environmental Protection Agency launched Energy Star, a voluntary labeling program that is designed to promote and recognize energy-efficiency in monitors, climate control equipment, and other technologies. This resulted in the widespread adoption of sleep mode among consumer electronics. Concurrently, the Swedish organization TCO Development launched the TCO Certification program to promote low magnetic and electrical emissions from CRT-based computer displays; this program was later expanded to include criteria on energy consumption, ergonomics, and the use of hazardous materials in construction.

- The definition, courtesy of “Green IT for Sustainable Business Practice” by Mark G. O’Neill and published by BCS is:
“Green ICT is a collection of strategic and tactical initiatives that directly reduces the carbon footprint of an organization’s computing operation. However, Green IT is not just focused on reducing the impact of the ICT industry. It is also focused on using the services of ICT to help reduce the organization’s overall carbon footprint.”
- The Greenpeace definition of Green IT
According to its April 2012 report “How Clean is Your Cloud?” Greenpeace has a straightforward definition of Green IT:

Green IT = Energy Efficiency + Renewable Energy

So the working definition of Green IT can be stated as:

Green IT is a set of practical measures designed to ensure that Information Technology is developed, delivered and used in a way that is environmentally friendly, sustainable and energy efficient. The practical measures and its ‘strategic and tactical initiatives’ include:

For organizations and individuals:

- Procure IT equipment and other infrastructure products based on both their power consumption efficiency and their embedded emissions. Use standards such as EPEAT (Electronic Product Environmental Assessment Tool) and ENERGY STAR to help with buying decisions
- Prolong the life of IT equipment, or when appropriate move to lower energy consumption products
- Move to duplex printing as the default
- Move to cloud computing and software as a service where appropriate
- Turn off unused equipment
- Recycle IT consumables

For organizations only

- Put Green IT high on the agenda, with board representation
- Structure the organization to support Green IT initiatives
- Change IT processes (such as Service Asset and Configuration Management) at the micro level to embed Green IT
- Manage data centre power efficiency. Review metrics to ensure that they help to manage energy consumption reductions effectively
- Move to server virtualization, cloud computing and software as a service where appropriate
- Implement server (and PC) power management
- Use renewable and cleaner power sources

WHY GREEN IT?

Following are some reasons why Green IT has become an imperative approach for both the organizations and the consumers as well:

- computer energy is often wasteful
 - leaving the computer ON when not in use (CPU and fan consume power, screen savers consume power)
- printing is often wasteful
 - Not many people print their emails or meeting agendas
 - printing out partial drafts
 - for a “paperless” society, we tend to use *more* paper today than before computer-prevalence
- pollution
 - manufacturing techniques
 - packaging
 - disposal of computers and components
- toxicity
 - As it is seen, there are toxic chemicals used in the manufacturing of computers and components which can enter the food chain and water.

Power Consumption

For commercial buildings, The State of California says “Office equipment accounts for 26 percent of electricity used in office buildings. This is more than the entire lighting system (22 percent) and almost as much as the chilled water subsystem (28 percent). Yet this is the easiest area to achieve energy efficiency savings”.

The most comprehensive study of the issue of direct power consumption by IT equipment in the U.S is the Lawrence Labs 2001 study by Kawamoto, et al. Their study concludes that office and networking equipment represents 3% of total U.S. electricity consumption.

The cooling load required to remove heat generated by IT systems, particularly data centers, is becoming a significant concern in commercial buildings. The U.S. EPA (Environmental Protection Agency) is sponsoring research on the problem and possible solutions.

Electronic waste, (e-waste)

Electronic-disposal or **waste electrical and electronic equipment (WEEE)** describes discarded electrical or electronic devices. There is a two way here as to whether the term should apply to resale, reuse, and refurbishing industries, or only to a product that cannot be used for its intended purpose. Informal processing of electronic waste in developing countries may cause serious health and pollution problems, though these countries are also most likely to reuse and repair electronics.

WHAT IS GREEN IT?

Green IT is changing physical processes to virtual ones, a much more significant one than most people realize, and building awareness of this is the first step to reduce the impact.

Green IT goes beyond purchasing and usage though it can be used to lessen other aspects of our environmental impact. The other way is what we call dematerialization, changing physical processes to virtual ones. Everyone is familiar with how the internet has revolutionized the distribution of music, what they may not be aware of are the significant environmental savings from avoiding packaging, transport, material production and shop space that this entails. This process can be done in many other areas, such as business meetings, home working, conferences, training, distribution, business processes and a whole host of other innovative areas. It is a win-win situation, more efficient businesses and less environmental impact.

Green IT goes on to address how the use of smart technology could make many other processes more efficient.

"The global information and communications technology (ICT) industry accounts for approximately 2 percent of global carbon dioxide (CO₂) emissions, a figure equivalent to aviation" - Gartner 2007

When we say ICT equipment? The list includes items such as:

- Desktop and Laptop PCS
- Printers, scanners, copiers, projectors
- Smart phones, PDAs, desktop phones
- Wireless and connected routers, hubs, and other networking equipment
- Mail servers, file servers, firewalls, databases etc.
- Data Centres and the equipments in them

The environmental impacts come in the same way as the impacts come from any equipment's - manufacturing, use and disposal. Green IT has specific challenges in the areas of:

- How the materials in IT equipments are mined/produced
- The conditions in which they are manufactured and the energy in the process
- The transportation to consumers
- The energy required in the usage
- The disposal at the end of their life time

Green ICT is concerned with all these effects and how to minimize the negative effects by encouraging equipments that:

- are sustainably produced

- lasts longer
- wastes less energy
- are used in an efficient way
- are disposed off responsibly

GREEN IT- PRINCIPLES AND PRACTICES

Green IT is implemented into the IT framework as set of best practices for optimizing the usage of computing resources. The environmental impact towards IT, creates many issues such as growing accumulation of greenhouse gases or modifying the climate world and weather pattern

Murugesan lays out four paths along which he believes the environmental effects of computing should be addressed. Green use, Green disposal, Green design, and Green manufacturing. Green computing can also develop solutions that offer benefits by aligning all IT processes and practices with the core principles of sustainability, which are to reduce, reuse, recycle and finding innovative ways to use IT in business processes to deliver sustainability benefits across the enterprise and beyond.

The Green IT principles show the concept of reducing the environmental impact, which are focused on different areas and activities.

1. **Green use** – Reduce the energy consumption of data centers, computers and other information systems and use them in the environmental ways e.g. virtualization, turning off computer when not in use, etc.
2. **Green design** – Design energy efficient and environmentally sound components, computers, servers and equipments and concern more for the future of electronic parts e.g. eco-friendly design, LED monitor, etc.
3. **Green manufacturing** – Every process in manufacturing electronic components, computers and other associate subsystems should imply a low or no impact on the environment.
4. **Green disposal** – In this practice the company should plan refurbishment and reuse of old computers. Also, recycling process for unwanted computers or other electronics components should be implanted.

The principles of Green IT were created not only to protect the environment and to save energy, but also to reduce the company's expenses on the long-term scenario. Recently, computer industry realized that going to be Green is the best direction to get success in both of environmental friendly and cost reducing matters. The companies try to engage these four green holistic principles with the entire IT life cycle.

HOW BUSINESS AND GOVERNMENT RELATE WITH GREEN IT

Green Business

Businesses that sell environmentally friendly products are held to a high standard of ethical behavior and community responsibility. All green businesses have active Sustainability programs that undergo constant improvement. Often, the full impact of Information and Computer Technology on the eco-footprint is only partially understood. The Green IT seminars can train staff and board members on the opportunities to reduce energy and waste by employing Green IT practices. Green IT Building Blocks can help the IT organization develop ideas for innovative leadership. The Green IT service packages can guide the organization through the entire Sustainable IT life cycle of assessment, planning and implementation.

Government

City governments and government agencies have a high profile when it comes to meet politically generated sustainability goals, for the same they provide support both to the public as well as private sector to use green technology.

Vietnam already has investment policies and financially supports enterprises adopting green technology in corporate law, environment protection law, and effective energy-use law. As per new preferential policies, enterprises adopting green technology in the hi-tech industry will enjoy a 10 per cent tax

exemption for 15 years and continue to receive special tax benefits for the next 13 following years. Moreover, enterprises will also enjoy preferential tax on exports and imports as well. The UK government has launched the Green Deal, a revolutionary programme. Under the Green Deal, bill payers will be able to get energy efficiency improvements without having to front up the cash. Instead, businesses will be provided capital, getting their money back via the energy bill. At the heart of the offer is a simple rule: estimated savings on bills will always equal or exceed the cost of the work. It's a flexible framework which gives businesses and consumers the opportunity to make the energy efficiency improvements that best suit their situation.

Some facts and figures related to the Information, Communication and Technology (ICT) industry ICT is the fastest growing sector of energy use

Global carbon emissions attributable to ICT have been estimated at 2% to 2.5% of world totals - about the same as the airline industry - and as high as 5-6% of developed nation totals. McKinsey forecasts that the ICT sector's carbon footprint will triple till the period of 2020.

For office buildings, ICT typically accounts for more than 20% of the energy used, and in some offices up to 70%. Although energy costs typically comprise less than 10% of an overall IT budget, in a few years they could rise to more than 50% (according to a 2006 Gartner report). Many large organizations such as Google already claim that their annual energy costs exceed their server costs.

Energy savings is the low-hanging fruit ready to be picked

Between 30% and 60% of the electricity consumed in server rooms is wasted - but integrated planning using current and emerging technologies can reduce power consumption in data centres by 50-80% and required floor space by up to 65%.

According to the Aug 2007 EPA Report to Congress on Data Center Efficiency, implementing best energy-management practices in existing data centers could reduce their current energy usage by 30%. Up to 70% reduction in energy usage could be achieved by using high efficiency technologies for cooling and power equipment and virtualization techniques.

Customers shop for Green Supply Chains

Public and private sector procurement departments are incorporating Environmentally Preferred Purchasing (EPP) requirements into IT contracts. To do that requires purchasing to work with both IT and Sustainability specialists to understand what is desirable and possible. Major global corporations - Coca Cola, Sharp, and BT, to name a few - have launched programs to evaluate the life-cycle environmental footprint of products they sell and assess the environmental policies of their suppliers. Communicating and educating suppliers on expectations is a basic part of any sustainable supply-chain initiative.

Often, companies get compliance from their supply chain by enforcing adherence requirements. Examples of these are the requirements to use less material, to use post consumer recyclable content, and to purchase all packaging materials from certified forests

EPP - Environmentally Preferred Purchasing - Sets the Bar

EPP policies are now routinely included in RFPs (Request for proposal) from Federal, State and local agencies and from corporations. Many RFPs require or give preference to vendors that meet Energy Star or EPEAT guidelines. A product supplier's proposal can be entirely excluded from consideration for a government RFP if the products do not meet the relevant criteria.

Customers Demand Sustainable Behavior

Corporate Social Responsibility reports are increasingly expected from companies now. Sometimes, as in the case of the Carbon Disclosure Project, companies are asked to produce such a report of the same comprehensiveness and attention to detail as their financial reports.

ISO 14000, a specification for establishing environmental policy and determining the impact of a company's products, activities and services, was adopted by the EU in 2001. It establishes standards for

environmental auditing, labeling and life cycle assessment. Enterprises certified to ISO 14000 demonstrate commitment to Green policy. With a mind toward increasing brand equity, Dell recently announced its intention to be the “greenest computer company on earth”, an initiative that puts it in competition with Hewlett-Packard for the same high ground. Other companies adopting similar mantles include IBM, Sun Microsystems, and AMD, to name a very few.

Green IT innovation leads the way to Sustainability

Radical improvements in waste reduction and energy use rely on innovative applications of information technology:

- Telework can reduce not only automobile travel but overall energy use by reducing the amount of dedicated office space.
- Smart energy applications adjust energy consumption to real time need patterns and climate conditions, resulting in drastic reductions in waste.
- Virtualization can eliminate wasteful network equipment, reducing energy and floor space.

EXAMPLES:

- **SONY- TVs that use up to 30% less energy**
- Some of SONY’S latest TVs come with Dynamic Edge LED screens with Local and Frame Dimming, which enables to reduce energy usage by up to 15-20%. What’s more, intelligent technology built-in to each TV knows what we are watching and adjusts the picture and lighting settings automatically, saving around 30% of the energy used in normal viewing.

VAIO energy-saving features

Some VAIO models have a ‘display off’ button that instantly turns off the screen. It’s an easy way to save power and make the battery last longer if the user is just listening to music. With the Ambient Light Sensor, laptop can save power by automatically adjusting the screen brightness to suit light levels. The VAIO range is packed with eco-conscious and energy efficient technologies. Creating eco-conscious laptops means considering the impact of our products at every single stage of their lifecycle. VAIO W Series notebooks have chassis made of plastic consisting of about 20 percent recycled compact disks and will be shipped in a "stylish reusable" carrying cases made from recycled plastic bottles. The W series is so green that it doesn't have a printed manual.

DELL - Sustainable solutions for green packaging and product delivery

Dell follow a "3Cs" strategy around reducing the impact through the cube (the box itself), the content (what it's made of) and the curb (how easy it is to recycle).

- **Creative packaging design:** Reduce the size of the box and you get more boxes in the same space for shipping. Put more products in one box — like using Multipack for some orders — and there’s less waste overall.
- **Innovative materials:** It pioneered the use of natural materials in its packaging, like bamboo and mushroom cushions and its wheat straw initiative. They make it easy for customers to recycle the packaging they do receive.

Better logistics: Shifting many international shipments from aircraft to ocean freight is just one example of how the company works, to constantly refine the transportation network, delivers better ways for getting products to the users safely and with a minimal footprint.

DELL’S RECYCLING PROCESS

Dell recovers used electronics and recycles them properly. By recycling products safely, it protects the health of people and the planet. Dell provides multiple convenient recycling options for customers to safely dispose their end-of-life computer equipment and lower their environmental footprint.

TOSHIBA'S 5000-Series Digital Telephones Use Up to 10% Less Energy
Efficient energy consumption is a key initiative of Vision 2050. Toshiba's 5000-series telephones consume approximately 10% less energy than earlier series, contributing to greater efficiency and lower cost of ownership. Select 5000-series digital telephones also offer further efficiency with an automatic backlight OFF sleep function.

TOKYO--(BUSINESS WIRE)--TOSHIBA TEC (TOKYO:6588) has announced the world's first eco-friendly MFP system that can erase images and text on the prints with integrated scan-to-network function, available in Japan from February 2013 to be followed by a worldwide roll out. The e-STUDIO 306LP MFP combines with the e-STUDIO RD30 for removing the toner color from the printed documents. The instantly erasable toner is a special toner whose color is removed by passing the paper through the RD30 at high temperature.

If the same paper is used five times, this constitutes some 57% reduction in the system's total CO₂ emissions.

CONCLUSION

Modern IT systems rely upon a complicated mix of people, networks, and hardware; as such, a green computing initiative must cover all of these areas as well. A solution may also need to address end user satisfaction, management restructuring, regulatory compliance, and return on investment (ROI). There are also considerable fiscal motivations for companies to take control of their own power consumption. Ultimately the concept of Green IT touches all our lives and brings together two great themes concerning the future of our current world, technology and the environment. It's important for people to understand what Green IT is, for businesses to engage with it, and for our decision makers to be aware of its consequences and potential in helping us get to a sustainable world.

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