

Green Computing – An Eco Friendly Concept

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Abstract

Green computing [8] is an issue that impacts everyone. And it's an issue shaped by nearly everyone in the developed and emerging economies. E-waste threatens the planet as both a source of toxins and through sheer tonnage. The UN Environment Program estimates the globe may be producing as much as 50 million tons a year in e-waste.

Companies within the computer, electrical appliance and consumer electronics industries have always accounted success by their bottom line profits. But in a plainly endangered world, a new greener way of accounting seems to makes more sense. Actions now must be measured in terms of their impact on people, planet, and profits rather than just the bottom line.

Green Computing [2] is a recent trend towards designing, building, and operating computer systems to be energy efficient. While programs such as Energy Star have been around since the early 1990s, recent concerns regarding global climate change and the energy crisis have led to renewed interest in Green Computing.

Thrust of computing was initially on faster analysis and speedier calculation and solving of more complex problems. But in the recent past another focus has got immense importance and that is achievement of energy efficiency, minimization of power consumption of e-equipments. It has also given utmost attention to minimization of e-waste and use of non-toxic materials in preparation of e-equipments. World leaders have also taken move towards this by following some principles. Now it is the time for the end user community to follow some rules of thumb to achieve partly the benefit of "Green Computing". In India, the implementability of principle of "Green Computing" is facing a dilemma due to many socio-economic matters and those are linked to be sougheed out topull India in the mainstream movement of "Green Computing".

Keywords : E-waste, Toxic, Non-conventional Energy, Eco-Friendly, SMEs and MNCs.

1. Introduction

Green computing or **green IT**, refers to environmentally sustainable computing or IT. In the article *Harnessing Green IT: Principles and Practices*, San Murugesan defines the field of green computing as "the study and practice of designing, manufacturing, using, and disposing of computers, servers, and associated

subsystems—such as monitors, printers, storage devices, and networking and communications systems—efficiently and effectively with minimal or no impact on the environment." we love our computers for all the ways they make our lives (and the world) better -- the wealth of knowledge (and democratizing force) of

the Internet, the instantaneous communication, the sophisticated tools that help us work and create and share. But this modern world's greatest tool is among our most disposable and resource-heavy items. Performance-wise, computer design has progressed staggeringly well and astonishingly fast but looking at it from a green perspective, the work has barely begun. It takes a lot of energy to create, package, store, and move every 10-20 megabytes of data. Even with energy prices as cheap as they are now, it will soon cost more to power a computer for four years than it does to buy a new one. When a computer dies it either rots in a landfill, or children in the developing world end up wrestling its components apart by hand, melting toxic bits to recover traces of heavy metals. The goals of green computing are similar to green chemistry; 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. Research continues into key areas such as making the use of computers as energy-efficient as possible, and designing algorithms and systems for efficiency-related computer technologies. Green computing is the practice of using computing resources efficiently. The goals are to reduce the use of hazardous materials, maximize energy efficiency during the product's lifetime, and promote recyclability or biodegradability of defunct products and factory waste. Such practices include the implementation of energy-efficient central processing units (CPUs), servers and peripherals as well as reduced resource consumption and proper disposal of electronic waste (e-waste). In 1992, the

U.S. Environmental Protection Agency launched Energy Star, a voluntary labeling program which 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. The term "green computing" was probably coined shortly after the Energy Star program began; there are several USENET posts dating back to 1992 which use the term in this manner.

2. The Demerits

Performance-wise, computer design has progressed staggeringly well and astonishingly fast but looking at it from a green perspective, the work is at its epoch. It takes a lot of energy to create, package, store, and move. Conventionally, manufacturing computers includes the use of lead, cadmium, mercury, and other toxics in general. Usually, computers can contain 4 to 8 pounds of lead alone, according to green experts. It's no wonder that computers and other electronics make up two-fifths of all lead in landfills. To counter this growing pollution threat all over the world due to the growing use of electronic device in general and computers in particular there is a need to look for a eco-friendly computer. "Data center servers use 50 times the energy per square foot as an office [does]," says Mark Bramfitt, principal program manager at PG&E. Data centers are the main reason behind energy consumption, Energy consumed by data centers in the United States and worldwide doubled from 2000 to 2005, according to Jonathan Koomey, a consulting professor at Stanford University and staff scientist at Lawrence Berkeley

National Lab. As a result, some companies are chasing cheaper data center power. Google is building a data center on Oregon's Columbia River to tap hydroelectric power, while Microsoft builds nearby in Washington for the same reason. Financial services company HSBC is building a data center near Niagara Falls.

To keep servers at the right temperature, companies mainly rely on air-conditioning equipments. The more powerful the machine, the more cool air needed to keep it from overheating. By 2005, the energy required to power and cool servers accounted for about 1.2% of total U.S. electricity consumption, according to a report released in February by staff scientist Jonathan Koomey of Lawrence Berkeley National Laboratory and sponsored by chip manufacturer AMD (AMD). According to Gartner by 2010, about half of the Forbes Global 2000 companies will spend more on energy than on hardware such as servers. Energy costs, now about 10% of the average IT budget, could rise to 50% in a matter of years, Kumar says.

Faster processors use more power, because they use too much power and their waste heat increases temperature for which air conditioning necessary, especially in server farms--between the computers and the HVAC. The waste heat also causes reliability problems, as CPU's crash much more often at higher temperatures.

3. The Designers plan

Designers plan to make future computer more eco-friendly across its entire life span, from manufacture to recycling [7]:

a) By replacing petroleum-filled plastic

with bioplastics plant-based polymers require less oil and energy to produce than traditional plastics with a challenge to keep these bioplastic computers cool so that electronics won't melt them.

- b) Landfills can be controlled by making best use of the device by upgrading and repairing in time with a need to make such processes (i.e., upgradation and repairing) easier and cheaper.
- c) Avoiding the discarding will not only control e-waste out of dumps but also save energy and materials needed for a whole new computer.
- d) Power-sucking displays can be replaced with green light displays made of OLEDs, or organic light-emitting diodes.
- e) Use of toxic materials like lead can be replaced by silver and copper.
- f) Making recycling of computers (which is expensive and time consuming at present) more effective by recycling computer parts separately with a option of reuse or resale.

So far, consumers haven't cared about ecological impact when buying computers, they've cared only about speed and price. But as Moore's Law marches on and computers commoditize, consumers will become pickier about being green. Devices use less and less power while renewable energy gets more and more portable and effective. New green materials are developed every year, and many toxic ones are already being replaced by them. The greenest computer will not miraculously fall from the sky one day, it'll be the product of years of improvements.

4. Materials Recycling

Recycling [5] computing equipment can keep harmful materials such as lead, mercury, and hexavalent chromium out of landfills, and can also replace equipment that otherwise would need to be manufactured, saving further energy and emissions. Computer systems that have outlived their particular function can be repurposed, or donated to various charities and non-profit organizations. However, many charities have recently imposed minimum system requirements for donated equipment. Additionally, parts from outdated systems may be salvaged and recycled through certain retail outlets and municipal or private recycling centers. Computing supplies, such as printer cartridges, paper, and batteries may be recycled as well.

A drawback to many of these schemes is that computers gathered through recycling drives are often shipped to developing countries where environmental standards are less strict than in North America and Europe. The Silicon Valley Toxics Coalition estimates that 80% of the post-consumer e-waste collected for recycling is shipped abroad to countries such as China and Pakistan.

Unfortunately, in 2011, the collection rate of e-waste is still very low, even in the most ecologically advanced countries like France. In this country, e-waste collection is still at a 14 % annual rate between electronic equipments sold and e-waste collected for 2006 to 2009 [3].

The recycling of old computers [2] raises an important privacy issue. The old storage devices still hold private information, such as emails, passwords and credit card numbers, which can be recovered simply by someone using

software that is available freely on the Internet. Deletion of a file does not actually remove the file from the hard drive. Before recycling a computer, users should remove the hard drive or hard drives if there is more than one, and physically destroy it or store it somewhere safe. There is some authorized hardware recycling companies to whom the computer may be given for recycling, and they typically sign a non-disclosure agreement.

Electronics giants are about to roll out eco-friendly range of computers (like desktops and laptops) that aim at reducing the e-waste in the environment. [4] They are likely to be free of hazardous materials such as brominated flame-retardants, PVCs (Polyvinyl Chloride) and heavy metals such as lead, cadmium and mercury, which are commonly used in computer manufacturing.

5. Conclusion

The field of "green technology" encompasses a broad range of subjects from new energy-generation techniques to the study of advanced materials to be used in our daily life. Green technology focuses on reducing the environmental impact of industrial processes and innovative technologies caused by the Earth's growing population. It has taken upon itself the goal to provide society's needs in ways that do not damage or deplete natural resources. Mainly this means creating fully recyclable products, reducing pollution, proposing alternative technologies in various fields, and creating a center of economic activity around technologies that benefit the environment. Nowadays [6] we can see people used computer everywhere

and anywhere. This shows that computer nowadays it compulsory to all people including businessman, university student, employer government and non-government, kids, school and lecturer. So far, consumers hardly cared about ecological impact when buying computer but they care only about speed and price. But now some of people realised that they need to do something that have to reduce pollution and recycle things. This is because computers were made up from

many chemical and harmful things; this can affect the environment and human healthy. If computers were broken for sure people will throw it away and burned it but they never realised once they burned it out it release toxic contaminants into the air. This green computing [1] has many attentions all over the world with one mission “go green, save green”.

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