A Study On Green Computing: The Future Computing And Eco-Friendly Technology

S.V.S.S. Lakshmi[1], Ms. I Sri Lalita Sarwani[2], M.Nalini Tuveera[3]

(Department of IT & MCA ,ANITS)

ABSTRACT

Green computing, the study of efficient and eco-friendly computing resources, is under the attention of environmental organizations, and businesses from other industries. In recent years, companies in the computer industry have come to realize that going green is in their best interest, both in terms of public relations and reduced costs. This paper presents at several green initiatives currently under way in the computer industry, as well as issues that have been raised regarding these initiatives and presents a study with an example to learn more about the future of green computing.

Keywords : Energy Star, Environment , Green Computing ,Recycle, Sustainable.

I. INTRODUCTION

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 the natural resources. 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. The huge amount of computing manufactured worldwide has a direct impact on environment issues, and scientists are conducting numerous studies in order to reduce the negative impact of computing technology on our natural resources. A central point of research is testing and applying alternative nonhazardous materials in the products' manufacturing process.

2. History of Green computing

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;

For a PC disposal, it is necessary to know everything there is to know in order to be involved in green computing. Basically, the whole green aspect came about quite a few years back when the news that the environment was not a renewable resource really hit home and people started realizing that they had to do their part to protect the environment. Basically, the efficient use of computers and computing is what green computing is all about. The triple bottom line is what is important when it comes to anything green and the same goes for green computing. This considers social responsibility, economic viability and the impact on the environment. Many businesses simply focus on a bottom line, rather than a green triple bottom line, of economic viability when it comes to computers. The idea is to make the whole process surrounding computers friendlier to the environment, economy, and society. This means manufacturers create computers in a way that reflects the triple bottom line positively. Once computers are sold businesses or people use them in a green way by reducing power usage and disposing of them properly or recycling them. The idea is to make computers from beginning to end a green product.

II. BACKGROUND

1. Governments go green

Figure 1 : Energy Star

Many governments worldwide have initiated energy-management programs, such as Energy Star, an international standard for energy-efficient electronic equipment that was created by the United States Environmental Protection Agency in 1992 and has now been adopted by several other

countries. Energy Star reduces the amount of energy consumed by a product by automatically switching it into "sleep" mode when not in use or reducing the amount of power used by a product when in "standby" mode. Surprisingly, standby "leaking," the electricity consumed by appliances when they are switched off, can represent as much as 12 percent of a typical household's electricity consumption. In Australia, standby power is a primary factor for the country's increased greenhouse gas emissions — more than 5 megatons (CO_2 equivalent) annually.

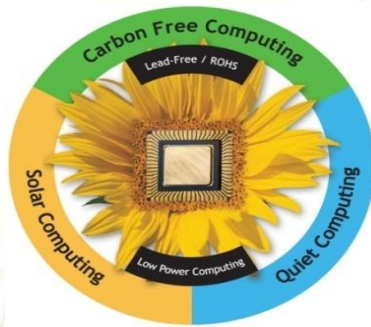## 2. An example of VIA technologies Green Computing

Figure 2: Green computing

VIA Technologies, a Taiwanese company that manufactures motherboard chipsets, CPUs, and other computer hardware, introduced its initiative for "green computing" in 2001. With this green vision, the company has been focusing on power efficiency throughout the design and manufacturing process of its products. Its environmentally friendly products are manufactured using a range of clean-computing strategies, and the company is striving to educate markets on the benefits of green computing for the sake of the environment, as well as productivity and overall user experience.

2.1. Carbon-free computing

One of the VIA Technologies' ideas is to reduce the "carbon footprint" of users — the amount of greenhouse gases produced, measured in units of carbon dioxide (CO_2). Greenhouse gases naturally blanket the Earth and are responsible for its more or less stable temperature. An increase in the concentration of the main greenhouse gases — carbon dioxide, methane, nitrous oxide, and fluorocarbons — is believed to be responsible for Earth's increasing temperature, which could lead to severe floods and droughts, rising sea levels, and other environmental effects, affecting both life and the world's economy. After the 1997 Kyoto Protocol for the United Nations Framework Convention on Climate Change, the world has finally taken the first step in reducing emissions. The emissions are mainly a result of fossil-fuel-burning power plants.

(In the United States, such electricity generation is responsible for 38 percent of the country's carbon dioxide emissions.)

VIA aims to offer the world's first PC products certified carbon free, taking responsibility for the amounts of CO_2 they emit. The company works with environmental experts to calculate the electricity used by the device over its lifetime, generally three years. From this data, one can conclude how much carbon dioxide the device will emit into the atmosphere during its operation. This estimate will serve as an indicator, and the company will pay regional organizations for the "sequestering," or offsetting, of the emissions. Offsetting carbon dioxide can be achieved in different ways. One way is to plant trees that absorb CO_2 as they grow, in the region in which the processors were purchased. The necessary amount of trees per processor is represented by VIA's TreeMark rating system. VIA promotes the use of such alternative energy sources as solar power, so power plants wouldn't need to burn as much fossil fuels, reducing the amount of energy used. Wetlands also provide a great service in sequestering some of the carbon dioxide emitted into the atmosphere. Although they make up only 4 to 6 percent of the Earth's landmass, wetlands are capable of absorbing 20 to 25 percent of the atmospheric carbon dioxide. VIA is working closely with organizations responsible for preserving wetlands and other natural habitats, and others who support extensive recycling programs for ICT equipment. The amount paid to these organizations will be represented by a proportion of the carbon-free product's price.

Carbon-emissions control has been a key issue for many companies who have expressed a firm commitment to sustainability. Dell is a good example of a company with a green image, known for its free worldwide product-recycling program. Dell's Plant a Tree for Me project allows customers to offset their carbon emissions by paying an extra $2 to $4, depending on the product purchased. AMD, a global microprocessor manufacturer, is also working toward reducing energy consumption in its products, cutting back on hazardous waste and reducing its eco-impact. The company's use of silicon-on-insulator (SOI) technology in its manufacturing, and strained silicon capping films on transistors (known as "dual stress liner" technology), have contributed to reduced power consumption in its products.

2.2. Solar Computing

Amid the international race toward alternative-energy sources, VIA is setting its eyes on the sun, and the company's Solar Computing initiative is a significant part of its green-computing projects. For that purpose, VIA partnered with Motech Industries, one of the largest producers of solar cells worldwide. Solar cells fit VIA's power-

efficient silicon, platform, and system technologies and enable the company to develop fully solar-powered devices that are nonpolluting, silent, and highly reliable. Solar cells require very little maintenance throughout their lifetime, and once initial installation costs are covered, they provide energy at virtually no cost. Worldwide production of solar cells has increased rapidly over the last few years; and as more governments begin to recognize the benefits of solar power, and the development of photovoltaic technologies goes on, costs are expected to continue to decline. As part of VIA's "pc-1" initiative, the company established the first-ever solar-powered cyber community center in the South Pacific, powered entirely by solar technology.

2.3. Quiet computing

A central goal of VIA's green-computing initiative is the development of energy-efficient platforms for low-power, small-form-factor (SFF) computing devices. In 2005, the company introduced the VIA C7-M and VIA C7 processors that have a maximum power consumption of 20W at 2.0GHz and an average power consumption of 1W. These energy-efficient processors produce over four times less carbon during their operation and can be efficiently embedded in solar-powered devices.

VIA isn't the only company to address environmental concerns: Intel, the world's largest semiconductor maker, revealed eco-friendly products at a recent conference in London. The company uses virtualization software, a technique that enables Intel to combine several physical systems into a virtual machine that runs on a single, powerful base system, thus significantly reducing power consumption. Earlier this year, Intel joined Google, Microsoft, and other companies in the launch of the Climate Savers Computing Initiative that commits businesses to meet the Environmental Protection Agency's Energy Star guidelines for energy-efficient devices.

Kevin Fisher, Intel's EU standards director, says that while the company is dedicated to its green-computing plans, it is important to not blame the IT industry alone for carbon emissions worldwide. He argues that the industry also helps in saving huge amounts of power due to the Internet, enabling, for example, online shopping and billing. Worldwide, standby power is estimated to account for as much as 1 percent of global greenhouse emissions. Most of the energy used by products on standby does not result any useful function. A small amount can be needed for maintaining memory or an internal clock, remote-control activation, or other features; but most standby power is wasted energy. Energy Star–enabled products minimize this waste.

III.   STEPS TO GREEN COMPUTING

1. Develop a sustainable green computing plan. Discuss with the business leaders the elements that should be factored into such a plan, including organizational policies and checklists. Such a plan should include recycling policies, recommendations for disposal of used equipment, government guidelines and recommendations for purchasing green computer equipment. Green computing best practices and policies should cover power usage, reduction of paper Consumption, as well as recommendations for new equipment and recycling old machines.
Organizational policies should include communication and implementation.

2. Recycle. Discard used or unwanted electronic equipment in a convenient and environmentally responsible manner. Computers have toxin metals and pollutants that can emit harmful emissions into the environment. Never discard computers in a landfill. Recycle them instead through manufacturer programs such as HP's Planet Partners recycling service or recycling facilities in your community. Or donate still-working computers to a non-profit agency.

3. Make environmentally sound purchase decisions. Purchase Electronic Product Environmental Assessment Tool registered products. EPEAT is a procurement tool promoted by the nonprofit Green Electronics Council to:

• Help institutional purchasers evaluate, compare and select desktop computers, notebooks and monitors based on environmental attributes

• Provide a clear, consistent set of performance criteria for the design of products

• Recognize manufacturer efforts to reduce the environmental impact of products by reducing or eliminating environmentally sensitive materials, designing for longevity and reducing packaging materials

4. Reduce Paper Consumption. There are many easy, obvious ways to reduce paper consumption: e-mail, electronic archiving, use the "track changes" feature in electronic documents, rather than redline corrections on paper. When you do print out documents, make sure to use both sides of the paper, recycle regularly, use smaller fonts and margins, and selectively print required pages.

5. Conserve energy. Turn off your computer when you know you won't use it for an extended period of time. Turn on power management features during shorter periods of inactivity. Power management allows monitors and computers to enter low-power states when sitting idle. By simply hitting the keyboard or moving the mouse, the computer or monitors awakens from its lowpower sleep mode in seconds. Power management tactics can save energy and help protect the environment.

1. Sustaining the Future

"The greatest challenges for businesses trying to be eco-responsible are really understanding what that really means, then making changes that are sustainable over time, while adding business value,"

"Another challenge is balancing the needs of various stakeholders who each have different ideas of what changes should be made." Some environmental non-governmental organizations would like certain flame retardants removed from electronic products, while the fire safety community is concerned about removing or changing flame retardants in electronics. One problem is that the substitute replacement must be assessed to ensure that environmental and health impacts are lower than the original material; however, since most replacements are fairly new, they have not been necessarily assessed with the same rigor applied to the original materials.

IV.CONCLUSION

Green computing represents a responsible way to address the issue of global warming. By adopting green computing practices, business leaders can contribute positively to environmental stewardship—and protect the environment while also reducing energy and paper costs.
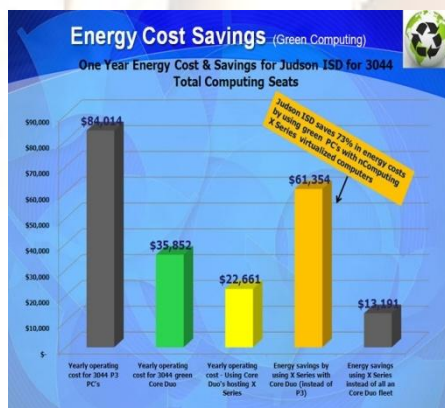

Figure 3 : Energy cost savings

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