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IMPACT OF GREEN COMPUTING IN IT INDUSTRY TO MAKE ECO FRIENDLY ENVIRONMENT

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Abstract: The tremendous explorations in Information Technologies and the range of new equipment being developed every passing day, 21st century can aptly be labelled as the "Century of Gadgets and Gizmos". The term Green Computing refers to the practice of using energy wisely and efficiently, causing negligible degradation to environmental resources and parameters also maintaining feasibility on the other hand. It is basically a balanced and sustainable approach towards the achievement of a healthy and clean environment without compromising the needs and necessities of technology for the present generation. Thus taking up a more holistic and careful approach to making our IT-industry greener definitely falls in our list of responsibilities in creating a more healthier, safer and clean environment. This also revolves on spreading awareness and ensuring people to take their necessary individual steps towards achieving the goals of Green Computing. In the present paper the authors have made a systematic study of several strategies, approaches and practices of green and energy efficient computing, in context to the growth and impact of the IT industry on environment in the recent years. The plans towards a greener IT-industry should include new electronic products and services with optimum efficiency and all possible options solutions towards energy savings.

Keywords

[Green Computing, Green IT, Energy efficient computing]

INTRODUCTION

Green Computing refers to the art of utilizing computing resources in an efficient and eco-friendly, sustainable manner. In recent years, this practice has drawn serious attention both from Educational Institutions, environmental organizations and the corporate and business sector. In the current trend, "going green" has become an agenda for the IT industries in terms of public relations and reduced costs. Green computing focuses on the triple bottom line of economic viability, social responsibility, and environmental impact. It differs from traditional business practices that focus mainly on economic viability of a computing solution. The term "Green Computing" came into existence after the "Energy Star Programme" by the U.S. Environmental Protection Agency, in the year 1992. It was a voluntary labeling program, designed to promote energy-efficiency in hardware of all kinds. A similar program was also conducted in Europe and Asia later on. The manufacturing industries contribute directly to pollution, whereas the IT industries have a hidden impact on environmental pollution caused by unconscious consumption of power and inefficient use of hardware devices. Hence, the main motto of green computing is to explore the reasons and find the solution of this indirect adverse effect on environment. In a

world where business is transacted 24x7 across every possible channel available, companies and organizations need to collect, store, track and analyze enormous volumes of data—everything from click stream data and event logs to mobile call records and more. But this all comes with a cost to both businesses and the environment. Data warehouses and the sprawling data centres that house them use up a huge amount of power, both to run huge number of servers and to cool them. IT industry has begun to address energy consumption in the data center through a variety of approaches including the use of more efficient cooling systems, virtualization, blade servers and storage area networks. But a basic problem persists in the path of achieving sustainability. As data volumes explode, traditional, appliance-centric data warehousing approaches can only continue to throw more hardware at the problem, which can negate the green-gains attained previously through the modern-trending approaches. [1]

GROWTH AND IMPACT OF IT ON ENVIRONMENT

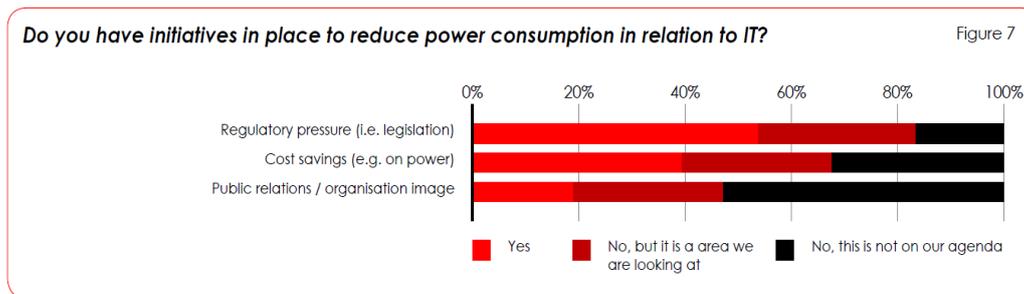
When PC visionaries Bill Gates and Steve Jobs set out to put a computer on every desktop back in the 1980s, no one could have imagined the millions of computers that drive billions of business, consumer and personal internet transactions across a global network each day. With an

average desktop computer and monitor consuming between 60 and 300 watts of electricity, it is not surprising that energy consumption and cost reduction programs represent a major area of focus and opportunity within Green IT. [2]

A business with a network of 20,000 desktop systems running 24 x 7 drawing 200 Watts consumes about 35 million kWh of electricity annually. Using the average U.S. cost of electricity at \$.0855/kWh, this would cost this business approximately \$3 million in utility charges annually. An estimated 90% of workstations in use on any given normal working day have their energy conservation features disabled. On a base of 20,000 workstations, implementing power management policies and standards

would represent an annual savings of between \$900,000 on the lower-end 60 watt devices and up to \$2.4 million on a base of higher-end devices annually. [2]

To a small business or homeowner looking at energy costs, these numbers are not large, nor are they the kinds of numbers that tend to stimulate immediate action. It is perhaps for this reason we find that business and homeowners give little thought to leaving their desktop PCs powered up with their screensavers running 24 hours-a day. The cumulative impact, however, when looked at from the perspective of the electrical drain created by a medium-sized business or community presents an entirely different picture. [2]



Those with a broader commitment to green are more likely to be looking at reducing power consumption in IT.

Fig.1: Graphical representation of statistical data of Initiatives by people to reduce power consumption [4]

GREEN COMPUTING SOLUTIONS

- Develop sustainable green-computing plans**
 This involves active participation of all the people associated with the industries from the topmost levels to the lowermost rungs. Organizational policies and checklists needs to be prepared, containing mandatory guidelines, government policies, “green-recommendations”, list of recyclable and non-recyclable items. The best practices and strategies should aim at reduction of usage of non-conventional resources, by reducing usage of paper and recycling of old machineries and systems in order to nullify e-wastes from organizations.
- Recycle and Reuse**
 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 recycling facilities in your community. Or donate still-working computers to a non-profit agency. [3]
- Purchase products which are environmentally green and sound**
 Purchase products which are labeled to be green and safe for you as well as the environment. These products help to reduce the degradation caused by

the energy-consumption to the environment. For these consumers should be encouraged to buy environmentally sound products. Clear and flawless criteria must be set for the design of green-products. Manufacturers too must be involved and given proper credits for the process of manufacturing products which are healthier for the environment. Purchase Electronic Product Environmental Assessment Tool registered products. EPEAT is a procurement tool promoted by the nonprofit Green Electronics Council. [3]

- Minimizing consumption of paper**
 There are many ways of nullifying the consumption of paper. With computers being more popular than any other thing today all jobs can be done on the accumulator. Sophisticated modes of communications like e-mail, free-messaging, other social networking sites have brought communication to your doorstep. Moreover paper is also being saved by the industries, as more and more industries are trying to convert themselves to “paper-less-mode” with each passing day.
- Conservation of energy**
 All electronic gadgets demonstrate the consumption of energy which has been extracted from non-renewable energy resources. So adopt the proper tactics and techniques so as to conserve energy so that it can be used in times of actual need.
- Green Procurement and Asset Management**

This category includes initiatives that focus on purchasing computing equipment that is more energy efficient and environmentally friendly and includes programs to extend equipment useful life, recycle and engage with suppliers that demonstrate a commitment to reducing hazardous materials in their manufacturing, packaging and factory waste management programs.[2]

- **Technology-based solutions**

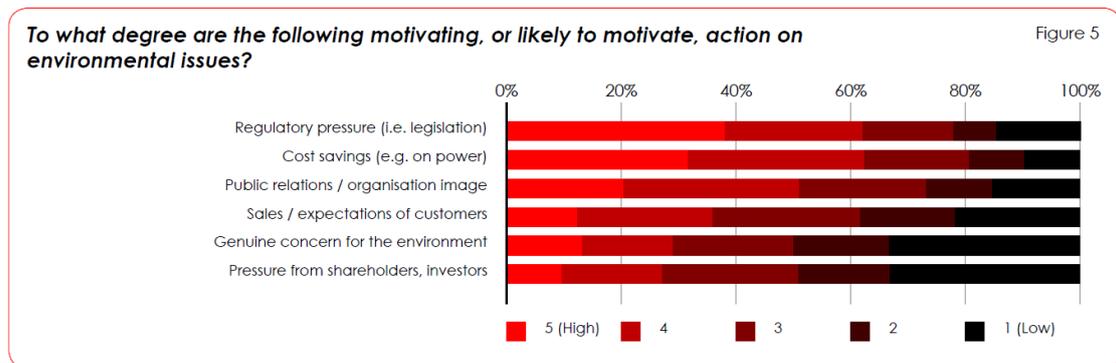
This category includes programs that employ technology in ways that are designed to reduce travel, commuting and real estate costs along with the environmental impacts of jobs related to people movement. [2]

- Don't run computers continuously unless they are in use continuously.
- Look for ways to reduce the amount of time your computer is on without adversely affecting your productivity.
- Unless you require immediate access to E-mail or other Internet services, break the habit of turning on all your computer equipment as soon as you enter the office each day.
- If practical, informally group your computer activities and try to do them during one or two parts of the day leaving the computers off at other times.
- Avoid using the switch on a power strip to turn on all your equipment.
- If you use a laser printer, don't turn your printer on until you are ready to print.
- Turn off your entire computer system or at least your monitor and printer when you go for lunch or will be out of office for a meeting or an errand.
- For "computer servers" which must be on to serve network functions, explore ways to turn servers off at night.
- If monitors are not needed for "servers" to operate, keep server monitors off. If server monitor is needed during the day, at least turn off at night and weekends.

ENERGY EFFICIENT COMPUTING PRACTICES

Energy efficient computing is the practice of using computing devices, with concerns for energy saving and productive utilization. Some such computing methodologies are:

- Turn off your computer and/or peripheral when they are not in use. Turning on and off will not harm the equipment.



Regulation, money and image are the top three drivers of environmental initiatives in business.

Fig.2: Graphical representation of statistical data of the awareness in people and motivating factors [4]

Some other green computing practices include:

- ❖ Reducing Paper Waste
- ❖ Reusing and Recycling of Hardware Devices
- ❖ Purchasing Recommendations

Reducing Paper Waste:

Computer use has vastly increased paper consumption and per waste. Here are some suggestions for reducing waste:

- Print as little as possible. Review and modify documents on the screen and use print preview. Minimize the number of hard copies and paper drafts you make. Instead of printing, save information to disks.
- Recycle waste paper as many times as you can.
- Save e-mail whenever possible and avoid needless printing of E-mail messages.

- Use e-mail instead of faxes or send faxes directly from your computer to eliminate the need for a hard copy.
- On larger documents, use smaller font sizes to save paper.
- When documents are printed or copies use double sided printing and copying. If possible, use the multiple pages per sheet option on printer properties.
- When general information-type documents must be shared within an office, try circulating them instead of making an individual copy for each person. This can also be done easily by e-mail.

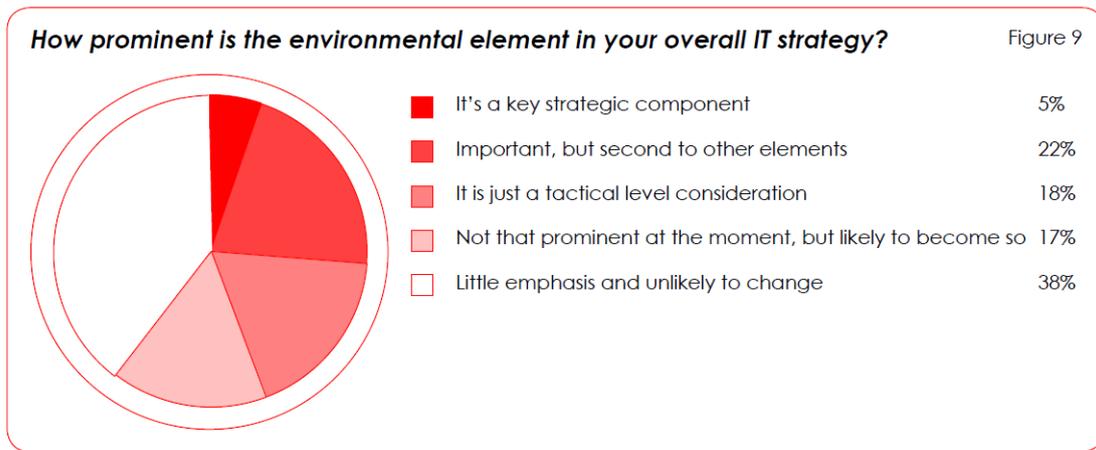
Reusing and Recycling of Hardware Devices: This is one of the most important aspects of Green Computing that

revolves around e-waste management. It involves making unused and old hardware devices or computing resources reusable through the process of recycling, for example, inkjet cartridges, batteries and diskettes can be recycled for further use.

Purchasing Recommendations: Environmentally responsible computer use implies not buying new equipment unless there is a demonstrated need. Here are some recommendations:

- ↳ Buy only “Energy Star” computers, monitors and printers. Flat panel monitors use about half of the electricity of a CRT (Cathode-Ray-Tube) display.

- ↳ Buy a monitor only as large as you really need. A 17-inch CRT monitor uses 30% more energy than a 15-inch one when each is in an active mode.
- ↳ Buy inkjet printers, not Laser printers. These use 80%-90% less energy than laser printers and print quality can be excellent.
- ↳ Consider buying “Green Computers”, once they are available in market.
- ↳ Buy non-petroleum based ink. These printer inks are made from renewable resources, require fewer hazardous solvents, which translate to fewer air emissions, and in many cases produce brighter, cleaner colors.



Most people have things other than green to worry about at the moment

Fig.3: Graphical representation of statistical data of awareness and activeness in people to take steps towards Green IT [4]

FUTURE OF GREEN COMPUTING

The plan towards green IT should include new electronic products and services with optimum efficiency and all possible options towards energy savings. That is enterprise wise companies are laying emphasis on moving towards Eco-Friendly Components in computers, **the use of eco-friendly sustainable components will become the norm rather than the exception in future.** To this approach for an instance - A Canadian

Company, Useful Inc. have come up with a solution that turns 1 computer into 10 - Discover Station. Quickly becoming the standard for green computing worldwide, Discover Station leverages the unused computing power of modern PC's to create an environmentally efficient alternative to traditional desktop computing. Multiple users can work on a single computer by simply. [5]

It is estimated that out of \$250 billion per year spent on powering computers worldwide only about 15% of that power is spent computing- the rest is wasted idling. Thus, energy saved on computer hardware and computing will equate tonnes of carbon emissions saved per year. Taking into consideration the popular use of information technology industry, it has to lead a revolution of sorts by turning green in a manner no industry has ever done before. Opportunities lie in green technology like never before in history and organizations are seeing it as a way to create new profit centres while trying to help the environmental cause.[1] The

plan towards green IT should include new electronic products and services with optimum efficiency and all possible options towards energy savings. Faster processors historically use more power. Inefficient CPU's are a double hit because they both use too much power themselves and their waste heat increases air conditioning needs, 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 high temperatures. Many people have been working for years to lice this inefficiency out of computers. Similarly, power supplies are notoriously bad, generally as little as 7% efficient. And since everything in a computer runs off the power supply, nothing can be efficient without a good power supply. Recent inventions of power supply are helping fix this by running at 80% efficiency or better. [6]

CONCLUSION

It is clear that the mushrooming growth of IT industries worldwide is slowly poisoning the environment. This grave threat requires immediate attention. Societies need to become more energy conscious. The need of the hour is for both governments and the corporate world to join hands to usher in more green computing solutions to be able to build a green-globe.

Green computing is a mindset that asks how we can satisfy the growing demand for network computing without putting such pressure on the environment. There is an alternative way to design a processor and a system such that we don't increase demands on the environment, but still provide an increased amount of processing capability to customers to satisfy their business needs. Green computing is not about going out and designing biodegradable packaging for products. Now the time has come to think about the efficient use of computers and the resources which are non-renewable. It opens a new window for the new entrepreneur for harvesting with E-waste material and scrap computers. The greenest computer will not miraculously fall from the sky one day; it'll be the product of years of improvements. The features of a green computer of tomorrow would be like: efficiency, manufacturing & materials, recyclability, service model, self-powering, and other trends. Green computer will be one of the major contributions which will break down the 'digital divide', the electronic gulf that separates the information rich from the information poor. [5]

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