Green Computing – Need and Implementation

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Abstract - **Green computing is an effective approach to protect our environment from the hazardous material and its effects that comes from the computers and its related devices. It is an effective study of environmental science that use manufacturing, using, disposing and recycling of computer and other electronic devices. In this research paper we concern about the Green computing, its needs and steps toward Green computing by a common man. This research paper describes that today computer is basic need of everyone. No individual or organization can work without computer, But they also have to aware about the harmful impacts to use of computers, its manufacturing and disposing and what steps we should take to reduce the harmful impacts and save our environment.**

*Keywords***: Green computing, environment, computers, hazardous, carbon dioxide (CO_2).**

I.   INTRODUCTION

Green computing is an emerging concept towards reducing hazardous material and to save our environment from harmful impacts of the use of computers and other electronic products. Green Computing is concerned with the manufacturing, using and disposing of computers with no impact on environment. Green computing aims to reduce the carbon footprint generated by the Information Systems Business while allowing them to save money. The green-Computing, as defined in the Official Journal of the French Republic on July 12, 2009, the ESTs of information and communication for short eco-ICT, are information technology and communication which design or use can reduce the negative effects of human activity on the environment. Today there is a great need to implement the concept of Green computing to save our environment. Use of computer plays a big role in environment pollution. About 60-70 percent energy is consumed by computers which are not in use but still turned ON and that consumed energy is the main reason of CO_2 emission. So now there is a big need to guide a common people for saving of electricity by their own efforts and save environment.

II.   WHAT IS GREEN COMPUTING

Green Computing is an application of environmental science which offers economically possible solutions that conserve natural environment and its resources. It can be defined as environmentally responsible use of computers and

its resources. Green computing is all about designing, manufacturing, using and disposing of computers and its resources efficiently and effectively with minimal or no impact on environment. it is efficient approach towards electricity saving and less amount of heat generated by the computers. The goals of green computing are power management and energy efficiency, choice of eco friendly hardware and efficient software and material recycling and increasing the product's life. With the help of information and communication technologies (ICT), Green computing becomes an effective approach to grow segments that affects carbon emission. It also implements energy star management strategies and technologies that reduce energy consumption waste.

## III.   HISTORY OF GREEN COMPUTING

The term Green computing came into existence with the launch of Energy Star program in 1992 by U.S environmental protection agency. Energy Star is a kind of label awarded to computers and other electronics products. Energy Star program minimizing the use of energy while maximizing efficiency. One of the first approaches towards green computing was sleep mode function in computers. Sleep Mode function which places a computer on standby mode to a pre-set period of time.

According to Wikipedia "The Swedish organization TCO development launch the TCO certification program to promote a low magnetic and electrical emission from Cathode Ray Tube (CRT) based computer display; this program was later expanded to include criteria on energy consumption, ergonomics and the use of hazardous material in construction".

IV.   NEED OF GREEN COMPUTING

Now a days computer is the basic need of every human. A computer made our life easier and saves a lot of time and human efforts, but the use of computer also increase power consumption and also generate a greater amount of heat. Greater power consumption and greater heat generation means greater emission of green house gases like Carbon Dioxide(CO_2) that has various harmful impacts on our environment and natural resources. This is because we are not aware about the harmful impacts of the use of computer on

environment. Personal computers and data centers consume a lot of energy which use various old techniques and they don't
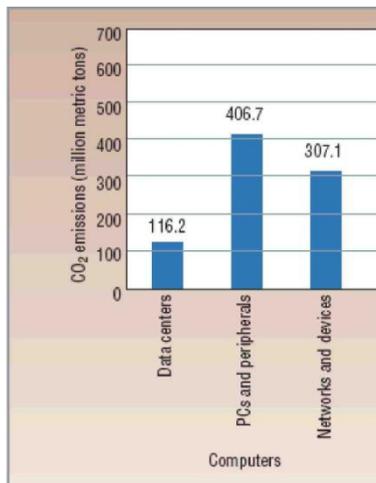
have sufficient cooling systems. Resultant is the polluted environment.

Fig. 1(CO^2 Emission)

According to figure1 all computer related terms like Data Centers, PC & its peripherals and Network & networking devices all produce a large amount of CO_2 emission. But the huge part of CO_2 emission is produced from only PC's and its peripherals. PC's are bad for environment because they are not biodegradable and the parts and pieces will be around forever and are rarely recyclable. Environment pollution could be because of the defects in manufacturing techniques, packaging, disposal of computers and components. There are toxic chemicals used in the manufacturing of computers and when we use informal disposing they put harmful impacts on our environment. So to save our environment and to reduce the harmful impacts of computers we have to aware about it. To decrease these impacts the term green computing comes into existence. There are various reasons for the use of green computing are:

A. Computers and electronic devices consume a lot of electricity that have some harmful impact on our environment. It produces air pollution, Land pollution and water pollution. Electricity generated through Fossil Fuel power plants release air pollution and requires a lot of water that effect our environment like climate change, acid rain (pH<5), ozone(O_3) and air toxic.

B. Most of electronic devices generate a lot of heat which cause the emission of CO_2. Co2 is one of the green house gases, warming the earth surface to higher temperature by reducing outward radiation. With the rapidly increasing of carbon Dioxide the rate of global warming became increase causing and through anthropogenic climate change.

C. While disposing of computers and it resources produces a lot of hazardous waste that really damage our environment. It also releases heavy metal like lead (Pv), mercury (Hg), cadmium (Cd) into air.

D. The manufacturing of computers product release heavily on the use of toxic comical for electrical insulation, soldering, and fire protection. Expose the comical fumes over the long term can cause cancer, cause miscarriages.

All these causes can be reduced using one concept i.e. "Green computing". Now we have needed to implement the green computing on various electronic and electrical devices to save our environment from these harmful impacts

V. EFFORTS FOR GREEN COMPUTING

We need not to stop using computers and even need not to stop using electricity but we have to do some efforts to make environment healthy. The following actions should be taken by us:

A. *Use Energy Star labeled products*: - All the energy star labeled products are manufactured with keep in mind the term Green Computing and its features. These products are manufactured on the idea of less power consumption. These devices are programmed to power-down to a low power state or when they are not in use. So we have to

use "Energy Star" labeled desktops, monitors, laptops, printers and other computing devices.

Fig. 2 (Energy Star Logo)

B. *Turn off your computer*: - As the previously used figures stated that PC's and its peripherals consume more power and resultant is the high amount of CO_2 emission. So we

have to keep it in our mind and never hesitate to turn off our personal computers when they are not in use.

Fig. 3 (Green Computing with Power Off)

C. *Sleep Mode*: - Sleep mode save our session and put our computer in a low power state so that we can quickly
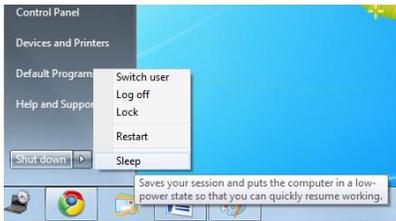
resume windows. Always put our PC on sleep mode when not in use. It saves 60-70 percent of electricity.

Fig. 4 (Sleep Mode function in windows 7)

D. *Hibernate our computer*: - This mode allows us to shut everything down. When we are not using our computer

for a short period of time we have to hibernate it. It saves the electricity when computer is not in use.
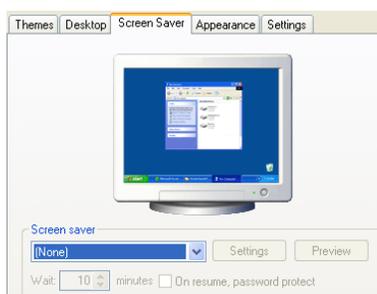
Fig. 5 (Hibernate option in Windows XP)

E. *Set a power plan*: - Set an effective power plan to save electricity. Because if our computer consumes more
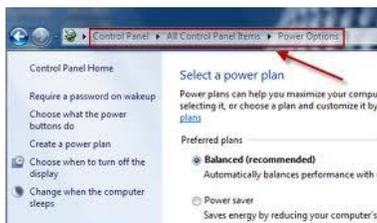
electricity, they produced more harmful impacts on our environment.

Fig. 6 (Example of Power Plan Settings)

F. *Avoid using screen saver*: - Screen savers are also

consumes electricity even when a computer is not in use. Screen saver can be a graphic, text or an image that shows

Fig. 7 (Example of No Screen Saver)

on computer screen when it is not used for pre-set time. But the best option for energy saving than screen saver is turn off your monitor when not in use.

G. *Turn down monitor brightness*: - Electricity consumption plays a main role in CO_2 emission. If we use our PC at a
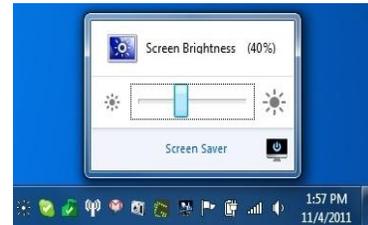
high brightness it consumes more electricity than using at a normal brightness. So we should always turn down our PC's brightness to save electricity.

Fig. 8 (Example of Less Brightness)

H. *Stop informal Disposing*: - Computer and its components use toxic chemicals when manufactured and when we use informal disposing they put harmful impacts on our environment. So to minimal or reduce these harmful impacts we have to use formal disposing.

Fig. 9 (Example of Informal Disposing)

I. *Use LCD rather than CRT monitors*: - The use of new technologies can play a vital role to reduced power consumption. LCD (Liquid Cristal Display) is the less power consumption device then CRT (Cathode Ray Tube). So if we have to save our environment from the effect of CO2 emission we have to use LCDs rather than CRTs.

Fig. 10 (Use LCD rather than CRT)

J.   Recycle old hardware using formal techniques: - Recycling of computer hardware is manufacturing of new hardware devices using old one. Recycling using formal techniques is follow by various companies. It is done in a special laboratory. It also consumes a lot of money but the main feature of formal recycling is to save our

environment from pollution. So we have to recycle our useless hardware using formal techniques.

Fig. 10 (Example of Formal Recycling)

VI.   CONCLUSION

This research paper shows the importance of Green computing. We should understand the need of Green computing and as shown in research paper necessary steps should be taken for healthy environment. If not then we of us will suffer from air pollution, water pollution, soil pollution etc. So with a little sense of understanding the importance and need of Green computing we should take the steps from today or even from now.

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