GO GREEN:MAKING IT HAPPEN

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ABSTRACT

Green IT is a practice of environmental friendly computing. It is all about creating a more effective world of information technology. In this paper, an overview of Green computing is given. The paper is written to highlight the work that is done all over the world by the IT companies in order to achieve eco-friendly computing.IT companies are continuously implementing new policies and participating in green IT movement within companies to use power more efficiently, reduce waste and create more eco-friendly computing products.

As per new report of "Greenpeace" (*a non-governmental, environmental organization*),US tech-giants are involved in buying of renewal energy and they are ahead of European companies in the field of green computing.

Now–a-days, the word "green" is used as a buzzword. The paper also explain concepts like green collar, green datacenter, green washing, green purchasing which are widely used these days. The buzzwords have come to existence because of Green IT technology.

Keywords: Green IT, Green Computing, Green Collar, Green Data center, Green Washing, eco –friendly computing, Green Purchasing

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1.   Introduction

Green, the **color** of life, renewal, nature, and energy, is associated with **meanings** of growth, harmony, freshness, safety, fertility, and environment. The combination of word green with IT represents the use of information technology in a more eco-friendly manner. The hazardous waste of IT should not deteriorate the nature.

Today, almost all streams whether its IT, medicine, transportation, agriculture etc., use machines which indirectly require large amount of power and money for its effective functioning. We have huge machines and equipment to accomplish our tasks, fancy gadgets with royal looks andfeatures to make our lives more impressive and smooth. The goals of Green computing is 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. The growing green IT movement includes initiatives within companies to use power more efficiently, reduce waste, and create more eco-friendly computing products.

2. History

It started in the 1990s, when the U.S. Environmental Protection Agency launched **Energy Star**, a voluntary labeling program which is designed to promote and recognize energy-efficiency in monitors, ACs, Refrigerators, climate control equipment, and other technologies. This resulted in the widespread adoption of sleep mode among consumer electronicsproducts. The term "green computing" was probably coined shortly after the Energy Star program began. Subsequently, 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 lessuse of hazardous materials in construction. This paved the way for green computing to be taken up seriously at an international level. [1]

3.Work done by companies in the field of Green Computing

Multitudinous work is done by ITcompanies in the field of green computing.Some companies have created various policies and guidelineswhichneedto be followedby the employees of the company, some companies have become part of some leading organization which work in the

field of green IT.IT companies also produce product which are more energy efficient and produce less harm to the organization.

Here we have summarized information in points regarding some leading IT companies and their work regarding green Computing.

1.   **Wipro:** Wipro Limited a leading player in global IT and R&D services has collaborated with WWF-India(*World Wide Fund for Nature* is an organization which works for conserving the worlds' biodiversity)[6].The issues on which   they work is water management, climate change, waste management and biodiversity conservation.Wipro Company is committed toward green computing by reducing the usage of hazardous substance and chemicals which deteriorate the environment.

2.   **Dell:** Dell is known for its free worldwide product- recycling program. It has "Green Image".[5]

3.   **Intel:**Intel are the world's largest semiconductor makers, they 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.[5]

4.   **Google:** Google is able to reduce its energy consumption to 50% as that of industry average by help of ultra -efficient evaporative cooling technology.Google also came with the concept of "Blackle" search engine.[1,4]. The concept behind Blackle is that when a computer screen is white, presenting an empty word or google home, and computerconsumes 74W of energy and when the computer screen is black then it consumes 59W of energy.Based on this concept if consumer switches from google to Blackle,then there would be saving of 750MW each year. This is one of the examples of green computing.

5.   Advanced Power Management which is a joint venture of Intel and Microsoft allows a computer's BIOS to control power management functions in a computer.

6.   **Zonbu Computer**:Zonbu is a new, very energy efficient PC. It consumes just one third of the power of a typical light bulb. The device runs the Linux operating system using a 1.2 gigahertz processor and 512 Mb of RAM.[1,4]

7.   **Asus EeePC** :The "ultra-portable" class of personal computers is characterized by a small size, fairly low power CPU, compact screen, low cost and innovations such as using flash

memory for storage rather than hard drives with spinning platters. These factors combine to enable them to run more efficiently and use less power than a standard form factor laptop. The Asus Eee PC is one example of an ultraportable.[4,5]

4.Recent Advances in Green Computing:

Greenpeace releases a "clean energy index report" every year, based on data from companies. The index reflects how much clean energy, on average, a company uses to power its data centers. [8]

Following scorecard shows comparison of companies as per based upon energy transparency, renewable energy commitment and policy, energy efficiency and mitigation. Companies are graded from the rating A to F. Top IT companies of the world are listed from highest value of clean energy index to lowest value. There might be many companies in between but the data reflects the top companies of the world.

No	Company	Clean Energy Index	Natural Gas	Coal	Nuclear	Energy Transparency	Renewable energy commitment and sitting policy	Energy efficiency and mitigation
1	Apple	100%	0	0	0	A	A	A
2	Yahoo	73%	6%	11%	8%	C	B	A
3	Facebook	49%	10%	25%	14%	A	A	A
4	Google	46%	15%	21%	13%	B	B	B
5	Microsoft	39%	19%	30%	10%	C	C	C
6	Rackspace	25%	21%	33%	21%	C	B	B
7	IBM	24%	27%	30%	17%	B	B	B
8	Akamai	24%	-	-	-	A	C	A
9	Salesforce	23%	20%	25%	26%	A	B	C
10	Amazon	23%	21%	27%	26%	F	C	D
11	HP	22%	26%	41%	11%	C	D	B

12	Oracle	17%	18%	50%	11%	D	F	D
13	ebay	10%	51%	29%	9%	B	D	B

Table 1 Clean Energy Index Report   Source: Internet[8]

1.   As per Greenpeace "clean energy index report" Apple is in top in powering its datacenter operation with renewable energy. As per report Apple has claimed 100% renewably powered cloud for another year, followed by Yahoo, Facebook and Google with 73%, 49% and 46% clean energy respectively.[7] Greenpeace has found that Amazon's current investments would deliver an energy mix of 23% renewable energy for its operations."

2.   Apple and Facebook are using increasing amount of renewable electric power for their datacenters. The research shows that Google is interested in buying wind energy which is injected into the local electric grids where it runs data centers. Microsoft was also interested to buy power from a wind energy.[7]

3.   Amazon and Oracle are not showing any willingness to use clean energy for their data centers. One fact is that Oracle does not disclose its corporate-wide or data center energy mix, nor has it indicated that it shares the carbon footprint of its services with consumers.

4.   Due to peer pressure, other American companies like Texas-based Rackspace are trying for buying clean power for its nine data center worldwide.

5.   The concept which tech-companies are trying to follow in 2016 is to buy green power rather than credit and run their data center accordingly.

5. Related Terms in Green IT:

With the "go green" mission, now-a–days the word "green" is also been used as buzzword. There are many concepts that have arrived with the advent of green IT. The word "green" is getting prefixed with all IT jargons. Some of these concepts are highlighted below.

5.1 Green Data Center: It is a repository or a center for storing, managing, disseminating of data in which electrical, mechanical and computer related systems are designed in a way so that they render maximum efficiency and minimum impact on environment.[2] Advanced technologies and strategies are involved in constructing, maintaining and operating those data centers. Examples:

- Shrink carbon footprints of the buildings.
- Using carpet, paints and building materials that emit less radiation.
- Waste recycling
- Installation of catalytic converters on backup generators
- Using energy efficient cooling and heating equipment's.
- The use of hybrid or electric company vehicles

Although building a data center is an expensive process but we can save cost in operations and maintenance in long term. Thus we can say that data centers are long term investment in the field of green IT. [9]

5.2 Green washing: The practice of Greenwashing is quite redundant now-a-days. Green washing states that how IT companies misuse the term of Green IT, the practice of making an unsubstantiated or misleading claim about the environmental benefits of a product, service, technology or company practice.

Greenwashing can make a company appear to be more environmental friendly than it really is. It can also be used to differentiate a company's products or services from its competitors by promising more efficient use of power or by being more cost-effective over time.

With time, the companies customize their products, packaging, advertising and branding in a way so that a customer thinks that the product is very environmental friendly. Consumer buy products in disguise that the product is energy efficient and ecofriendly. It was realized later that those were just techniques for increase in sales. Now-a–days strict scrutiny, vigilance and transparency is done by the government bodies to reveal which environmental claims are accurate and which are just hype.

Consultant can be taken from National Advertising Division of Council of Better Business Bureaus (CBBB), which administers a system of voluntary self-regulation for the advertising industry.[9] Various websites like coopamerica.org, treehugger.com, greenbiz.com, corpwatch.org provide additional assistance.

Websites like "DotheRightThing.org" allow consumers to read news article and rate action of companies, based on positive and negative impact on environment.

5.3Green collar

Green collar is any kind of employment that involves products or services that are environmental friendly. Green collar jobs include solar panel installation, weatherizing homes, refining biofuels like biodiesel, manufacturing hybrid cars or photovoltaic cells, building wind turbines or developing renewable energy sources.

5.4Green Purchasing

Green purchasing is encouraged by the IT companies and customers now-a-days.One of the way of Green Purchasing is buying the products that are having labels such as EPA energy star(US), TCO 95 (Sweden) and blue angel (Germany) [3].This also encourages companies to manufacture greener products that consumes lesser power and cause less harm to environment. . Each and every IT companies and individual are moving toward Green Purchasing.

6.Conclusion

With the threat of increase in global warming, green computing is just a small but effective step from tech companies to save the environment. The main objective of this technology is to reduce the energy consumption of computer related products. IT organizations are actively participating in Green IT campaign. Tech companies have designed various policies and adhering to them as well as other companies which are manufacturing product, are more energy efficient, fuel saver and emit less carbon radiation. Some companies have started to act just because of peer pressure from their competitive companies.

However, this is not the end, but it is just the beginning. There are many milestones yet to be achieved in the field of green computing. American companies are much ahead of Indian companies in implementing and experimenting with new techniques in the field of ecofriendly computing. Better policies by Indian government, support to IT companies in leveraging green data center and providing green collar employment in India is need of an hour.

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