

GREEN IT PRACTICES FOLLOWED BY IT VENDORS

K. Kiruthika

ABSTRACT

Nowadays, the people and the organization's usage of the computing resources are ramping up very fast. Among them IT vendors are the major consumers of the computing devices. The IT vendors depend on computing devices for their global operations. When the IT vendors becomes incapable in sustaining the company needs in computers and other computing devices, the global market and industry shall surely suffer. This situation led to instigate the process of Green Computing practices. The idea of Green Computing revolves the people to practice to save resources when they use the computing technology. This paper deals with some of the ways where green computing is being revealed.

Keywords : IT Vendors, Green Computing, Carbon Emission, Computing devices, Energy efficiency, Renewable Energy, Carbon Foot Print, Recycling.

I. INTRODUCTION

Green computing is the technique for sustainable computing in IT sector. The leading IT companies trust on the implementation of green computing approaches saving operational costs and reduce the negative impact on environment. Many companies gone through study on green computing approaches

by following possible techniques got success. Among these techniques using renewable energy, energy efficient computing and recycling plays a major role to reduce carbon emission. They found that by reducing energy consumption, carbon foot prints and by increasing use of renewable energy for their global operations were increase the success rate of green computing and reducing negative environmental impact.

This paper aims on the renewable energy usage, energy efficient computing, carbon emission and recycling methods of leading 4 IT companies like Google, Microsoft, Dell and Amazon. Based on the company's annual environment report and environment initiative, data were discussed and analyzed.

II. GREEN STRATEGIES

The companies must know its current electricity usage. They must aware of how much electricity is being consumed and how much are wasted. The highest growing scrap products in the world are electronics products called e-waste. Electronics or computer waste plays a vital role in landfill space. These e-waste parts contain toxic chemicals such as lead oxide, mercury, nickel, zinc and cadmium, which are very hazardous to humans and the environment.

Assistant Professor, Department of CS, CA & IT, Karpagam Academy of Higher Education, Coimbatore, India.

Green Computing follows the 3R principle that is Reduce, Reuse and Recycle. Some computer parts can be reused instead of discarding, upgrade can be adopted. The computer user should be aware of that the computers parts can be recycled and can be reused.



Figure 1: 3R Principle

Carbon footprint is defined as the set of green house gas emission caused by individual, event, organization or product and it is expressed as carbon dioxide equivalent CO₂e. Carbon footprints are calculated by using a concept called green house gas accounting. This will provide information to understand and manage the climate change impacts. Green House Gas Emission uses a protocol which is divided into different categories called Scope 1, Scope 2 and Scope 3.

Scope 1: It is also referred to as direct green house gas. It is defined as source that are owned and controlled by the organization.

Scope 2: It referred to as energy indirect green house gas. It is defined as emissions from the consumption of purchased electricity, steam, or other sources of energy which is generated upstream from the organization.

Scope 3: It referred to other Indirect green house gas Emissions. These are a consequence of the activities of the company, but occur from sources not owned or controlled by the company.



Figure 2. Green House Gas Protocol

III. GREEN IT PRACTICES

3.1. Utilizing Renewable Energy

Using renewable energy is a smart way to reduce the impact on environment and also to reduce the carbon footprints. Google is the world largest user of renewable energy to their operations and buyer of renewable power (2,600 megawatts).

Google is in process to reach 100% renewable energy for their global operations including both their data centers and business offices by this year. They are the first corporations to create large-scale, long-term contracts to buy renewable energy directly and one

who signed the first agreement to purchase all the electricity from a 114-megawatt wind farm in Iowa, in 2010.

Microsoft uses renewable energy for their various operations. They use renewable energy like wind and solar. Since in 2012 Microsoft became 100% carbon neutral in their global operations. The methods they used to achieve 100% carbon neutral is price for carbon emission associated with electricity usage in their business division.

As a result they reduce nearly 9.5 million metric tons of carbon dioxide equivalents and purchased 14 billion hours of green power. In addition they became 100% powered by renewable energy from 2014.

Amazon Web Services (AWS) used 40% renewable energy for their global operations. Now they are in progress to achieve 50% renewable energy usage by the end of 2017. Amazon Wind Farm US Central, Amazon Wind Farm US East and Amazon Solar Farm US East became operational from 2016. Likewise as a result of all renewable energy projects they delivered about 2.6 million megawatt of energy annually.

Dell uses more than 36% renewable energy for their global operations. They are constantly increasing the number of facilities to purchase renewable energy.

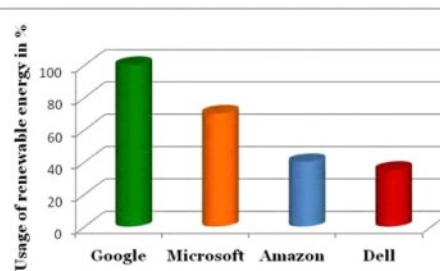


Figure 3. Increasing usage of Renewable energy

3.2. Maximize Energy Efficiency

Energy efficiency takes a huge reduction in climate impact because less energy consumed will result in fewer carbon emissions. To improve energy efficiency and reduce the power consumption of computers and servers various techniques were followed by the companies. I would like to discuss some of them.

On average, a Google data center uses 50% less energy than other data center. As compared with past five years now they deliver more than 3.5 times as much computing power with the same amount of electrical power. To achieve this, the company introduced custom designing in high efficient server which is core for data center. They compact the component which runs the software products and services by minimizing the number of times to convert electrical current from one form to another and kept the server close to the component using efficiency batteries. These result in 500 kilowatt hours per system as annual saving. By the same way the using number of techniques they are saving

energy using water, wind, solar and cooling equipments.

Microsoft products like Microsoft Surface Pro4 is ENERGY STAR certified and registered with EPEAT to ensure that the computer can run on less energy. They also introduced applications, features and technologies such as ambient light sensors, efficient Snapdragon™ processors, and OLED or AMOLED displays to save energy.

Amazon being a Large-scale cloud providers they use a power of 28% less carbon intense than the global average. By combining the fraction of energy required with a less carbon impact power mix, customers can use the service with a reduction in carbon emissions of 88% by moving to the cloud and AWS.

Dell product use less power in additional 25% less in Dell desktop and note books. Dell servers are arranged to run for extended run for 113 °F/45°C. They reduced their total consumption of electricity from 674.8 million kWh to 652.7 million kWh.

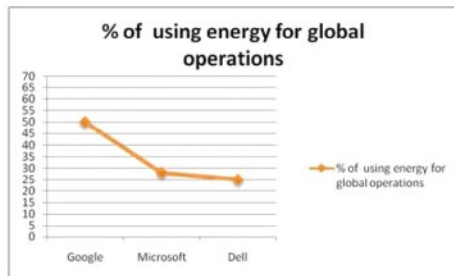


Figure 4. Reducing energy usage

3.3. Reducing Carbon Emission

As per Google’s environment report, Green House Gas (GHG) emission on 2015 was 3 million metric tons of carbon dioxide equivalents. In this case the use of renewable energy for their data center it gets neutral to 0% of carbon emission.

Microsoft has reduced its carbon emissions by the equivalent of 9.5 million metric tons of carbon dioxide and saved more than \$10 million through reduced energy consumption.

Dell’s Green House Gas emission was decreased by 25.6% and other transportation emission is decreased by 18.6%. They reduced total electricity power use by 28 million kilo watt hours.

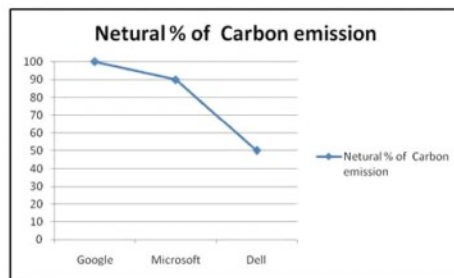


Figure 5. Reducing Carbon Foot Prints

3.4. Recycling the e-waste

Microsoft joined with their recycling partners collected unused computer parts from consumer and sends it to recycling process. They strongly believed that 100% of materials in electronic products that we are purchased can be recycled or converted into energy resources.

In the year 2015 Microsoft recycled nearly 9931492kgs of their consumer’s e-waste.

Dell provides convenient way for recycling to their customers and ensures safe dispose their unused computer equipment. They recommend recycling for the equipment which does not have resale value. By taking the plastic from recycled computers and converting them into new parts for 48 different

products, Dell reduces environmental impact and costs. By this way last year they made 3.4 million pounds of new parts.

Dell’s Reconnect Program is accepting any brand of computers and its parts in any condition from consumers and recycles it for free. This Program offered in over 2,000 participating Goodwill locations though out North America.

Features	Sub Features	Google	Microsoft	Dell
Carbon Emission (in Metric Tons)	Scope 1	66,991	85,188	38,690
	Scope 2	1,695,161	1,521,370	5,67,051
	Scope 3	1,234,682	8,620,547	14,492,999
Carbon Emission decreased by (in %)	Direct GHG Emission	100 %	100 %	25.6 %
	In-direct GHG Emission	100 %	17 %	18.6 %
Electricity Usage (in MWH)		5,743,793	329,818	~674,000
Renewable Energy Usage (in MWH)		4,644,990	3,240,620	~259,000

Table 1: Environmental data of IT Vendors

IV. CONCLUSION

The companies taken for discussion were contributing their level of best to create positive impact on the environment and also take up the responsibilities to save our environment from carbon emission.

Google has neutralized the carbon emission level by various projects. Microsoft’s pricing system on carbon emission also most inviting initiative of green strategy. While concern with utilization of renewable

resources all the companies were implemented innovative projects on purchasing renewable resources.

Remarkably Google’s 20 renewable projects had a tremendous success of 100% renewable is just the beginning. By 3R principle Microsoft’s recycled a good number of products. Dell’s Reconnect program should be a quoted initiative for 3R principle. They are working to expand the program and they created a remarkable place in recycling of e-waste and worked to reduce their carbon foot prints.

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