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# Computers and Global Warming

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***Abstract:*** ***Our computer system solves many problems in our day to day life and there isn't much debate to the wonders it gives us, a problem exists and has existed for some time too. The problem is pollution. What is the extent of the pollution? Try 90 Billion pounds of carbon dioxide a year spewed into our atmosphere in America alone. Internet is responsible for consuming a growing portion of global power production. The computer centers often contain thousands of PCs used as servers. With about 200 million internet searches estimated globally daily, the power consumption and GHG emissions generated by internet and computers is alarming. The average desktop computer, not including the monitor, consumes 60-250 watts a day. In this paper we are mainly concerned with global heating due to computer and its uses, a topic which is not talked about much in relation to climate change and can have severe consequences on global climate change.***

***Keyword:*** **GHG**

## I. INTRODUCTION

Energy is the fuel of today's technological (digital) society which is increasing continuously. The cause of the increase in energy requirement is population growth as well as modernization of our civilization. Everyday electrical appliances - including refrigerators, fans, washing machines, dryers, toasters, boilers, all generate heat while operating. Electricity production is currently about 37% efficient, automobile engines are roughly 25% efficient, and ordinary incandescent light bulbs are only around 5% efficient (E. J. Chaisson, EOS, Transactions, American Geophysical Union, AGU, vol. 28, 2008); the rest is immediately lost as heat to the environment. The efficiencies of systems could be improved but no device will ever be perfectly efficient.

Superconductors are used for simulations of the birth of galaxies, nuclear explosions, etc., and such computations generate a lot of heat. The demand of PCs is growing rapidly and they can hardly be operated in an energy-saving manner. The average desktop computer, not including the monitor, consumes 60-250 watts a day.

Internet, servers, data centers and RD laboratories consume massive amount of energy and generate heat, huge air-conditioning is required to keep them running. Internet is responsible for consuming a growing portion of global power production. The computer centers often contain thousands of PCs used as servers.

CO2 is currently about 385 ppm (parts per million) which is in the danger zone (350 parts per million, ppm). Regardless of the kind of energy utilized, Earth is constantly subjected to heat generated by the industrial sector, transport, household, and the commercial and ICT sectors. According to a 2007 report of the Intergovernmental Panel on Climate Change, the Earth's temperature has risen by about 0.7¦C during the twentieth century. Less use of energy seems vital for our continued well-being; otherwise heating due to excessive energy use combined with warming due to GHG could be a threat.

## II. PROBLEM IDENTIFICATION

### *A. How do computers cause global warming?*

**Video Game:** Inspired by the public indifference to global warming, Electronic Arts has created Global Warming: the Video Game. In the game, you play the part of the leader of a country, building as many coal power plants and gas-guzzling cars as possible and doing everything you can to suppress and discredit scientists who say global warming exists. After the release of Global Warming: the Video Game, EA Games released two more climate-themed games, one based on Global Cooling and the other based on Global Boring.

A screen saver is not an energy saver. According to the U.S. Department of Energy, 75% of all the electricity consumed in the home is standby power used to keep electronics running when those TVs, DVRs, computers, monitors and stereos are "off." The average desktop computer, not including the monitor, consumes from 60 to 250 watts a day.

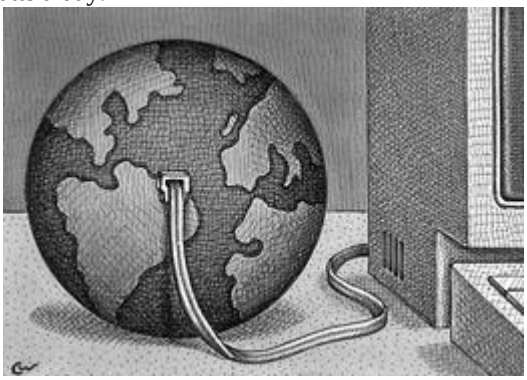

**Fig: 1**

Compared with a machine left on 24/7, a computer that is in use four hours a day and turned off the rest of the time would save you about $70 a year. The carbon impact would be even greater. Shutting it off would reduce the machine's CO2 emissions 83%, to just 63 kg a year.

### *B. How internets cause global warming?*

Blog servers might have more than 10,000 PCs occupying an area of more than 40, 0000 sq. ft that generate huge amount of heat while running. Each click of the keyboard engenders heat in our computers and laptops and processing of information data causes a minuscule rise in environmental temperature. Single internet search, depending upon the initial data, might consume enough electricity to run an 11 watt energy saving light bulb few

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minutes to an hour. With about more than 200 Million (…) internet searches estimated globally daily, the power consumption and GHG emissions generated by internet and computers is alarming. In 1998, Google handled 10,000 searches a day and 500,000 a day in 1999. According to research group COM Score estimates that Google hosted **235 million searches** a day in July 2008.

**Table 1.**

TOP 20 COUNTRIES WITH HIGHEST NUMBER OF INTERNET USERS

| # | Country or Region | Population, 2010 Est | Users Latest Data | % Population (Penetration) | Growth 2000-2010 | % of World Users |
|---|---|---|---|---|---|---|
| 1 | China | 1,330,141,295 | 420,000,000 | 31.6 % | 1,766.7 % | 21.4 % |
| 2 | United States | 310,232,863 | 239,893,600 | 77.3 % | 151.6 % | 12.2 % |
| 3 | Japan | 126,804,433 | 99,143,700 | 78.2 % | 110.6 % | 5.0 % |
| 4 | India | 1,173,108,018 | 81,000,000 | 6.9 % | 1,520.0 % | 4.1 % |
| 5 | Brazil | 201,103,330 | 75,943,600 | 37.8 % | 1,418.9 % | 3.9 % |
| 6 | Germany | 82,282,988 | 65,123,800 | 79.1 % | 171.3 % | 3.3 % |
| 7 | Russia | 139,390,205 | 59,700,000 | 42.8 % | 1,825.8 % | 3.0 % |
| 8 | United Kingdom | 62,348,447 | 51,442,100 | 82.5 % | 234.0 % | 2.6 % |
| 9 | France | 64,768,389 | 44,625,300 | 68.9 % | 425.0 % | 2.3 % |
| 10 | Nigeria | 152,217,341 | 43,982,200 | 28.9 % | 21,891.1 % | 2.2 % |
| 11 | Korea South | 48,636,068 | 39,440,000 | 81.1 % | 107.1 % | 2.0 % |
| 12 | Turkey | 77,804,122 | 35,000,000 | 45.0 % | 1,650.0 % | 1.8 % |
| 13 | Iran | 76,923,300 | 33,200,000 | 43.2 % | 13,180.0 % | 1.7 % |
| 14 | Mexico | 112,468,855 | 30,600,000 | 27.2 % | 1,028.2 % | 1.6 % |
| 15 | Italy | 58,090,681 | 30,026,400 | 51.7 % | 127.5 % | 1.5 % |
| 16 | Indonesia | 242,968,342 | 30,000,000 | 12.3 % | 1,400.0 % | 1.5 % |
| 17 | Philippines | 99,900,177 | 29,700,000 | 29.7 % | 1,385.0 % | 1.5 % |
| 18 | Spain | 46,505,963 | 29,093,984 | 62.6 % | 440.0 % | 1.5 % |
| 19 | Argentina | 41,343,201 | 26,614,813 | 64.4 % | 964.6 % | 1.4 % |
| 20 | Canada | 33,759,742 | 26,224,900 | 77.7 % | 106.5 % | 1.3 % |
| TOP 20 Countries | | 4,480,797,760 | 1,490,754,397 | 33.3 % | 417.8 % | 75.8 % |
| Rest of the World | | 2,364,812,200 | 475,760,419 | 20.1 % | 551.2 % | 24.2 % |
| Total World - Users | | 6,845,609,960 | 1,966,514,816 | 28.7 % | 444.8 % | 100.0 % |

So what happened with the Internet in 2011? How many email accounts were there in the world in 2011? How many websites? How much did the most expensive domain name cost?

***Email***

- **3.146 billion –** Number of email accounts worldwide.
- **27.6% –** Microsoft Outlook was the most popular email client.
- **19% –** Percentage of spam emails delivered to corporate email inboxes despite spam filters.
- **112 –** Number of emails sent and received per day by the average corporate user.
- **71% –** Percentage of worldwide email traffic that was spam (November 2011).
- **360 million –** Total number of Hotmail users (largest email service in the world).
- **$44.25 –** The estimated return on $1 invested in email marketing in 2011.
- **40 –** Years since the first email was sent, in 1971.
- **0.39% –** Percentage of email that was malicious (November 2011).

***Websites***

- **555 million –** Number of websites (December 2011).
- **300 million –** Added websites in 2011.

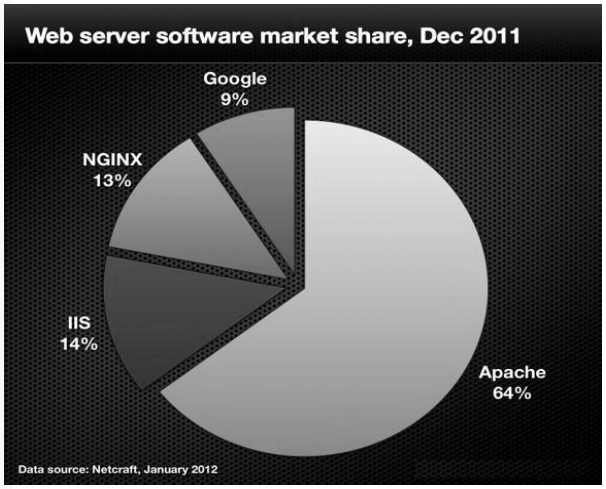


**Fig: 2**

***Web servers***

- **239.1% –** Growth in the number of Apache websites in 2011.
- **68.7% –** Growth in the number of IIS websites in 2011.
- **34.4% –** Growth in the number of NGINX websites in 2011.
- **80.9% –** Growth in the number of Google websites in 2011.

***Domain names***

- **95.5 million –** Number of .com domain names at the end of 2011.
- **13.8 million –** Number of .net domain names at the end of 2011.
- **9.3 million –** Number of .org domains names at the end of 2011.
- **7.6 million –** Number of .info domain names at the end of 2011.
- **Million –** Number of .biz domain names at the end of 2011.
- **220 million –** Number of registered domain names (Q3, 2011).
- **86.9 million –** Number of country code top-level domains (.CN, .UK, .DE, etc.) (Q3, 2011).

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- **324 –** Number of top-level domains.
- **28% –** Market share for BIND, the number one DNS server type.
- **$2.6 million –** The price for social.com, the most expensive domain name sold in 2011.

***Internet users***

- **2.1 billion –** Internet users worldwide.
- **922.2 million –** Internet users in Asia.
- **476.2 million –** Internet users in Europe.
- **271.1 million –** Internet users in North America.
- **215.9 million –** Internet users in Latin America / Caribbean.
- **118.6 million –** Internet users in Africa.
- **68.6 million –** Internet users in the Middle East.
- **21.3 million –** Internet users in Oceania / Australia.
- **45% –** Share of Internet users under the age of 25.
- **485 million –** Number of Internet users in China, more than any other country in the world.
- **36.3% –** Internet penetration in China.
- **591 million –** Number of fixed (wired) broadband subscriptions worldwide.

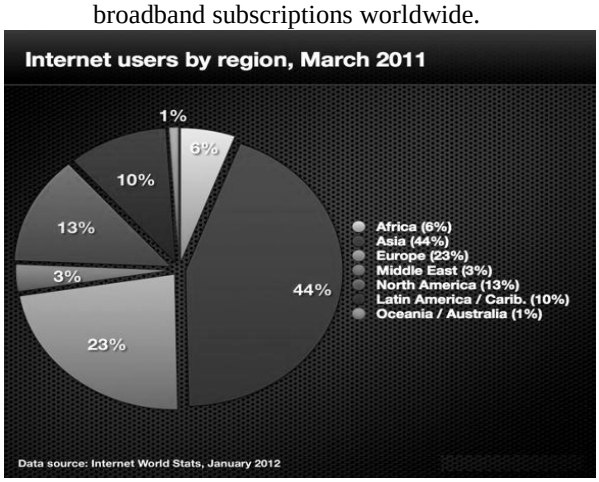


**Fig: 3**

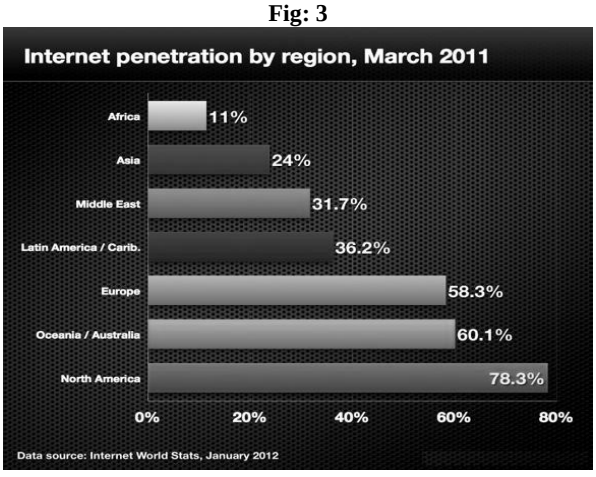


**Fig: 4**

The best we can get are some hard figures mixed with many estimates. However, some information stay unknown, such as how many servers are running at big banks, government agencies and in other organizations. Still, some data and estimates can be extracted and they are still helpful to get a picture of what is going on.

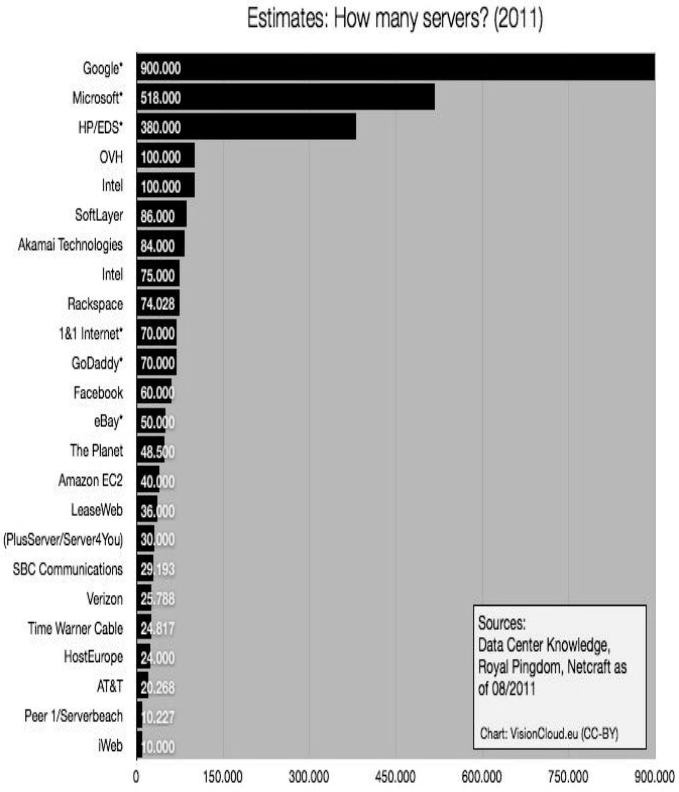


**Fig: 4**

## III. CONCLUSION

So you are probably wondering what solution there may be to help reduce your contribution to this growing problem. There are many ways to help lessen the burden on our mother earth:

- Turn Off Computer When Not in Use
- Adjust Your Hibernate Mode to Idle at a Lesser Time
- Install the Free Co2 Saver from Snap Onto Your Computer
- Explore Alternative Energy for Your Home (Solar, Wind, etc.)
- Try More Outdoor Activities without a Car
- Free Energy Saving Program Installs

The Co2 Saver from Snap is a cool install application that is free of spyware that allows you to monitor your computer's usage and the impact it is making on the environment in relation to carbon dioxide. It is a real nifty little tool as it lets you see what you have saved as well as how much you have consumed. It automatically can adjust your computer to the most environmentally friendly settings in your contribution to battle global warming.

Another cool install does about the same thing exact thing except it also shows you what natural resources you

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have saved and what you have consumed in relation to your computer's energy consumption. The program is offered by a company named Uni-Blue and is called Local Cooling. Both programs are entirely free, so it might be fun to see just how much of a dent you can put in the global warming trend.

While global warming and pollution may seem like a trendy topic often associated with politics, hippie parades, or MTV the topic is nothing to ignore or just show concern for one day out of a year. The reality of life is that we all have just this one planet for many generations to come. This planet is what gives us life, food, air, and water. We cannot expect to enjoy the luxury of living if we do not protect our human habitat.

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