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Times Online

From The Sunday Times

January 11, 2009

Revealed: the environmental impact of Google searches

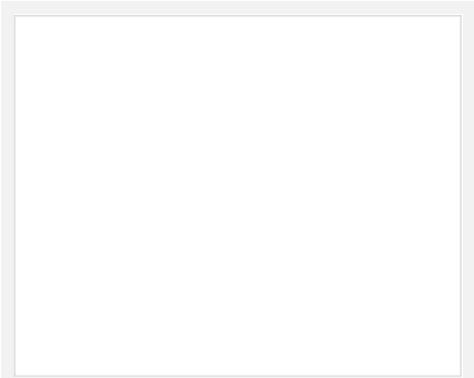
New research lifts lid on links between CO2 emissions and internet searches

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Jonathan Leake and Richard Woods

[Alex Wissner-Gross describes his research in detail](#) | [Google's response to the story](#)

Clarification added 16th January: A report about online energy consumption (Google and you'll damage the planet, Jan 11) said that "performing two Google searches from a desktop computer can generate about the same amount of carbon dioxide as boiling a kettle" or about 7g of CO₂ per search. We are happy to make clear that this does not refer to a one-hit Google search taking less than a second, which Google says produces about 0.2g of CO₂, a figure we accept. In the article, we were referring to a Google search that may involve several attempts to find the object being sought and that may last for several minutes. Various experts put forward carbon emission estimates for such a search of 1g-10g depending on the time involved and the equipment used

Performing two Google searches from a desktop computer can generate about the same amount of carbon dioxide as boiling a kettle for a cup of tea, according to new research.

While millions of people tap into Google without considering the environment, a typical search generates about 7g of CO₂. Boiling a kettle generates about 15g. "Google operates huge data centres around the world that consume a great deal of power," said Alex Wissner-Gross, a Harvard University physicist whose research on the environmental impact of computing is due out soon. "A Google search has a definite environmental impact."

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Google is secretive about its energy consumption and carbon footprint. It also refuses to divulge the locations of its data centres. However, with more than 200m internet searches estimated globally daily, the electricity consumption and greenhouse gas emissions caused by computers and the internet is provoking concern. A recent report by

Gartner, the industry analysts, said the global IT industry generated as much greenhouse gas as the world's airlines - about 2% of global CO₂ emissions. "Data centres are among the most energy-intensive facilities imaginable," said Evan Mills, a scientist at the Lawrence Berkeley National Laboratory in California. Banks of servers storing billions of web pages require power.

Though Google says it is in the forefront of green computing, its search engine generates high levels of CO₂ because of the way it operates. When you type in a Google search for, say, "energy saving tips", your request doesn't go to just one server. It goes to several competing against each other.

It may even be sent to servers thousands of miles apart. Google's infrastructure sends you data from whichever produces the answer fastest. The system minimises delays but raises energy consumption. Google has servers in the US, Europe, Japan and China.

Wissner-Gross has submitted his research for publication by the US Institute of Electrical and Electronics Engineers and has also set up a website www.CO2stats.com. "Google are very efficient but their primary concern is to make searches fast and that means they have a lot of extra capacity that burns energy," he said.

Google said: "We are among the most efficient of all internet search providers."

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Wissner-Gross has also calculated the CO2 emissions caused by individual use of the internet. His research indicates that viewing a simple web page generates about 0.02g of CO2 per second. This rises tenfold to about 0.2g of CO2 a second when viewing a website with complex images, animations or videos.

A separate estimate from John Buckley, managing director of carbonfootprint.com, a British environmental consultancy, puts the CO2 emissions of a Google search at between 1g and 10g, depending on whether you have to start your PC or not. Simply running a PC generates between 40g and 80g per hour, he says. of CO2 Chris Goodall, author of Ten Technologies to Save the Planet, estimates the carbon emissions of a Google search at 7g to 10g (assuming 15 minutes' computer use).

Nicholas Carr, author of The Big Switch, Rewiring the World, has calculated that maintaining a character (known as an avatar) in the Second Life virtual reality game, requires 1,752 kilowatt hours of electricity per year. That is almost as much used by the average Brazilian.

"It's not an unreasonable comparison," said Liam Newcombe, an expert on data centres at the British Computer Society. "It tells us how much energy westerners use on entertainment versus the energy poverty in some countries."

Though energy consumption by computers is growing - and the rate of growth is increasing - Newcombe argues that what matters most is the type of usage.

If your internet use is in place of more energy-intensive activities, such as driving your car to the shops, that's good. But if it is adding activities and energy consumption that would not otherwise happen, that may pose problems.

Newcombe cites Second Life and Twitter, a rapidly growing website whose 3m users post millions of messages a month. Last week Stephen Fry, the TV presenter, was posting "tweets" from New Zealand, imparting such vital information as "Arrived in Queenstown. Hurrah. Full of bungy jumping and 'activewear' shops", and "Honestly. NZ weather makes UK look stable and clement".

Jonathan Ross was Twittering even more, with posts such as "Am going to muck out the pigs. It will be cold, but I'm not the type to go on about it" and "Am now back indoors and have put on fleecy tracksuit and two pairs of socks". Ross also made various "tweets" trying to ascertain whether Jeremy Clarkson was a Twitter user or not. Yesterday the Top Gear presenter cleared up the matter, saying: "I am not a twit. And Jonathan Ross is."

Such internet phenomena are not simply fun and hot air, Newcombe warns: the boom in such services has a carbon cost.

HAVE YOUR SAY

Is it a myth Gemma? We can see everyday the weather changes. But the worst of all is our changes. Human of today became lazy and indifferent. Financial crisis is in relation with energy crisis and finally with human life crisis. We have to remember an ancient greek maxim: "best measure of everything"

Dimitris, Thessaloniki, Hellas

There's website that is as effective as Google and Yahoo: ecocho.com. Each time 1000 researches are done, 2 trees are planted. Not much? 6669 have already been planted and the website is still unknown! Think about it! I prefer to be poor and healthy than rich and sick.

M-C, QC, Canada

Phew, what a lot of hot air from America! Quite surprising that you mostly claim climate change is a figment of imagination. Maybe you will 'see the light' in due course.

FWIW, I don't drive (no car, nor need of one) and don't touch Google - there are better search tools without adverts.

Peter, near Liverpool, UK

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