Google reveals energy use to show search is green

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Stung by concerns that using Google is bad for the planet, the Internet search giant has revealed exactly how much electricity the company uses and how much greenhouse gases it produces in an effort to show its business model is environmentally friendly.

Experts say it's true: Watching a video on Google's Youtube site is indeed more energy-efficient than watching a DVD that had to be manufactured, packaged, shipped and purchased.

Talking about sustainability is a popular marketing tool, but Google has made renewable energy and environmental protection part of both its corporate identity and its operations in a way that is unique in corporate America. Google's philanthropic arm funds projects aiming to make renewable energy cheaper than coal power. The company purchases large blocks of renewable energy directly from power generators. Google has invested nearly $1 billion in renewable energy projects, including wind farms in North Dakota, California, and Oregon, solar projects in California and Germany, and the beginnings of a transmission system off the East Coast meant to foster the construction of offshore wind farms.

The environment has long been a major concern for co-founder and CEO Larry Page and, since 2007, the company has been paying for projects that remove greenhouse gases from the atmosphere to completely offset its own emissions.

Google's environmental focus made a 2009 article in the British newspaper The Sunday Times claiming Google searches generated large amounts of greenhouse gases particularly painful for the company. The article, which caused a stir in the environmental community, said a single Google search generates the same amount of carbon as boiling a kettle of water for tea.

Google defended itself vigorously, and the paper later accepted Google's contention that most Google searches produce 35 times less carbon than the report suggested. Still, the report, along with concerns that power use by big data centers that Google and others rely on was growing rapidly, prompted Google to conduct detailed studies of the company's efficiency, power use, and greenhouse gas emissions.

In a blog post made public Thursday, Google revealed an unprecedented amount of data about the environmental footprint of its own operations.

"They are concerned, and rightly so, that people think they are bigger (electricity users) than they actually are," says Noah Horowitz, a Senior Scientist at the Natural Resources Defense Council who studies efficiency.

Google says it used 2.3 billion kilowatt-hours of electricity last year, about the same as what 207,000 U.S. homes would use in a year or the power consumption of about 41 Empire State Buildings, according to Edison Electric Institute, a utility industry trade group.

Google uses about half the power of the biggest power consumers such as oil companies, automakers and steel companies. But that level of consumption does make them a major industrial user, along the lines of a big chemical company, according John Hughes, the Vice President for Technical Affairs for the Electricity Consumers Resource Council, a trade group that represents large industrial electric power consumers.

Rick Needham, Director of Green Business Operations at Google said in an interview that Google will continue to release this data periodically so the company's progress can be publically tracked. "It holds our own feet to the fire," he said.

To reduce the impact of all its power use on the environment, Google is buying renewable power, investing in renewable energy projects to help make it more available, making its data centers more efficient and paying for projects that remove greenhouse gases from the atmosphere, known as carbon offsets.

Also, Google is trying to prove that its business model is far greener than the alternative. Even if data centers use lots of power, using them to run a search on, say, the legend of Atlantis, uses far less energy than driving to a library and looking through an encyclopedia for the information.

Google, Microsoft and others in the information technology industry are pushing business customers to shift to centralized data centers packed with thousands of computers to store and process data and run software.

Using this model, called cloud computing, is far more efficient and cheaper for companies than running their own servers, email programs and other software in in-house information technology departments, according to Jonathan Koomey a consulting Professor at Stanford University who studies data center efficiency.

Google says an email system run on in-house servers consumes about 75 times more power than Google's Gmail email service.

Other companies that rely on cloud computing, such as the business software company Salesforce.com, have also conducted studies that show cloud computing is more efficient.

The reason is that data centers make better use of their equipment. An in-house data center in the back room of a company headquarters requires its own power systems and cooling systems to run computers that are doing far less than they could be. A data center can process information from around the world at all hours with one heating and cooling system.

Still, Data centers use 10 times to 20 times more energy per square foot than a typical commercial building, according to the Electric Power Research Institute. And while data center power use is growing slower than efficiency experts had feared it would in the early part of the last decade, it is still growing fast.

It now accounts for roughly 2 percent of the nation's annual electricity consumption. Fifteen years ago, it was not a factor.

And for every kilowatt-hour used for computing in a typical data center, nearly a whole additional kilowatt-hour is used for running cooling and heating systems.

"Not all clouds are created equally," says Horowitz. "Some data centers are more efficient than others, and it matters what kind of power they use."

Google says its data centers are about twice as efficient as typical data centers as measured by a score it publically reveals each quarter that measures how much power is used directly for computing compared with power used for heating and cooling.

Google says more efficient data centers are a major cost savings for the company because it has to buy less power. Google won't say how much money it saved, but it says its data centers use about half the power as a typical data center. Using the national average retail power price for industrial customers, that would make for an annual savings of $130 million. That figure does not take into account the extra expense, if any, of designing more efficient data centers.

Facebook and Yahoo have both revealed in recent months that they have built new data centers that are among the most efficient ever built, though not all of their data centers meet that standard.

Horowitz hopes Google's disclosure prompts other big data center operators such as Apple, Amazon.com and the U.S. Government to also reveal data center efficiency and work to improve it.

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