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# Heat is on for energy-efficient Internet

By **James Temple**

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Data centers produce 2 percent of the world's global warming pollution and waste about 90 percent of the energy they consume, former Vice President Al Gore said during an environmental summit at Google headquarters Thursday.

"With the vast increase in cloud use and data center use, it's obvious we have to make a change," he said in a half-hour keynote speech that alternately complimented Internet companies like Google for their efforts to improve energy efficiency and called on them to do more.

Gore appeared in Mountain View as the opening speaker for the Internet giant's "How Green Is the Internet?" conference, its third since 2009 focused on technology-related energy issues. About 150 experts from

industry, academia, government and environmental groups gathered to explore that complicated question.

The Internet has great potential to cut energy use by replacing physical processes with digital ones, such as swapping pixels for paper and video conferencing for business flights, as a series of researchers presenting new studies at the event emphasized.



## ***Energy use***

But other speakers pointed out that the mere ability to produce energy gains doesn't mean it always happens. And, as Gore emphasized, the machines that form that abstraction we call the Internet suck up vast amounts of energy themselves.

Stanford research fellow Jonathan Koomey said that the electricity consumed by devices, data centers, networks and other components of the Internet approach 10 percent of all energy use.

The findings on this issue differ - depending on how the Internet and its use is defined - but they all add up to big numbers. A UC Berkeley study came up with a total of between 170 billion and 307 billion watts, or 1.1 to 1.9 percent of the total energy used by all of humanity. A New York Times investigation published last year found that data centers alone used 30 billion watts of electricity - or about the output of 30 nuclear power plants.

More troubling, research firm McKinsey & Co. found that only 6 to 12 percent of the energy consumed by those data farms was actively used. The rest went to keep servers humming just in the event of an activity spike that could slow operations and send fickle Internet surfers onto other sites.

## ***Making strides***

Google, Facebook, Apple and other major Internet companies have made strides in this area during the last few years, adopting more energy-efficient technology and committing to various levels of

renewable-energy use.

But most researchers Thursday said the bigger potential lies in using the Internet to replace or improve on energy-gobbling activities in the physical world.

Koomey noted that downloading a music album is 40 to 80 percent more efficient than buying a physical CD. He also highlighted the example of a smart parking system developed by Streetline, which uses wireless sensors and smartphone apps to direct drivers to open spots, preventing endless circling. The total amount of electricity required to run the system in Los Angeles is only 15 watts, Koomey said.

"There's a huge potential effect on this much larger system of cars and trucks driving around," Koomey said.

### ***Fewer flights***

That earlier Berkeley study found that if a quarter of all flights were replaced with video teleconferences, it would mean 400 million fewer passenger trips. That adds up to a savings of 285 billion watts - about as much as the Internet consumes.

But potential is different from reality. UC Davis Professor Patricia Mokhtarian made the case Thursday that the Internet has actually increased travel, as online systems and software made getting around cheaper, easier and more efficient.

The mere ability to stay connected with co-workers, friends and family makes travel less of a burden.

"So we're less inclined to avoid it," she said.

### ***Renewable energy***

Gary Cook, a senior IT analyst at Greenpeace, has attended the conference over the years and said he's noticed an important shift in the conversation from focusing on gains in data center efficiency to greater use of renewable energy.

Environmentalists and climate scientists insist we've already reached an unhealthy level of carbon

dioxide in the atmosphere - 400 parts per million this year - so energy efficiency is a necessary but insufficient answer to the problem of global warming. Sustainable energy systems that don't pump more greenhouse gases into the atmosphere are what is needed.

But few think voluntary actions by a handful of businesses will get us where we need to go.

## ***Government resources***

Instead, the government needs to pour resources into developing more efficient clean-energy technology and pass laws that accelerate the transition away from fossil fuels.

"We're headed for a 4- to 6-degree (Celsius) increase this century, unless we take some dramatic action," said Gore, citing projections from the forthcoming U.N. Intergovernmental Panel on Climate Change report. "Our planet is running a fever."

Google deserves considerable credit for being an industry leader on this issue, hosting conferences, committing to eventually use 100 percent renewable energy, and achieving carbon neutral status through legitimate offsets, such as by paying for systems that reduce greenhouse gas emissions from landfills and hog farms. But, like most businesses, it hasn't done nearly enough to force the issue on the policy front.

Around the time the conference broke for lunch in Google's Building 40, activists were assembling on another corner of the campus to protest the company's membership in the U.S. Chamber of Commerce.

There are a host of reasons that Google should denounce the organization, but here's the one that seemed particularly germane on Thursday.

"Generally, the U.S. Chamber has opposed almost every piece of environmental regulation," said Jake Parent, coordinator of Public Citizen's U.S. Chamber Watch project. "It has lobbied for the (Environmental Protection Agency) to be abolished, and it has been one of the biggest cheerleaders for dirty energy policies."

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