How Google Keeps Its Power-Hungry Operations Carbon Neutral

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7-8 minutes

Google sustainability officer Kate Brandt urges others to embrace the "circular economy."

Callie Giovanna/TED

Kate Brandt has a radical idea for how we'll have to live in the future, if we're going to be in balance with nature. She envisions a world without landfills, where ownership is obsolete, and everything down to the socks on our feet is rented and shared. Brandt is Google's sustainability officer. And she's obsessed with one idea: the "circular economy,"

which aims to eliminate waste. This would require products and materials to be kept in use, rather than thrown away, and for the world to be powered by renewable energy.

At Google, Brandt is employing this ethos at scale. At TEDWomen 2018, a conference for women thought leaders in Palm Desert, California, this week, she issued a challenge to the rest of the tech industry to do the same.

The timing is good—and necessary. A [recent report](#) from the US government paints a dire picture of what will happen to our planet if we don't aggressively counteract climate change in the next decade. That's in line with the [UN's report](#) from October,which concluded that humans have about 12 years to reverse current trends before we do irreversible harm.

Brandt is focused on implementing this vision at the buildings that house Google employees and at Google's 14 data centers around the globe. The company has been carbon-neutral since 2007, which requires a lot of work to offset its substantial power demands. Google achieves this three ways, according to its most recent [Environmental Report](#): by reducing its demand, by buying renewables to match its use of non-renewable energy, and with other offsets, [like capturing methane gas from animal waste](#).

Data centers are a large source of emissions. According to a [recent report](#) in the journal *Nature*, data centers use 200 terawatts of energy a year—roughly 1 percent of global electricity use.

Google [estimates](#) that each search emits roughly 0.2 grams of CO_2 into the atmosphere, due to the energy it takes to power the cables, routers, and servers that make Google work. That's on par with the energy it takes to power a lightbulb for 17 seconds. Watching or uploading a video to YouTube is worse for the environment: 1 gram of carbon for every 10 minutes of viewing, according to *[The Guardian](#)*. [Experts estimate](#) that internet companies put out as much CO_2 as the

airline industry.[1]

As Google grows, "We are committed to neutralizing all the carbon emissions associated with our operations," Brandt says. That sounds great, but how do you actually do it?

"First we applied machine learning to the cooling of data centers," Brandt says, cutting energy use by the cooling system by 30 percent.

Google designed servers that will last longer and be easier to reuse. "We are taking components from old servers, and we are keeping them in our new machines. We're remanufacturing new servers from old ones. And we sell old servers on secondary markets after wiping them clean," she says. In 2017, that meant 18 percent of Google's new servers were remanufactured machines, and 11 percent of components used for machine upgrades were refurbished inventory. The company sold more than 2 million used machines to others.

Google also bought 3 gigawatts of wind and solar last year to offset the energy use of its data centers, allowing the company for the first time to match 100 percent of its energy use with renewables. Though that tactic has long been a component of its carbon-neutral effort, 2017 was the first year it was able to buy enough clean energy to offset all its data center energy consumption. "For every kilowatt-hour of energy we consume, we add a matching kilowatt-hour of renewable energy to a power grid somewhere," Urs Hölzle, a Google senior vice president, wrote in a [blog post](#) earlier this year.

Google is far from alone in embracing the circular economy. Nike, Brandt points out, is designing out waste in how it harvests materials and makes products. She points also to Renault and Walmart as companies embracing reusable materials and 100 percent renewable energy, respectively. "But no one else in the data center industry is applying this

circular approach at scale," she says.

Though she doesn't call them out specifically, streaming services could have a huge impact if they answered Brandt's call, since streaming services like Netflix account for a [majority of global broadband traffic](). [Greenpeace has singled out Netflix]() for not making commitments to reduce its climate impact. Amazon has taken heat for not being open about its sustainability efforts and climate impacts, [recieving an F rating]() in 2016 from the Carbon Disclosure Project, which called it out as the largest US company to refuse transparency. Netflix and Amazon did not respond to requests for comment.

Microsoft doesn't call it a circular economy approach, but it's been making big strikes on sustainability for the past six years. Microsoft [created an internal carbon tax]() to help reduce its emissions. Since implementing it in 2012, [the company has been carbon-neutral](), and it has pledged to cut its absolute emissions by 75 percent by 2030.

The good news is that the circular economy is an idea whose time may have come. The urgency of recent climate reports has led not just a handful of companies to embrace the idea of renewable and circular manufacturing, but also countries. The European Union's parliament [embraced it this year]() and is considering advancing broader [circular economy]() goals. [Japan and China]() are both introducing circular goals into their economies.

Getting more businesses to buy in is a hard ask. But it's potentially a profitable one. "Today we have so many materials that are used once. There is still so much intrinsic value that is left in those materials, but we aren't designing them to retain that value," Brandt says. She points to a [recent study]() estimating that if industry embraced a circular economy, it could boost economic output by $4.5 trillion by 2030, by cutting down on the cost of buying new materials in favor of reusing and remanufacturing existing materials.

There's a symmetry to that year: It's the deadline after which the UN estimates humans will not be able to recover from the climate impacts we've had on Earth. By embracing the circular economy, Brandt hopes humans can mitigate disaster without even losing money in the process.

[1] **CORRECTION, Dec. 1, 8:10 PM:** An earlier version of this story included an outdated estimate for the CO_2 emissions for each search.

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