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Energy: Will Efficiency Lead to More Consumption?

Posted by **BRYAN WALSH** Thursday, September 30, 2010 at 7:00 am

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In the polarized realm of climate and energy politics, energy efficiency has always been the common ground. The concept is so attractive—we clearly waste far too much of our energy, whether that means driving a car with that gets low gas-mileage or living in a poorly insulated house. If you're worried about climate change and are looking for a way to cut carbon emissions, improving energy efficiency is a no brainer. And even if you think climate fears are overstated, there's a logical business case for upping your energy efficiency: energy wasted is money wasted. (See this report from the UN Foundation to set a sense of the hopes being placed in scaled-up energy efficiency.)

But what if the environmental faith that increasing energy efficiency means decreasing carbon emissions isn't perfect? What if by improving the efficiency of our lightbulbs (or our cars or our thermostats), we actually pave the way for increased energy consumption—and as long as most of our energy is provided by fossil fuels, increased carbon emissions as well? What if energy efficiency rebounds on us?

That's the argument being made by Harry Saunders, one of the authors of a recent paper in the *Journal of Physics* on the energy-economics of solid-state lighting—in plain language, how the introduction of ultra-efficient LCD lighting will impact energy consumption and energy prices. (Get a PDF of the paper here.) The study itself looked at data from 300 years of lighting use in Britain, and found that people have spent about the same amount of money on lighting—roughly 0.72% of GDP—no matter where in the world or when in history they live. The difference is the efficiency of the lighting source—in the rich world, as fireplaces gave way to whale lamps, and incandescent lightbulbs gave way to compact flourescent bulbs, we've been able to get more and more light for the same amount of money.

From an economic perspective—and a quality of life one—that's a good thing. (Just ask the 1.4 billion people around the world who live without access to regular electricity.) But the history of lighting shows that improving energy efficiency doesn't reduce overall energy consumption. Rather, it can actually increase energy consumption, as efficiency improvements allow us to burn more light without paying more.

As Saunders wrote in a recent post, this is an example of the "rebound effect"—energy efficiency lowers the cost of energy, and we then tend to use those cost savings on activities or items that either use energy or have energy embedded in them. The savings end up rebounding on the economy as a whole, as Saunders points out:

The good news is that increased light consumption has historically been tied to higher productivity and quality of life. The bad news is that energy-efficient lighting should not be relied upon as means of reducing aggregate energy consumption, and therefore emissions.

The rebound effect is a hotly debated one among energy experts, as I found in reporting a fairly brief article on the subject last year. (It's also called the Snackwell effect, after the diet cookies—snackers eat more because each cookie is lower in calories, and end up packing on the pounds.) Skeptics of the rebound effect believe it's naturally limiting, arguing that just because light gets cheaper thanks to greater efficiency doesn't mean we'll suddenly be driven to keep the Christmas lights on year-round. There's a limit in how many lightbulbs we'd want burning at one time, no matter how cheap their energy costs are, just as trading in an SUV for a Prius doesn't mean we'll drive three times as much. Here's what Evan Mills, a scientist at