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How Do We Solve Energy Poverty?

By David Biello | Thursday, June 30, 2011 | 3 comments



Each year, human civilization consumes some 14 terawatts of power, mostly provided by burning the fossilized sunshine known as coal, oil and natural gas. That's 2,000 watts for every man, woman and child on the planet. Of course, power isn't exactly distributed that way. In fact, roughly two billion people lack reliable access to modern energy—whether fossil fuels or electricity—and largely rely on burning charcoal, dung or wood for light, heat and cooking.

"Three tablespoons of crude oil provide as much free energy as expended by an adult male laborer in a day's labor," noted political scientist Thomas Homer-Dixon of the University of Waterloo, during a talk at the Equinox Summit in early June.

Bringing modern energy to the poorest and enabling the continued use of copious energy in the developed world without the attendant greenhouse gas emissions are the main reasons many experts think we will need roughly 30 terrawatts of energy by mid-century. And just as cellphones have leapfrogged their way into becoming the communication tool of choice throughout the world, the hope is that solar-battery systems or renewable- or nuclear-based microgrids might displace the need for more coal burning at centralized power plants to give light to the masses. After all, Edison's first coal plant served a microgrid of sorts in lower Manhattan back in 1882, exclusively for lighting.

The killer app of modern energy—whether kerosene or electricity—is lighting, in fact, as that's the first thing people use it for: either allowing their children to learn to read or extending their working hours for extra income. And then there's charging for all those leapfrogging cellphones out there.

Lighting and battery charging are closely followed by another application—television. For example, the Chinese government is in the midst of a rural improvement scheme that essentially promises three goods: a road, an electricity line and television.

But the greenhouse gases that are raising global average temperatures are in the atmosphere as a result of two passions in the developed world: electronic devices and cars. In the U.S., for example, household emissions tripled between 1950 and 2009, according to the U.S. Energy Information Administration, thanks to the use of electricity in the home for devices like TVs.

Extending that lifestyle to the rest of the world means more environmental impact. China, for example, has lifted millions of people out of poverty and into the middle class, according to the U.N. Development Program, largely by burning coal—and that's also made them the nation with the largest total amount of greenhouse gas emissions. And even if more environmentally-friendly technologies are used to extend modern energy's reach, there will be more environmental impact: more mining and energy use for rare-earth elements for electric motors; more pollution from the process of purifying silicon, incorporating thin films of toxic elements or fossil fuel-based polymers for photovoltaics; more lead, nickel or lithium for batteries. "A cellphone's embodied energy is one-quarter of a car," said environmental scientist Vaclav Smil of the University of Manitoba at the Equinox Summit, despite being 1/1,000th the size.

In fact, back when electric vehicles were resurrected in the 1990s, researchers found that battery-powered cars would introduce more lead into the environment than if they burned leaded gasoline. As it stands, recycling lead-acid batteries—still the standard for starting cars around the world—is one of the world's worst environmental problems, according to the Blacksmith Institute.

Certainly, those of us in the developed world could get by with less—Americans consume twice as much energy as Europeans or Japanese without an appreciable difference in quality of life. "Assuming U.S. and Canada reduce per capita energy consumption to the level of Germany, that would reduce greenhouse gas emissions by 1,200 million metric tons of oil equivalent per year," noted engineer Ding Jianhua of the China Urban Construction, Design and Research Institute in Beijing at the Equinox Summit. "That is nearly the total energy consumption of Latin America and Africa."

It is also clear that using less energy is not the answer for the world's poorest. "In Uganda, less than 5 percent of the population has energy, it doesn't make sense to talk about energy efficiency," says [Juan Jose Daboub](#), former World Bank managing director and founding CEO of the Global Adaptation Institute, an organization devoted to adapting to the challenges of climate change.

In the starkest terms, energy, largely from fossil fuels, has freed humans and animals from labor by powering machines—it would take 100 human slaves to do the work of one gallon of gasoline. It is also about health: burning smoky fuels indoors shortens lives, and a lack of modern energy means a lack of electricity to power refrigerators to store life-saving vaccines.

Those applications of energy are definitely ones we want to extend to the developing world, certainly more so than sharing our love of gadgets and cars. The trick will be doing it in a way that preserves people and the planet.

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