

Source: Silver Spring

What consumers need to know about the smart grid and smart meters

America's outdated energy system is wasteful, expensive, and a huge source of pollution. Over the next 10 years, utilities will have to invest hundreds of millions of dollars to modernize our electricity grid, most of which is past the age of retirement. By making smart investments in a "smart" green grid, we can greatly reduce our use of dirty energy, improve air quality and the health of millions of Americans¹ affected by dangerous air pollution, and advance our energy independence and economic growth.

The diverse benefits of a smart grid

Modernizing our electricity system with information and networking technologies will allow us to diversify energy sources and eliminate enormous waste. The smart grid will be an "energy Internet" that transforms energy as completely as the information revolution transformed telecommunications, bringing us everything from cell phones to YouTube. A properly designed smart grid will help households and businesses reap many economic and environmental benefits, including:

1. Economic and job growth

The clean energy industry is one of our fastest growing sectors, with venture capitalists, utilities, and businesses investing billions in domestic solar, wind, energy efficiency, smart grid, and electric vehicle companies and projects. Between 1998 and 2007, clean energy jobs in the U.S. grew by 9.1 percent, while total jobs grew just 3.7 percent. All told, 770,000 people were working in 68,200 fast-growing businesses spread across all 50 states.²

2. Lower utility bills

With easy-to-use tools—such as simple online displays of the information smart meters provide about use and prices and set-and-forget home energy management tools—consumers will be able to make choices that lower bills and shrink their environmental footprint.

3. More reliable service through shorter and fewer outages

A smart grid uses two-way, real-time communication to pinpoint and fix problems, often before they happen. When black-outs do occur, power can be restored quickly, keeping businesses up and running and households comfortable and safe during storms and heat waves.

4. Cleaner air and improved public health

The burning of fossil fuels to generate electricity is one of the biggest sources of pollution and a major health threat. Dirty air causes alarming rates of asthma and lung disease, especially among children and the elderly. According to the EPA, the more than 20 million Americans suffering from asthma endure two million visits to the emergency room and 5,000 premature deaths, at annual costs of approximately \$14 billion each year.³ A smart grid will help clear our air, delivering huge benefits for public health.

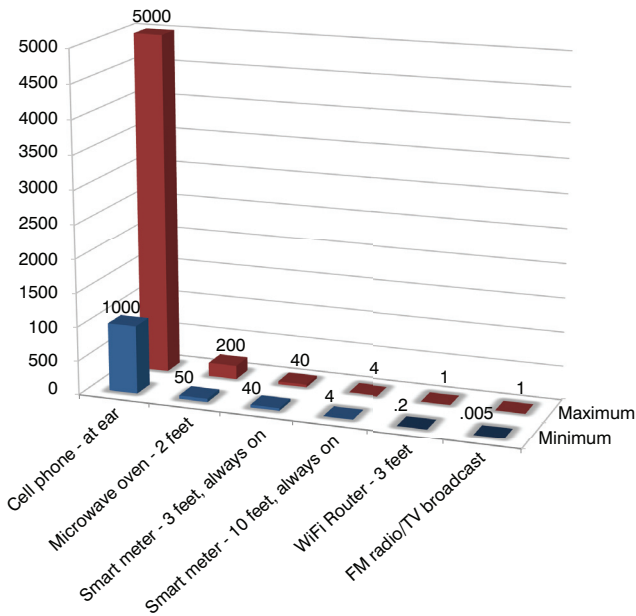
5. More clean renewable energy and less dirty fossil fuel

Because a smart grid can adjust demand to match intermittent wind and solar supplies, it will enable the United States to rely far more heavily on clean, renewable, home-grown energy: cutting foreign oil imports, mitigating the environmental damage done by domestic oil drilling and coal mining, and reducing harmful air pollution. A smart grid will also facilitate the switch to clean electric vehicles, making it possible to "smart charge" them at night when wind power is abundant and cheap, cutting another huge source of damaging air pollution.

WHAT CONSUMERS NEED TO KNOW ABOUT THE SMART GRID AND SMART METERS

COMPARISON OF RADIO-FREQUENCY LEVELS FROM VARIOUS SOURCES IN $\mu\text{W}/\text{cm}^2$

Source: CCST January 2011 Report: Health Impacts of Radio Frequency From Smart Meters



The technology behind smart meters

Digital “smart” meters—capable of two-way communication between customers and electric utilities—are key to realizing all of these benefits. The only way we’ll be able to shift, on a large scale, to clean electricity and clean cars is with a smart network to plug them into. And the only way we will eliminate the huge waste throughout our whole energy system is if customers have real-time information about use and rates, and the power to reduce or shift that use: to cut costs and pollution.

Information flows between meters and utilities using radio frequencies (RF) such as those used by radios, baby monitors, and cell phones.

Putting RFs in perspective

Electromagnetic fields (EMF), including RFs, have been studied for years. The World Health Organization has found no evidence of health impacts from exposure to low-level EMFs.⁴ The Federal Communications Commission (FCC) has set guidelines to protect public health by establishing standards for safe levels of RF exposure.⁵ And the California legislature has established the non-profit California Council of Science and Technology (CCST) to provide impartial expert advice on scientific and technology-related policy issues, including radio frequency from smart meters.

“A well-designed smart grid will improve our quality of life, grow our economy, and drive the clean energy revolution we need.”

MIRIAM HORN

Director, Smart Grid Initiative

A person’s actual exposure to RFs from any source is a function of signal strength—which diminishes rapidly with distance—and amount of daily exposure. The CCST study found that even if smart meters were on 100 percent of the time, an individual’s exposure from ten feet away would be nearly zero.⁶ That is 250 - 1,250 times less than the exposure level from holding a cell phone to one’s ear, and significantly less than standing next to a microwave.⁷ Even if an individual was sitting directly on the other side of the wall from a meter, CCST concluded that he or she would be exposed to a very small fraction (0.03 percent) of the level established as safe by the FCC guidelines.⁸

We need a smarter grid now

A well-designed smart grid will improve our quality of life, grow our economy, and drive the clean energy revolution we need. It will empower consumers to manage their electricity use and save money, help utilities reliably deliver power, increase our energy independence, and help us compete in the global clean energy market—while protecting our air, water, and public health.

1. American Lung Association State of the Air 2010 Report, <http://www.stateoftheair.org/>, found that more than 175 million people, 58 percent of the US population, suffer from pollution levels often too dangerous to breathe.
2. http://www.pewcenteronthestates.org/uploadedFiles/Clean_Economy_Report_Web.pdf
3. <http://www.epa.gov/asthma/about.html>
4. <http://www.who.int/peh-emf/about/WhatisEMF/en/index1.html>
5. CCST Report (Pages 7-8), <http://www.ccst.us/publications/2011/2011smartA.pdf>, concluding that the FCC guideline is more than adequate to protect from potential thermal effects of RFs, the only effects that have been scientifically established.
6. CCST Report (Pages 18), <http://www.ccst.us/publications/2011/2011smartA.pdf>
7. CCST Report (Page 5), <http://www.ccst.us/publications/2011/2011smartA.pdf>
8. CCST Report (Page 7), <http://www.ccst.us/publications/2011/2011smartA.pdf>

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Smart Meters. An Integral Piece To The Smart Grid Pie.

March 23, 2011 | Posted by [Lauren Navarro](#) in [California](#), [Smart Grid](#)



As you may have heard, the roll out of smart grid technology in California has raised some health concerns over the safety of smart meter use. As a result, the California Public Utility Commission (CPUC) has ordered Pacific Gas & Electric (PG&E) to develop an alternative to wireless meters.

The [Environmental Defense Fund](#) (EDF) is following this issue closely. Our organization offers a unique perspective given our proven track record of enabling markets and innovation to gain environmental benefits. Our national organization is working across the country to advance smart grid deployment in a way that ensures maximum consumer, economic, and environmental benefits. To do so, we are working with public utilities and regulatory commissions on smart grid policy and advancing smart grid pilots such as Austin's world-renowned [Pecan Street Project](#).

Deploying an effective smart grid throughout the country is a national priority supported by multiple stakeholders: from companies like GE, Cisco and Google, who see it as key to the future of their businesses, America's global competitiveness, and job growth, to Chambers of Commerce, who see the huge economic development and security benefits in making more energy at home and keeping energy dollars at home, to consumer groups like the Citizens Utility

Board, our partner in Illinois, who see it as the only way to keep electric bills from climbing steeply in the years to come. Right now, our outdated energy grid wastes approximately 10% of generated electricity just in transmission and distribution, costing the consumer roughly \$25 billion a year. We lose another estimated \$100b in black-outs, which a smart grid will help us avoid.

Digital “smart” meters, capable of two-way communication between customers and electric utilities, are key to realizing the multiple [benefits of a smart grid](#).

A properly designed smart grid will help households and businesses reap many economic and environmental benefits. It will allow us to greatly reduce our use of dirty energy, improving air quality and the health of millions of Americans now hurt by dangerous air pollution. With easy-to-use tools, such as online updates on how much energy they're using and what it's costing, consumers will be able to make choices that lower their bills. Businesses will be able to pinpoint the most valuable opportunities to make their buildings and operations more energy efficient, saving money. Utilities will be able to provide customers with more reliable service.

Smart meters allow information to flow between meters and utilities by utilizing radio frequencies (RF) such as those currently used by AM/FM radios, baby monitors and cell phones. Studies (such as research by the [California Council on Science and Technology](#) (CCST) and the Electric Power Research Institute) have found no evidence that these radio frequencies pose risks to human health. In fact, the [CCST report](#) released earlier this year found that even if smart meters were on 100% of the time, an individual's exposure would be a very low (4 uW/cm^3). To put this number into perspective, the average exposure to RFs from using a cell phone is between 1,000 and 5,000 uW/cm^3 or 250 – 1,250 times that from a smart meter.

A well-designed smart grid will be a boon to public health. It will improve our quality of life, grow our economy, and drive the clean energy revolution we need.

For more information regarding the benefits of a smart grid, please view EDF's fact sheet [here](#).

<http://blogs.edf.org/energyexchange/2011/03/23/smart-meters-an-integral-piece-to-the-smart-grid-pie/>

Smart Grid Investment Keeps the Future in Mind

Sierra Club “Compass” Posted on June 13, 2011 at 02:52 PM



The future of energy will rely on data to deliver the cleanest power to our homes and vehicles. Imagine, for example, a modern grid hooked to a turbine that detects a gust of wind that immediately triggers a charge into your plugged-in electric car while you sleep. Pretty neat, huh?

We're a few years away from mainstreaming this, but today White House officials took a step in that direction by [re-boosting its ongoing commitment](#) to the smart grid and its potential capabilities.

Energy Secretary Steven Chu's announcement covered several layers, but mostly highlighted more than \$250 million in new loans for smart grid projects for rural areas. The plan will also call for the development of energy data innovation that will provide consumers with information and enable utilities to increase efficiency.

Chu also mentioned the formation of "a crowd-sourced map to track progress of smart grid projects, a student competition around home energy efficiency, and an Energy Information Administration project on measuring energy efficiency progress," [reports](#) Reuters.

President Obama's team [has already pumped](#) "\$4.5 billion into smart grid projects, which were then matched by \$5.5 billion in private money." Chu noted that more than 5 million smart meters have been installed across the country, mostly in a handful of states. This new effort will target states with little or no familiarity with smart-grid technology.

"A modern electric grid is critical to meeting the President's goals of generating 80 percent of electricity from clean energy sources by 2035 and putting one million electric vehicles on the



road by 2015," Chu [said](#) in today's announcement.

This is encouraging considering that advancements in energy and cars are slowly heading into an integrated direction. With the sales of plug-in cars rising, utilities [are fully aware of the implications](#). More plug-in cars could mean more stress to the aged grid. Grid modernization will eventually enable utilities to anticipate demand, and an onslaught of plug-in cars will make it easier for the grid to absorb this demand.

Furthermore, data-gathering capability embedded in the grid will become key in efficiently delivering clean energy to our homes and cars. Bearing this in mind, it could prove to be the ultimate one-two punch to our dependence on oil and coal.

"Public and private investment in smart grid tech is crucial," says Gina Coplon-Newfield, Sierra Club Senior Campaign Representative for Electric Vehicles. "So too is our support for public utility commissions, utilities, automakers, and EV charging companies to integrate smarter technology into long-term product and grid planning. We'll end up saving money and reducing emissions."

For more on the smart grid and what it is, [click here](#). Curious about plug-in cars? Read Compass for EV news and get more information by visiting Sierra Club's [Go Electric Campaign](#).

-- *Brian Foley*

<http://sierraclub.typepad.com/compass/2011/06/smart-grid-electric-cars-steven-chu.html>

Five Million Smart Meters Installed Nationwide is Just the Beginning of Smart Grid Progress

Submitted by [Secretary Steven Chu](#) on June 13, 2011 - 1:55pm

The so-called “grid” is not just an electrical transmission and distribution system. It is the integration of transmission and distribution with power generation. Edison invented the light bulb, the phonograph and the first electrical generating and distribution system. If he were transported in a time, Edison would be amazed by progress in lighting and sound recording, such as the LED light or the iPod. On the other hand, he would easily recognize much of the basic technology behind today’s power system.

We need a 21st century electric grid for a 21st century economy. The bottom line is that we must have an efficient electricity infrastructure to compete in the global economy.

Today, China has the highest voltage and capacity transmission lines. Ireland and Spain have a grid system that efficiently integrates large percentages of wind onto the power grid. We can’t let the rest of the world pass us by.

We need to modernize the grid to:

- Improve reliability, especially as we face new complexities like two-way energy flow and cyber security challenges.
- Increase the overall efficiency of our generating, transmission and distribution system.
- Facilitate the growth of renewable energy sources like solar and wind, and enable electric vehicles and dispersed generation. The U.S. needs an electricity system that can automatically synchronize intermittent renewable energy sources with fossil energy generation and energy storage.



*A 21st Century Grid includes increasing the overall efficiency of our generating, transmission and distribution system to facilitate the growth of renewable energy sources. | **Department of Energy***

A modern grid must be able to support both distributed and central generation. A modern electric grid is critical to meeting the President's goals of generating 80 percent of electricity from clean energy sources by 2035 and putting one million electric vehicles on the road by 2015.

And as we undertake transmission and distribution planning, states, regions and national entities need to fully understand all the options and their benefits and trade-offs. The modern grid also will give businesses and consumers the tools to better manage their energy use and costs.

Modernizing the electric grid won't happen overnight, but we need to take the long view and get started now.

There are enormous economic opportunities for utility companies, merchant generators, market operators, regulators, entrepreneurs and engineers to achieve benefits such as better utilization of electricity generation and transmission assets.

President Obama is committed to creating a 21st century electric grid. The 2009 economic stimulus law made a good start – including \$4.5 billion to upgrade the grid.

Today, I'm pleased to announce that we have installed more than [5 million smart meters and 140,000 programmable communication thermostats](#), nationwide.

Through the Recovery Act, we are deploying smart grid technologies and supporting research and demonstration projects, workforce development and more.

Our efforts are helping to improve reliability, efficiency and customer service.

Recovery Act efforts are a start, but more needs to be done. To modernize the grid, we will need:

- Innovative business models that reward efficiency and improved performance.
- Dialogue and cooperation – between government agencies; between states and regions; and between stakeholders, including utilities, regulators and consumers. The Department of Energy can be a facilitator to share best practices and lessons learned.
- New technologies in areas like energy storage, advanced power electronics, grid modeling and cyber security.

We look forward to working with interested parties to seize this opportunity and build a smarter, stronger, and more secure electric grid.

For more information about the Department's smart grid activities visit the [Smart Grid Website](#).

Steven Chu is the Secretary of Energy.

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- [Secretary Steven Chu](#)
- [Energy Policy](#)
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<http://blog.energy.gov/blog/2011/06/13/five-million-smart-meters-installed-nationwide-just-beginning-smart-grid-progress>

The Smart Meter Backslide

Harvard Business Review

8:23 AM Monday October 4, 2010

by Dr. Peter Fox-Penner | [Comments \(0\)](#)

FEATURED PRODUCTS

[For more, visit [Tomorrow's Smart Grid](#).]

Bolstered by [stimulus funds](#) and the growing market for smart grid technologies, smart meter deployment recently reached a high of [50.5 million meters \(or 25% of U.S. residential accounts\)](#). Ironically, this record coincides with unexpected consumer backlash to smart meter deployment. The most notable debates have centered on California, Texas, and Maryland, where meter rollouts have been [delayed by moratoriums](#), the [center of lawsuits](#), and [questioned by regulators](#). How can it be that an innovation designed to empower customers, reduce costs, and increase reliability has become so widely disliked?

Before answering this, let's get a few facts straight. First, smart meters are only a part of the smart grid — the entire smart grid is a vast array of technologies stretching across the whole of the industry that will be deployed in stages over the next several decades. Smart meters are the source of some of the smart grid's many benefits and costs, but not all of them. As my colleague at The Brattle Group, [Ahmad Faruqi](#) notes, their cost is small compared to the industry's trillions of dollars of investments.

Substantial smart meter benefits stem from their ability to provide [dynamic pricing](#), or rates that vary throughout the day to reflect fluctuations in the cost to produce power. These prices provide incentives for customers to use power at times when it is cheapest. When power use is spread more evenly throughout the day, prices decline, reliability increases, and fewer plants are needed. Smart meters will modestly improve reliability and reduce outage times but also enable customers to have more control over their power use and utilities to adopt [far superior business and pricing models](#).

Smart meter opposition is rising due to concerns over costs and potential impacts on low income customers, [misinformation about dynamic rates](#), mistrust of utilities, and a variety of privacy and [health concerns](#). As for the costs — [\\$200 to \\$500 per meter](#) — these outlays are [largely offset over time with the savings utilities realize \(and pass on to customers\)](#) in lower prices and better service. Other benefits [are more difficult to quantify](#), but I'm convinced that the [overall economic impact is positive](#).

A cost-benefit calculation of this nature never tells the whole story. To the emerging smart meter opponents, these meters also bring some less welcome attributes. Smart meters will provide utilities (and possibly other parties) with much more information on energy use, [raising genuine privacy and security concerns](#).

Cyber security issues are also critical, and not yet treated. Consumer advocates, who've spent decades trying to ensure that low income customers aren't disconnected too readily, worry that the immediate control afforded by smart meters will allow utilities to disconnect delinquent accounts with a single click.

Most of all, there is enormous suspicion that utilities are using smart meters as a cover for raising prices. Here misinformation enters the fray. The introduction of time-varying prices in regulated utilities lowers rather than raises costs for the vast majority of customers, and in particular lowers them for nearly all low income ratepayers. There are reasons why utility rates will be going up in the future, but this applies equally to flat and dynamic rates, while the latter conveys added benefits.

Remarkable as it may seem, most utilities have rolled out smart meter change-outs across their territories without first engaging in programs to inform customers and ensure a measure of buy-in. Many customers and stakeholders felt they weren't asked whether they wanted these meters — they were given no information and no choice. Combined with misinformation about the intent, cost, and impact of smart meters, this "top-down" has bred something of a backlash that isn't surprising, even if it is regrettable. As Nancy Brockway, a leading voice in consumer advocacy puts it: "It is possible to create a clamor from consumers for these technologies, if they really work and work for the overwhelming majority of customers. You can't force them down consumers' throats and then be surprised that consumers don't want to swallow." As the industry finds better ways to inform customers and address some of the specific smart meter concerns, I think this opposition will fade.

The lesson here for the utility industry is straight out of Business School 101. If you are changing your relations with customers and spending their money, engage them first! Let customers validate the new benefits themselves. Make them your partners, not your guinea pigs. As the energy industry continues through an era of many product, service, and business model transformations, this rule should remain front and center. Meanwhile, the Smart Meter Backslide of 2010 will make for a great future case study at Harvard Business School.

Dr. Peter Fox-Penner is a principal and chairman emeritus of The Brattle Group and author of Smart Power: Climate Change, the Smart Grid and the Future of Electric Utilities. The views expressed in this post are strictly those of the author.