

I'm not robot!

For "hypermilers," just driving to the supermarket is a competition Whenever I start my Toyota Prius, I note one number above all else. It's not the time, not the odometer, not even the gas left in the tank. My eyes go straight to the car's average miles per gallon since last fill-up. If I don't exit our vehicle with that number higher than what my wife left it, I have failed. Driving has become a game—and by playing it, I save money and conserve energy. If only my competitive streak led to greater efficiencies in my far more significant uses of energy: the electricity and gas that light and heat our home. Instead, we live in the dark (figuratively speaking, of course). Our appliances offer no hint of how much electricity they use; my furnace and its associated ductwork operate at some unknown level of efficiency. Monthly bills provide no breakdown of where and when the energy went. US homes used 10.55 quadrillion British Thermal Units of energy—costing \$201.07 billion (PDF) in 2005, the most recent year that government data is available. Regulatory measures like cracking down on "vampire power" in inefficient power bricks can help at the margins; weatherstripping, insulation, and more efficient appliances can make a bigger difference. But if you can, in essence, reprogram people to think more often about the energy they use, you can see both changed behavior and more voluntary interest in making investments in efficiency. The challenge of bringing a hypermiler's score-keeping and competitiveness to home energy has already stymied both Google and Microsoft, which both elected to shelve home energy-monitoring services within days of each other last year. A new federal effort, combined with a crop of social-media startups, may yet get this game off the ground, but a truckload of things need to go right first. If they do, our networked, data-driven future may give people enough information to make the self-interested decisions that can both conserve energy and save cash without radical infrastructure changes. Breaking down bills Most monthly utility bills are great at telling you what you owe but terrible at revealing how you ran up those costs. Some provide basic tools to help you track use, but few break down the numbers in any helpful way. My electric provider, Virginia-based Dominion, includes a chart in its online account-management page that shows year-over-year usage. Dominion also offers an online "Energy Use Audit" of each month's bill in PDF format. (You need to be enrolled in paperless billing for this. David Botkins, spokesman for the company, said 700,000 of Dominion's 2.4 million customers were enrolled. He did not have stats on how many clicked through to the audit link. Update: Botkins called back early Wednesday afternoon to say that 155,876 customers have clicked through that link.) My January report indicates that warmer weather this year saved us the equivalent of \$27, while higher electricity rates cost us \$13.15. But the biggest piece of the bill was "Customer-Controlled Use," which accounted for \$52.60. Advertisement Ouch. Also: Huh? Maybe the dishwasher that started taking upwards of three hours ate those extra kilowatt-hours. Maybe the used TiVo HD I bought in December contributed more than its fair share to the total. I have no idea. Traditionally, you can check an individual appliance's electricity use by plugging it into a power meter. Years ago, I was disturbed to see a Kill-A-Watt report that our sad old tube TV drew eight watts even when it was turned off. Technology has advanced since then, with "smart plugs" like ThinkEco's "modlet" not just measuring electrical use but also reporting it online. But many of the largest consumers of power—refrigerators, air-conditioning units, heat pumps—are packed into inaccessible spaces or require 220-volt outlets that consumer-level power meters don't support. An upcoming crop of self-aware appliances will report their own energy use. The Internet-linked washer, oven, and fridge from LG were among the weirder things I saw at CES this January. But more granular data from utilities would help a lot more; if you could watch your electrical consumption (and the realtime cost) spike during the hour the clothes dryer cranks away, you might consider replacing it. Electronic "smart meters," which collect more data and report it to a utility in real time or on regular intervals, promise to help encourage such changes. They can also save utility companies the expense of sending meter readers to each house, and they allow for more flexible pricing. An Echelon smart meter used by Duke Energy So far, smart meters have had a slow roll out. California's story shows why: privacy worries, fears over their wireless transmissions, and unsettling mishaps like the power surge that caused 80 meters in East Palo Alto to catch fire last August. (Whole groups now exist just to fight smart meter deployments around the country; utilities are trumpeting studies showing the devices are generally safe.) Together, the problems pushed Pacific Gas & Electric to action. The utility now allows customers to pay a fee to opt out of the program, although only .08 percent had done so by mid-February. Across the country in the Washington DC area, the utility Pepco finished deploying smart meters and aims to be done in Maryland by the end of the year. But Dominion is still "in a very incremental deployment phase," the company told me. They're limited to tests in a few localities in Northern Virginia as well as in Charlottesville and Midlothian. WGL Holdings, parent company of Washington Gas, previously reported deploying almost one million smart meters by the end of 2009. That information is now oddly gone from its site; a spokesman did not return a call or an e-mail asking for comment. Advertisement Though slow, smart meter rollouts are proceeding; making them useful becomes the next challenge. The Green Button and gamification Even if consumption data is broken down to the minute, it's of little use if trapped in a PDF on your utility's website. To crack that problem, then-US Chief Technology Officer Aneesh Chopra challenged the industry in September to develop a common, customer-friendly format for storing and sharing energy usage information. Their answer? The Green Button. After an earlier effort to write a standard specification for healthcare data, the idea debuted this January. The initiative calls for Green Button-compliant utilities to advertise their support with a green button on their customer Web portals (see what they did there?). People can then click this to download their personal usage data. Third-party developers can write apps and services that interpret this information without having to worry about supporting a raft of different formats. The format problem isn't trivial; it already helped sink Google's PowerMeter and Microsoft's wonderfully-named Hohm. A common format "lowers the cost of entry... for an app developer or an online service that is looking to help you," said Nick Sinai, a senior advisor in the White House's Office of Science and Technology Policy. As an example, he cited Lexington, Massachusetts-based FirstFuel. The company was able to collect granular usage data and mash it up with factors like weather to perform a virtual energy audit. "You're talking about something that used to cost a lot of money and required an engineer to walk the building," Sinai said. The Green Button's proposed logo On a consumer level, Sinai pointed to WattQuiz, an app coded during the CleanWeb Hackathon in New York City this January. It helps users pick the best utility rate for their situation. Noted venture capitalist Fred Wilson helped judge the hackathon and raved about it afterward. "This is the kind of innovation that gets me excited," he wrote. Sinai expects more such apps will come. "I think you'll really be impressed when you see the services that come out over the next 6 to 12 months that take smart meter data, that take hourly and 15-minute increment data, and suggest actionable improvements," he said. But more visible data, by itself, spurs only modest improvements in efficiency—and those can't always be maintained. A 2010 study out of the Netherlands found that "initial savings in electricity consumption of 7.8 percent after four months could not be sustained in the medium to long term," as Reuters summed it up. To see significant gains, people need to change their routines more fundamentally. And to do that, it helps to know that your neighbor is doing better than you are. Page 2 Green Button's standardized data can also make life easier for the developers of Facebook games hoping to turn energy efficiency into yet another form of one-upmanship. Boulder, Colorado's SimpleEnergy quickly updated its Facebook app to support Green Button data. The app lets users compete with friends for spots on a leader board and earn Foursquare-style badges. "Support for the Green Button standard helps tremendously," marketing manager Elizabeth Hartman told me. Don't laugh at the thought of a "FarmVille for energy efficiency." A demo program in San Diego found that customers who used only energy-management monitors provided by San Diego Gas & Electric trimmed their consumption by a decent nine percent, but those who also competed in SimpleEnergy's game cut theirs by 20 percent. Arlington, Virginia-based Opower developed a similar Facebook game with the Natural Resources Defense Council. (It's currently in private beta.) At February's DC Tech Meetup, product manager Wayne Lin demonstrated the app and admitted it led him to turn off the heat in his apartment. "Last winter my bills were around \$70," he said. "This winter, I think I haven't passed \$30 because I'm getting into this strange competitive mode and I'm willing to live in the cold." Not that conservation always involves suffering. Homes with real-time electricity pricing (where the price fluctuates throughout the day in response to demand) can save money by running high-draw devices like dishwashers, air conditioners, and dryers outside the most expensive late afternoon hours. Spreading consumption more evenly across a day can also help keep aging (and dirty) standby electricity plants from being pulled online by high demand. Make pricing variable and the data visible, and many people will start finding ways to shift their usage patterns. Opower's app doesn't support the Green Button yet. But marketing director Eric Fleming suggested via e-mail that the new standard will soon help customers whose utilities don't support the app's current "Utility Connect" option to get at their data. Advertisement In the meantime, Lin noted Opower's own departments were keeping score with one another. "Sales is absolutely last, at three times the usage of product and engineering," he said. "I'm not sure what that says." Whether it's green Facebook gamers or my wife and I in our Toyota, adding a social dimension may give gamification developers an extra boost. "The successful examples I've seen around feedback about energy usage give people a general sense of how they are doing relative to their neighborhood," said Kevin Werbach, a professor at the University of Pennsylvania's Wharton School who has written extensively about gamification strategies. "When people see that they are using more energy than most of their neighbors, they are motivated to act. Subtle social pressure can be even more effective than monetary incentives. It can be better than showing you your own performance over time or absolute usage levels." Such competition can even be hyper-localized to make it more compelling. Werbach pointed to the University of Hawaii's Kukui Cup competition among various campus dorms, which led to 15 to 20 percent reductions in energy use within the room clusters where the most students participated. Utility players A Gainesville subdivision's energy use The most extreme example of neighborly competition may be in Gainesville, Florida, where the city-owned power utility's records are considered public data under state open-records law. That allowed local firm EnergyIT to build a site, Gainesville-Green.com, that labels the relative consumption of individual homes with colored pushpins: red for high bills, green for low, yellow and orange for in-between. A second site, Tools for Tenants, ranks the efficiency of local apartment buildings to help renters. Advertisement Ryan Davis, director of programming at EnergyIT, told me that only two customers had opted out of having their homes displayed. He added that the data feeds exclude the residences of police officers, judges, and elected officials. The site also doesn't list names or allow searching by them. The company hasn't conducted any scientific studies to determine the site's effectiveness at encouraging efficiency. But "one thing we can say for sure," Davis said, "building a website about energy usage makes you VERY aware of your own energy use." Davis thinks adding a social dimension would better motivate users, but he can't get data often enough to make it work well. "We currently get a data dump every quarter from the utility," he said. "This is way too infrequent for a social networking game." In other words, The Green Button's emphasis on granular data could help. Back in California, only two utilities so far support the initiative: Pacific Gas & Electric and San Diego Gas & Electric. Others are on the way. A White House press release says Southern California Edison, Glendale Water & Power, Pepco and "several other utilities across the country that collectively serve an additional 11.3 million households" plan to join them this year. Personally, I may be out of luck. Washington Gas has been silent on Green Button support; Dominion hadn't even heard of it when I called. (Update: In his Wednesday call, Botkins said that the utility will add Green Button downloads for its smart-meter customers by the end of this March.) If neither of my utilities participates, I'll be stuck with the same crude system I've had since 2005. I record each month's electric and gas usage in a spreadsheet, occasionally making notes like "insulation blown into walls" or "clothesline set up." Maybe a Facebook game like Opower's will eventually provide more social motivation to compete on efficiency. In the meantime, my own energy-efficiency tactics aren't likely to get much more sophisticated than gamification guru Werbach's: "It's a lot of, 'Kids, turn off the lights!'" Rob Pegoraro tries to make sense of computers, consumer electronics, telecom services, the Internet, software and other things that beep or blink. He served as the Washington Post's tech columnist from 1999-2011 and now reports for a variety of online and print outlets.

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