

CAN MEDIA MAKE MONEY ONLINE? p64

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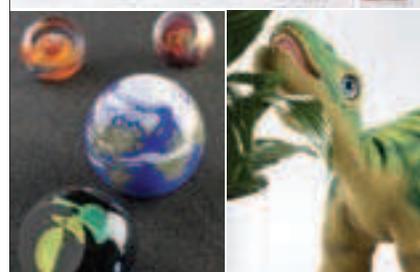
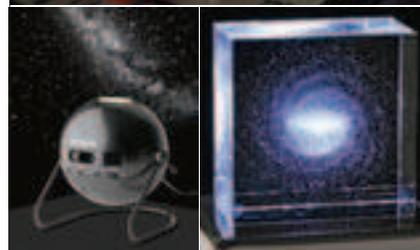
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*De Technologia non multum scimus. Scimus autem, quid nobis placeat.*



## Technology and Optimism

WHY TECHNOLOGISTS ARE SO CONFIDENT.

In “A Zero-Emissions City in the Desert” (p. 56), Kevin Bullis, *Technology Review*’s energy editor, writes of a nearly empty, dusty building site in the Persian Gulf: “[It] is the start of a vast experiment, an attempt to create the world’s first car-free, zero-carbon-dioxide-emissions, zero-waste city. Due to be completed in 2016, the city is the centerpiece of the Masdar Initiative, a \$15 billion investment by the government of Abu Dhabi ... . The new development, being built on the outskirts of Abu Dhabi city, will run almost entirely on energy from the sun and will use just 20 percent as much power as a conventional city of similar size.”

Nothing like Masdar City has ever been attempted. Although zero-emissions residences and commercial buildings already exist, larger clean buildings have never worked very well. Oberlin College’s Lewis Center already has some of the features that Masdar City’s designers wish to deploy on a grander scale; but the center consumed far more energy than its architects had anticipated, and only the addition of a solar array in a nearby parking lot allowed the college to claim, dubiously, that the building itself produced as much power as it used. Certainly, no one has ever raised a small *city* to these standards.

Insofar as many environmental engineers doubt that something as complex as a city could ever be entirely green, Masdar City is a triumph of optimism. But if the optimists are right, such a massive demonstration may be necessary. As the chief executive of a sustainable-design company puts it, “People say, ‘Gee, that would be great ... but obviously it’s not possible.’ Once you can point at something, it takes away a lot of those arguments.”

Elsewhere in this issue of *Technology Review*, we unveil the 10 emerging technologies that we think have greatest potential to change our world. Among them is a nanofluidic chip that could lower the cost of sequencing DNA so that the entire human genome could be read in eight hours for less than \$100. Lauren Gravitz explains, “Despite many experts’ doubt that whole-genome sequencing could be done for \$1,000, let alone a 10th that much, BioNanomatrix [the startup that invented the chip] believes it can reach the \$100 target in five years” (see “\$100 Genome,” p. 41). That would be a tremendous thing. A cheap, rapid sequencing tool could make personalized medicine a practical reality: a doctor could biopsy a malignant tumor in a patient’s lung, sequence its DNA, and then use the genetic information to design the treatment best suited for that particular variant of the cancer—“all for less than the cost of a chest x-ray.”

In another story (“*But Who’s Counting?*” p. 64), I describe how the absence of common tools for measuring the size of online audiences is threatening the future health of media, as print and broadcast television and radio shrink in importance: “No one really knows how many people visit websites. No established third-party supplier of audience measurement data is trusted. Internal Web logs exaggerate audiences.” This matters. Because the content on most websites is free, the only thing that will pay for anything like good journalism is the “display” or banner ads that publishers sell; but the inability to agree on audience numbers is stunting the growth of display advertising. As Roger McNamee, an investor in *Forbes*, puts it: “Getting this right is absolutely necessary for publishers to be able to continue to do interesting things.” No less an expert than McNamee himself confesses that “the remedy is not yet obvious.” Yet the story provides a reason for cautious optimism: an innovative San Francisco startup named Quantcast is working on new ways to more accurately measure online audiences.

All three stories point to a similar moral. Faced with large, pressing, global problems—how does one build a green city? Can medicine really be personalized? How can one save publishing?—conservative worthies fret that there may be no immediate solution. But the most innovative technologists are blithely optimistic about their inventions. They are sure that some application of existing or emerging technologies will force a breakthrough on big problems. They are not wholly irrational; they are not like those magical thinkers who proclaim that nothing is impossible if one only wants it sufficiently. But technologists *do* think they understand the difficulties that interest them, and they are happily confident that their particular combinations of technologies will be equal to the challenge.

Of course, their confidence may be misplaced. The great anxiety of editing *Technology Review*—and also its great fun—is that while we also understand the day’s big problems, we are never entirely certain at the time of publication, even with the best analysis and all our sources, that we have in fact chosen the solutions that will later make the conservative fretters sit up, eyebrows flying, and say, “Well, I’ll be *damned*.” But we’re optimistic that the technologies in this issue will be the ones that matter.

Write to me and tell me what you think at [jason.pontin@technologyreview.com](mailto:jason.pontin@technologyreview.com). —Jason Pontin



LAUREN GRAVITZ reports, for our annual feature selecting 10 important emerging technologies, on a technique for rapidly isolating long pieces of DNA very inexpensively—a boon to the nascent field of personalized medicine (“\$100 Genome,” p. 41). “I thought I had some idea of how cool this technology is, but I had no idea how powerful until I saw it in action,” says Gravitz. “Over the course of 15 minutes, they took a sample of commercial DNA, broke it up into long fragments, labeled it, loaded it into one of their chips, and placed the chip on a normal microscope with a camera attached. Suddenly, on the monitor attached to the camera, strands of DNA started flying through the chip, and I realized it was the first time I had ever actually seen molecules of DNA. They were no longer just images in a book.” Gravitz also wrote this issue’s Demo (“Laser Show in the Surgical Suite,” p. 88), on a laser technique that can prompt wounds to stitch

themselves closed. “It was pretty incredible to watch. With just a laser and a bit of dye, the skin appeared to be healing itself,” she says. Gravitz is a freelance science writer whose work has appeared in *Discover*, the *Christian Science Monitor*, the *Economist*, and *O, The Oprah Magazine*, among other publications.



GINO SEGRÈ’s essay on becoming indoctrinated into the “family” of physics traces in fascinating detail the intertwined ties of famed physicists (“*The Family Business*,” p. 70). “In physics, the concept of family can be explored on so many different levels: personal, professional, and institutional,” Segrè observes. “My brother, nephew, uncle, father-in-law, brother-in-law, and many cousins all are or were physicists,” he says. “Physics has also provided a kind of family feeling to me and others working in the profession, complete with rifts, feuds, and accusations, as well as the more traditional

expressions of warmth, trust, and support. I wonder how this family atmosphere has evolved over the past century, as physics has gone from a profession practiced by perhaps a few hundred people, mostly in Northern Europe, to a global enterprise pursued by tens of thousands.” Segrè is a professor emeritus of physics at the University of Pennsylvania and the author of *Faust in Copenhagen: A Struggle for the Soul of Physics* and *A Matter of Degrees: What Temperature Reveals about the Past and Future of Our Species, Planet, and Universe*. He is currently working on a new book, but its topic is “a family secret.”



MATTHEW L. WALD reports on a development that might help revitalize the nuclear-power industry (“*Traveling-Wave Reactor*,” p. 42). The traveling-wave reactor could allow a small bit of fuel to power a plant for hundreds of years without the need to refuel. “The underlying idea is analogous to cooking

a Thanksgiving turkey breast-side down,” says Wald. “Sometimes using the standard ingredients but in a different way can produce a better result. In this case, the raw ingredient is still likely to be uranium, but if this reactor runs as advertised, it would make much of its fuel as it operated, cutting the cost of preparing fuel and stretching uranium supplies.” Wald is a reporter for the *New York Times*, where he has written about nuclear power since 1979.



OLIVIER ASSELIN shot the photographs for a TR10 story about a way to store Web pages that is cheaper and uses less energy than current methods (“*HashCache*,” p. 52). The advance could provide faster access to Web content in countries with limited bandwidth. “Technology is quickly changing things in Africa,” he says. A Canadian photographer based in Ghana, Asselin has had work in *Time*, *Newsweek*, the *New York Times*, and other periodicals.

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**ON THE GRID**

David Talbot's article on the power grid ("Lifeline for Renewable Power," January/February 2009) tells of the discontinuity between the present utility system and any future system that might depend on renewable sources of energy. The problem is that utilities are built to serve people where they live, while sun and wind are most plentiful where they don't.

May I offer an idea? In the 19th century, the United States managed to construct a vast and reliable rail system when the government granted huge concessions in real estate to railroad companies, which then proceeded to develop the miles of land on either side of the tracks they built. Today, the government owns vast tracts of inhospitable land, so why not do something similar to get energy grids out into those empty, windy, sunny regions? Give concessions to utilities to build nuclear plants, on the provision that they build large grids to collect power from the renewable sources that obtain there. The virtue of this idea is that it will be up to private markets to raise the funds and up to private companies to construct the hardware—usually a pretty efficient way to go.

Charles A. Berg  
Former chief engineer  
United States Federal Power Commission  
Buckfield, ME

David Talbot's wide-ranging review of improvements needed for a better power

grid was flawed by its failure to recognize the role of nuclear power, which is effectively dismissed as nonrenewable. Obviously, we can't require each and every power source to be indefinitely renewable—just clean, safe, cost-effective, and sustainable for a reasonable time. Safety concerns about nuclear power plants are often overstated, and waste issues are solvable with a combination of repository design, maintenance, and replacement planning. *TR* can play a role in educating nontechnical people



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about these issues, rather than assuming that nuclear power has no role to play in energy independence or atmospheric-carbon control. By making this assumption, the article nibbles around the edges of the energy problem instead of contributing to a complete solution.

David Korenstein  
Wayne, PA

Cathy Zoi's notebook on clean energy ("Rebuilding the Power Grid," January/February 2009) is unscientific. The economy is not "collapsing"; it is contracting. The bursting of a credit bubble caused this, not an "addiction to fossil fuels." Generating 100 percent of our electricity from carbon-free sources within 10 years is not an "achievable goal"; it is a scientifically and economically unsupportable fantasy. We surely have many real challenges to face that could be overcome with technology. Publishing hysterical political propaganda is not helpful. I have been faithfully reading *TR* since I graduated from MIT in 1976. I applauded when John Benditt rescued and rebuilt the magazine, which had fallen into the hands of left-wing ideologues. I hate to see the magazine's editorial policy backslide.

William Frezza  
Charlestown, MA

Editor David Rotman responds:

Mr. Frezza is welcome to his opinion on whether the economy is collapsing or merely contracting, and whether generating carbon-free electricity is actually achievable. But I must point out that *Technology Review's* editorial policy is now, as it was when John Benditt redesigned the magazine in the spring of 1998, to present clear and precise explanations of promising technologies, and to present differing opinions on the future of these technologies.

**AN APPRECIATION**

I want to thank Mark Williams for his moving tribute to my husband, Algis "Ajay" Budrys ("The Alien Novelist," November/December 2008). It was so encompassing of his entire life and brought tears to my eyes as I read it. I hadn't realized that Ajay's interview with *Technology Review* was so close to the end and am impressed with how true to him it was. It made me feel as if I were listening to him again as he recalled stories of his youth that I had heard over the 54 years we were together.

Edna Budrys  
Chicago, IL

**ZERO GRAVITY?**

The caption on page 60 of *TR's* oral history of space tourism ("Very Stunning, Very Space, and Very Cool," January/February 2009) reads, "Charles Simonyi experiences zero gravity aboard a Russian aircraft." No airplane flies in zero gravity. People become weightless because the airplane flies a path that does not support them; when they are weightless they are really in free fall, accelerating toward Earth as a result of gravity!

James F. Jackson  
Carlisle, IN

*Correction:* On pages 34–35 of the January/February 2009 issue, we misattributed credit for photographs of the Am386 and Motorola 68000 chips. They were photographed by William Blair.

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