

A WALL OF MIRRORS

Idealab's Bill Gross has a new gadget that could transform solar.

BY BRIAN DUMAINE

BILL GROSS IS A GEEK'S GEEK. WHEN he was a kid, he spent more time tinkering with inventions in his parents' Van Nuys, Calif., garage than playing sports. At 15, he built his first solar-powered product, a four-foot-wide, parabola-shaped dish that used the sun's rays to cook hot dogs. He sold plans for his solar hot-dog machine in the back of *Popular Science* for \$4 each and made enough money to put himself through college.

Gross believes that his mirrors can boost solar energy dramatically.

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Before long, he had launched a career as one of America's most prolific serial entrepreneurs. The founder of the startup incubator Idealab, Gross has created dozens of companies. Some, such as eToys and Myhome.com, have flopped. Others, including the online guide Citysearch and the digital-photo software firm Picasa, have done well. His biggest score: In 1999 he started pay-per-click software firm Overture with \$200,000; he sold it to Yahoo in 2003 for \$1.6 billion.

After all the heartburn—a lawsuit, angry investors—and all his successes, Gross, 46, is turning away from the Internet and back to the sun. Though he's still invested in 18 companies in fields ranging from robotics to wireless networking, he has become the CEO of a 30-person firm called Energy Innovations, started in 2001 with \$10 million in funding. "I started thinking whether I could go back to the things I did as a kid, but with more scientific resources and more capital," says Gross, "to see if I could solve some of our energy problems." He sees solar power as a solution to our dependence on Middle Eastern oil and all its inherent political and economic costs. Says this crusader: "People have fought over energy for so long—if we could bring low-cost solar energy to the planet, I think it could reduce wars."

Gross figured that if he could dramatically cut the cost of photovoltaic cells—which convert sunlight directly into electricity—he could help transform a fledgling industry into one potentially worth trillions of dollars as people around the world convert to solar power. The problem, as Gross sees it, is that solar cells, which are made of expensive silicon, cost three times as much as traditional sources of power. Big companies that manufacture solar cells, such as BP, Kyocera, and Sharp, have slowly been making progress reducing the cost of photovoltaics, mainly through manufacturing efficiencies, by about 4% a year. At that rate, he estimates, it will take at least ten years for photovoltaics to become economical.

Gross doesn't have the patience to wait that long. His solution: a patented panel of mirrors called the Sunflower, which increases the amount of sun hitting each solar cell the same way turbocharging boosts power in a car engine, making each cell significantly more productive. Today's best solar cells translate only about 20% to 30% of the sunlight that hits them into electricity (see the diagram on page 40). What if, thought Gross, you could increase the amount of sunlight hitting the cell? The Sunflower, an array of 25 mirrors, tracks the sun as it moves across the sky and aims the sunlight directly onto the solar cell, increasing the number of photons hitting it by 25-fold. The trick is that each of the 25 mirrors moves individually, maximizing the light hitting the solar cells.

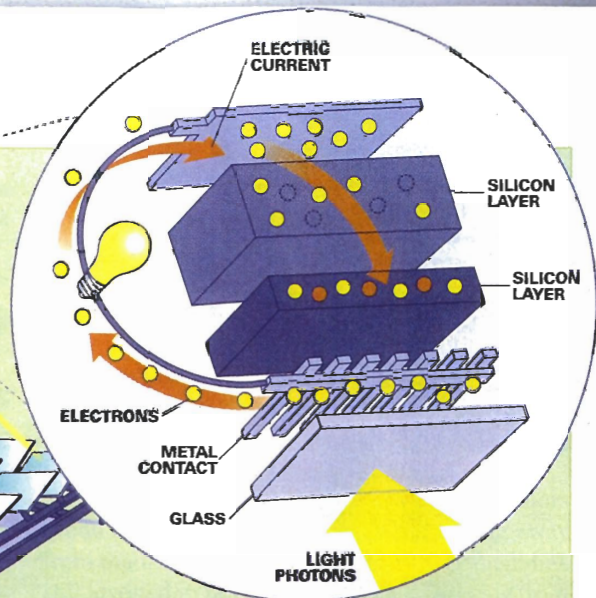
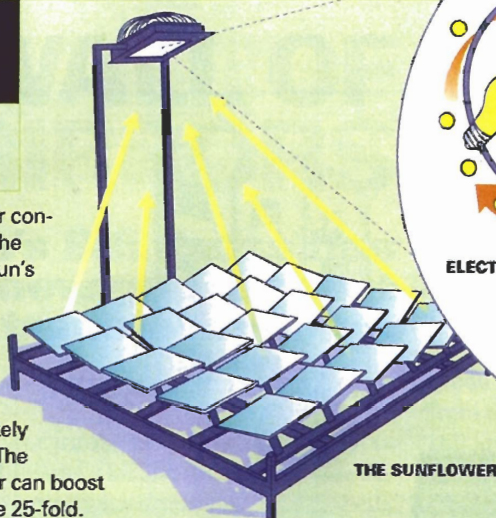
Gross, who plans initially to sell the Sunflower to

PHOTOGRAPH BY JOE TORENO

THE ENERGY BOOSTER

IDEALAB'S Sunflower uses mirrors to increase the productivity of the sun's rays.

THE 25 MIRRORS of the Sunflower concentrate and reflect sunlight onto the photovoltaic solar cell. When the sun's photons hit the cell, they create a reaction in the silicon's electrons that results in an electrical current, which travels through a wire called an electrode and sends power to a lamp or battery. Ultimately the electrons return to the silicon. The concentrated light of the Sunflower can boost the productivity of a solar cell some 25-fold.



owners of commercial buildings, will place six units in test sites in early 2005 and then roll them out in volume from his Pasadena factory by the end of the year. He calculates that the Sunflower—which will retail at roughly \$400 each—will cut the cost of solar power in half. In California, which offers generous subsidies, that means solar power would be cheaper than fossil fuels—about 6 cents a kilowatt-hour, vs. 15 cents from a utility. However, in states with cheap electricity that don't offer subsidies, solar

would cost roughly 50% more. "It won't be enough to compete with oil yet," says Gross, "but it will be enough to compete with other solar companies and really drive our business up."

Does Gross worry about the competition? Not at all. "The opportunity for solar is so large," he says, "that we don't even think of other solar companies. All of us combined could not make enough of this stuff to satisfy the planet's demand." Not a bad problem for any entrepreneur. □

THE GREEN CEO

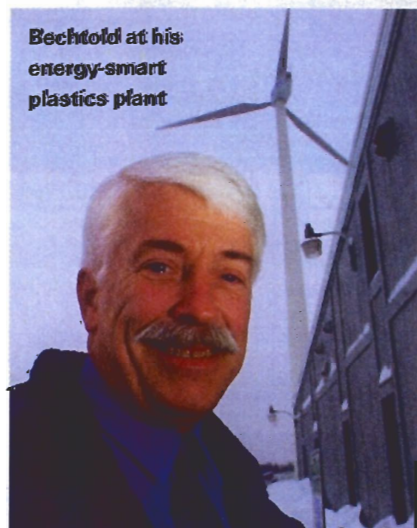
A plastics maker breaks the mold.

BY JULIE SLOANE

WHEN YOU HEAR THE term "green business," a plastics manufacturer probably isn't the first thing that comes to mind. But then, Harbec Plastics of Ontario, N.Y., is a little unusual. You can see the difference a mile away—just look for the 130-foot-high wind turbine. Owner Bob Bechtold, 56, has created one of the most energy-efficient manufacturing plants in America. He generates as much as 95% of the plant's electricity on-site, uses cogeneration, and drives electric and biodiesel fleet vehicles. In 2002 his green thumb won him a coveted federal Energy Star award.

Bechtold, a passionate environmentalist who has generated electricity for his home with windpower since 1980, founded the profitable \$12-million-a-year company—

which makes injection-molded plastic parts for the auto, medical, and consumer products industries—in 1977. After spending a decade researching how to use alternative energy at his business, he started out with an \$800,000 power plant, made



up of 25 microturbines. Fueled by natural gas, it emits one-tenth the carbon dioxide of a diesel generator. Since he began using the power plant in 2001, it has supplied 75% of the more than one million kilowatt hours of electricity that his factory uses annually. In a process called cogeneration, Bechtold also harnesses the heat given off as a byproduct from his power plant, saving him as much as \$20,000 a month in air-conditioning and heating costs.

By 2002, Bechtold was ready for phase two: a 250-kilowatt, \$400,000 wind turbine from German manufacturer Fuhrlander. It produces 20% of the plant's energy. He estimates that his projects will pay for themselves in eight years or less. But the green CEO hasn't stopped looking for ways to save energy, from the 55 skylights he installed to cut down on his electric lighting bills to his latest project: recycling scrap plastic into industrial products. "I'm haunted by the thought that the environment is not mine to waste," says the grandfather of three. A notion that all businesses could profit from, in more ways than one. □

INFOGRAPHIC BY JASON LEE; AMEE WILES—ROCHESTER DEMOCRAT AND CHRONICLE