

SCIENTIFIC
AMERICAN

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THE ADVANCE OF TECHNOLOGY depends on many heroic efforts, not all in the laboratory. Scientists and engineers extend our understanding and control of the physical world, while industrialists and corporations mobilize their own forces to make innovations available and commentators and legislators shape the policies guiding how society uses technology. This new annual roundup, the SCIENTIFIC AMERICAN 50, honors four dozen individuals, teams and companies—selected by the editors for their recent contributions to 12 broad categories of technological endeavor—as well as a Research Leader and a Business Leader of the Year. Join us in celebrating their bright visions of the future.



ENVIRONMENT

BUSINESS LEADER

JOAN BAVARIA

CEO, Trillium Asset Management, and founding chair, CERES

Vision: Wall Street should judge companies not merely on their financial returns but on the kind of world they support.



Joan Bavaria

JOAN BAVARIA HAS BEEN AT THE FOREFRONT of the movement to guide investment by social and environmental criteria since its inception more than 20 years ago. She continues to cajole, praise and savage firms according to their behavior. Last year alone, one organization she founded, the Coalition for Environmentally Responsible Economies (CERES), urged shareholders at ExxonMobil's annual meeting to demand the establishment of corporate environmental goals. CERES also threatened to end its cooperation with General Motors because of the company's opposition to stricter fuel-economy standards for SUVs.

In 1981, after several years of working in conventional banking, Bavaria co-founded the Social Investment Forum, an association of lending firms dedicated to investing in corporations chosen on social and environmental merit. She was the forum's president for four years and a member of its board for eight. In 1982 she founded Trillium, then called Franklin Research and Development Corporation, to establish a portfolio of such investments, organizing it as an employee-owned firm that does pro bono work and donates 5 percent of before-tax profits to charity. In 1989 Bavaria founded CERES to promote her standards of corporate behavior.

Potential investors had considered criteria other than the purely financial long before Bavaria came on the scene, but typically they did so for reasons of personal propriety. Muslims, for instance, would invest only in noninterest-bearing instruments, and nonprofit institutions would eschew holdings in firms involved in gambling, alcohol, birth control—whatever they considered unseemly at the time. It was Bavaria and the movement she inspired that first grasped the possibility of influencing corporate behavior by coordinated investing and, no less important, the publicity that accompanies it.

Boston-based Trillium—named for a three-petaled flower, representing the three investment goals of ecology, economy and equity—has 35 employees and manages only \$650 million. Yet the respect that the fund commands in the worldwide community of social investors—which, according to the Social Investment Forum, controls more than \$2 trillion—gives it substantial clout. "Sell" recommendations and other advice issued by Trillium have affected the disposition of such companies as the Body Shop and Ben & Jerry's. Both companies had won support among socially conscious investors and were thus particularly sensitive to Trillium's censure.

The social-investing community that Bavaria helped to mold can make life difficult even for those companies that have no particular following among environmentalists. In 1989, when the breakup of the *Exxon Valdez* drenched Alaska's Prince William Sound in crude oil, Bavaria titled a list of 10 corporate guidelines she was in the process of drafting the "Valdez Principles." The name caught the eye of many CEOs, who, not wanting to be tarred as Exxon had been, acceded to the objectives; today they are known as the CERES Principles. To gain and retain CERES's imprimatur, these companies—which include BankAmerica, Sun Microsystems and Ford Motor Company—must submit periodic reports to CERES regarding their environmental goals.

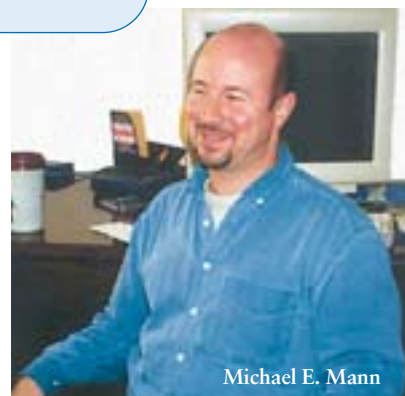
RESEARCH LEADER

MICHAEL E. MANN

Assistant professor of environmental sciences, University of Virginia

Vision: More scientific evidence will resolve the debate over global warming.

WHILE JUST A POSTDOC at the University of Massachusetts at Amherst in the late 1990s, Michael Mann made a splash with his studies of climate variability over the past 1,000 years. Using tree-ring and ice-core measurements to estimate global temperatures, he and his colleagues Raymond Bradley and Malcolm Hughes devised a graph that was dubbed "the hockey stick" because it showed a sharp upward swing in temperatures after 1850. The research helped to prompt a shift in the position of the United Nations International Panel on Climate Change, which reported last year that humans were responsible for most of the global warming over the past century. Mann was also the lead author of the panel's chapter on climate variability. He has subsequently buttressed his findings with more studies. Mann's work figured prominently in the Environmental Protection Agency's statement earlier this year that humans are gradually heating the planet, and although the Bush administration quickly repudiated that report, the evidence is becoming harder and harder to deny.



Michael E. Mann

COMPANY

PUBLIC SERVICE ELECTRIC AND GAS (PSEG) OF NEW JERSEY

Vision: Power plants can pollute less and still be profitable.

PUBLIC SERVICE ELECTRIC AND GAS has earned a reputation among environmentalists as the white knight of the utility industry. The company supports nationwide emissions standards for power plants, saying that rules would help level the industry's playing field and reduce business uncertainty. PSEG won plaudits for its response earlier this year to the Environmental Protection Agency's concerns about two coal-fired power plants in New Jersey. Instead of fighting the EPA's Clean Air Act



PSEG plant in Hamilton Township, N.J.

enforcement actions in court, the utility quickly settled by agreeing to spend more than \$300 million on state-of-the-art pollution controls. Scrubbers will remove 90 percent of the sulfur dioxide and 83 percent of the nitrogen oxide that the plants produce. Most significantly, PSEG also agreed to reduce the plant's output of carbon dioxide—the chief greenhouse gas—even though the step isn't required. That act set a fine precedent for the industry.

POLICY LEADER

S. WILLIAM BECKER

Executive director, State and Territorial Air Pollution Program Administrators

Vision: Reducing vehicle emissions will save lives.



S. William Becker

BILL BECKER'S JOB as the lobbyist for the nation's pollution-control agencies made him the prime mover behind one of the most important environmental accomplishments of 2002. In the last year of the Clinton administration, the Environmental Protection Agency announced a rule to cut 95 percent of diesel-truck emissions by 2007. But the cleanup plan was thrown into doubt when President George W. Bush ordered federal agencies to review all Clinton-initiated rules. To keep the plan alive, Becker assembled a coalition that included the Natural Resources Defense Council, the Clean Air Trust, the American Lung Association and even British Petroleum, which acknowledged it could cheaply produce the low-sulfur fuel that would be needed to cut emissions. The full-court press convinced the EPA not to ax the new rule. The plan overcame another hurdle this year when the D.C. Circuit Court of Appeals upheld the EPA's decision. The agency estimates that the rule will prevent 8,300 premature deaths each year.

UNIVERSITY OF VIRGINIA (top); PSEG (middle); COURTESY OF S. WILLIAM BECKER (bottom)