

## Soccer Goes Green

AT THE WORLD CUP, A NEW WAY TO OFFSET CARBON EMISSIONS BY GUNJAN SINHA

**S**occer, beer and bratwurst were very likely the only things on fans' minds as they descended on Germany to celebrate the World Cup this June. But all that partying had a downside—pollution. One million soccer tourists consumed a lot of energy. Environmentalism is part of the German zeitgeist, so it is only fitting that the event had a “green goal,” too. A consortium including FIFA, the international soccer federation, and the German football association DFB donated 1.2 million euros to make this year's play-off the first sporting event to

offset its carbon dioxide emissions by investing in three renewable energy projects.

Among the environmentally savvy, carbon-offset programs are the latest rage. At least a dozen companies offer the promise to mitigate greenhouse gas emissions from activities such as flying and driving and from events such as weddings and record releases. Voluntary offset programs, however, are not regulated, so consumers cannot be sure that they are investing in environmentally sound projects. What is more, reductions do not help much, because emissions from such activities are tiny: for instance, Germany's total carbon dioxide emissions are about 800 million tons per year—the World Cup emitted a mere 100,000 tons extra.

But governments are starting to pay heed to offsets. Europe established a cap-and-trade system last year that limits carbon dioxide emissions from about 50 percent of industry to reach its emissions goals as dictated by the Kyoto Protocol. Officials modeled the system on the sulfur dioxide trading market established in the U.S. in 1995, which has successfully cut levels of acid rain. As the trading market evolves, some environmentalists think that voluntary offset programs could join existing cap-and-trade market schemes to cut emissions even more substantially.

Right now, however, groups involved in voluntary projects are busy establishing



**WORLD CUP 2006** brought in Brazilian, Croatian and other energy-hungry fans. Soccer officials hope to compensate for the emitted carbon by funding sustainable energy programs.

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The European Union instituted caps on greenhouse gas emissions for about 50 percent of Europe's industries to meet Kyoto Protocol goals. That system suffered a setback in May after governments realized that they had set emissions limits too high. Most companies came in far below their limits, rendering their pollution credits worthless and eliminating financial incentive for them to cut carbon dioxide output. The European Union is discussing how to tighten the scheme.

The U.S. is not part of the Kyoto treaty, but states are picking up the slack. Under the Regional Greenhouse Gas Initiative, Northeast and mid-Atlantic states plan to implement a market-based cap-and-trade program for all greenhouse gases emitted from power plants in the area. In California, a pending bill would cap greenhouse gas emissions from all industries in the state.

credibility. "We wanted to serve as a model," says Christian Hochfeld of the Öko Institute in Berlin, an environmental think tank that developed the Green Goal project for the World Cup.

To that end, the institute chose projects that met criteria established by the World Wildlife Fund to better define high-quality development projects for industries affected by Kyoto. In Tamil Nadu, India, Women for Sustainable Development, a nonprofit organization, will oversee the installation of 700 to 1,000 biogas reactors—simple enclosed pits about the size of a well into which villagers dump cow dung. The fermenting mass generates gas, which fuels stoves and replaces kerosene. Two other sustainable energy projects will take place in South Africa. One will capture off-gas at a sewage treatment facility and burn it to supply electricity to Sebokeng, a township near Johannesburg. The other will replace a citrus farm's coal-fired heating system with one that burns sawdust—a by-product of wood processing usually discarded. The projects will offset all the soccer tournament's emissions.

World Cup organizers could have planted trees—as has been done by previous sporting events, such as the Super Bowl—or invested in other projects on home turf. But planting has been criticized because trees take years of growth to suck up an equivalent amount of released carbon. Also, not all renewable energy projects constitute an



**BIOGAS REACTOR**, which consists of a well for fermenting dung, is being built in Tamil Nadu, India, as part of the World Cup's Green Goal program.

"offset." If an undertaking that would have happened anyway was jump-started through government subsidies—using wind power, for example—it cannot be considered a true offset, environmental groups say.

Currently, voluntary activities do not generate tradable emission credits. But imagine if they did. Suppose, for example, that anyone could earn credits for cutting consumption or increasing efficiency. Those villagers in India could earn credits for reducing their emissions that they could in turn sell, says Annie Petsonk, international counsel at Environmental Defense, a New York City-based nonprofit group. "How interesting would it be to have everyone participating? It would stimulate so much energy efficiency," she predicts. "We're talking about tapping economic power in favor of protecting the environment on a huge scale."

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## PHYSICS

## The Neutrino Frontier

AT FERMILAB, PARTICLE SMASHING YIELDS TO FLAVOR CHANGING BY MARK ALPERT

**S**ince 1983 researchers at the Fermi National Accelerator Laboratory in Batavia, Ill., have plumbed the subatomic realm by smashing high-energy protons and antiprotons together in the Tevatron, the world's most powerful particle collider. Next year, however, the high-energy frontier will move to Europe, where the even more powerful Large Hadron Collider will begin operations near Geneva. Fermilab intends to shut down the Tevatron by 2010. But rather than scrapping the device, lab officials have

outlined an ambitious plan to use some of the collider's parts to enhance a promising research program: the study of the mysterious neutrino, whose strange properties may offer clues to new laws of physics.

Appropriately enough, the lab's namesake—physicist Enrico Fermi—coined the name for the particle, which means "little neutral one." Neutrinos come in three types, called flavors; the most common are electron neutrinos, which are produced in copious amounts by reactions in the sun. (The