

Princeton Plasma Physics Laboratory. "It's unbelievable."

"The energy conversation"

Indeed, despite tight economies, Europe is on track with its ITER contributions, having recently allocated an additional €1.3 billion (\$1.7 billion) to the project; as host of ITER, Europe bears a 45% lion's share. European money for national fusion programs has gone down, says Sibylle Günter, director of Germany's Max Planck Institute for Plasma Physics. "Germany has a strong program, but it's an ongoing discussion. The general problem of the economy hits all countries [in Europe]. The question is how the politics play out." Like the US, the other partners—China, India, South Korea, Russia, and Japan—have each committed to providing 9% of ITER.

China, in particular, is moving aggressively ahead—covering not only

its ITER commitments but also planning to build a next-step fusion facility on its own. If the US does not keep up in the field, says Marmar, "we could end up buying fusion reactors from Korea or China. I don't want to see that happen."

"The whole tenor of the energy conversation is vastly different now than it was three and a half years ago," says Cowley. "Then, they were saying we have to find a solution to global warming." But after the nuclear meltdown in Fukushima, "everything has cooled on fission. And although it's clear that there is far more fossil fuel than we should burn, nobody has an appetite for environmental legislation during a recession." As a result, he says, "low-carbon energy, including fusion, has become less and less of a priority."

Still, says Cowley, "it's amazing how much more attention you can get

[for fusion] when you can quote that the Chinese are on the march." The fusion community is at "a breaking point," Cowley continues. "If we do not do ITER, we will degenerate. We will lose knowledge that we have built up over 50 years. We are just beginning to do fusion. It's critical that we push on, make sure we do ITER, and move on to deliver commercial fusion energy."

As for the US, some optimism may be drawn from the charge that William Brinkman, director of DOE's Office of Science, put to FESAC on 13 April. He asked the advisory committee to set research priorities for the magnetic fusion energy science program. In doing so, Brinkman wrote, FESAC should assume "that the ITER project is ongoing, will be until the end of this decade, and is supported separately from the rest of the program."

Toni Feder

Stove designed by US national lab improves lives in Darfur

In cutting the wood fuel requirement in half, the stove also reduces Darfuri women's exposure to violence.

When the US Agency for International Development asked physicist Ashok Gadgil seven years ago to see whether food wastes could be used as cooking fuel in displacement camps in Darfur, he quickly concluded that even under the most optimistic scenarios, way too little food waste was available to burn. But Gadgil, acting director of the environmental energy technologies division at Lawrence Berkeley National Laboratory (LBNL), saw another way to improve the lot of Darfuri women in the camps: a stove that would dramatically reduce the amount of wood they had to gather for cooking. Increasing stove efficiency would commensurately reduce women's exposure to sexual assault, which occurs regularly during their lengthy foraging excursions.

Gadgil led a small team from LBNL and the University of California, Berkeley, to Darfur in 2005. His idea, he says, was to "get somebody else's stove to work [better] for them; then I've done my job and I'm

out of there." But what the researchers found was that virtually all the food in the camps was being prepared over a

"stove" consisting of three stones on the ground. Finding no indigenous stove to improve on, the team set to work at LBNL to modify an Indian stove design to suit the pot shapes, cooking style, type of food, windy conditions, and sandy terrain of Darfur. In consultation with Darfuri women, the designers modified air openings to allow the stove to burn in windy conditions and altered a small firebox opening to reduce the amount of firewood needed.

A big market

"In terms of the physics end of it, of course you want high combustion efficiency, where you're not left with charcoal and smoke, which is where some of the chemical energy could go," Gadgil says. "And you want good heat transfer efficiency, so you're not just heating the kitchen air but putting the heat into the pot."

Of the 2.4 million Darfuris displaced to sprawling refugee camps by an 8-year-old civil war, some 22 000 families now have one of the LBNL-designed stoves. The stoves are built mostly from low-carbon steel sheet but have a cast-iron grate and stainless-steel heat shield. They are built specifically to accommodate the traditional cooking pot used in Darfur. In addition to consuming less than

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A Darfuri mother and child tend to a meal cooking on a Berkeley-Darfur stove.

half as much fuel as a three-stone fire, the Berkeley-Darfur stove emits far less black carbon, which is a major contributor to the shrinking of the world's glaciers and polar ice. The stove also puts out less carbon dioxide, carbon monoxide, and particulate matter, according to LBNL tests. In Darfur, cooking is traditionally performed in a room that is open on one side, allowing fumes to dissipate. The stoves, which cost about \$20 to make, are said to cut emissions by half compared with an open fire.

Andrée Sosler, executive director of the nonprofit Potential Energy (formerly the Darfur Stoves Project), estimates the demand at 900 000 stoves in Darfur. Her organization has set a goal for itself of filling 40% of the demand. Given a stove's estimated lifetime of five years, says Gadgil, Potential Energy must produce 80 000 stoves annually—far more than the current output of about 12 000 a year—just to maintain a stock of 400 000. "We haven't fully figured out how to take it to scale," Gadgil admits.

On 1 May, the US Agency for International Development awarded Potential Energy a three-year, \$1.5 million grant to support the distribution of stoves in Darfur and in neighboring Ethiopia, where the nonprofit, in partnership with the Dutch relief organization SNV, plans to begin shipping stoves later this year. A stove's design

will vary according to the fuel used in the particular region. Whereas wood is used in Darfur, other groups in the developing world burn dried animal dung, crop wastes, straw, and charcoal. Some 3 billion people—nearly half the world's population—prepare their food over fires fueled by biomass. The Ethiopian stoves will be modified somewhat to accommodate that country's culture and cooking utensils. As with Darfur, Ethiopia is largely deforested, and firewood is scarce.

Carbon credits

Another way to raise funding is to try selling carbon credits for the stoves in the European market. "We have gotten ourselves registered with a carbon-credit trader in London, and we have been certified," Gadgil says. For every stove it distributes, Potential Energy can sell credits, or offsets, for the right to emit 1 ton of CO₂. The price for a ton of CO₂ fluctuates widely, from as high as €17 (\$22) to under €7 now.

"Each stove saves \$1 a day in fuel costs," says Gadgil. "So our thinking is that maybe after we give away the first 400 000 stoves, the next series can be sold for full cost. By the time we go around again, they will have saved each woman \$1600 in fuel costs. Then things can be self-sustaining."

The project's partners on the ground, Oxfam America and the Sustainable Ac-

tion Group, a local non-governmental organization, import stove kits in flat packs from a contractor in Mumbai, India. The kits are shipped overland from Port Sudan to Darfur, where they are assembled at up to 70 per day. Demand is high: More than 1000 women showed up with cash in hand the first time they were offered for sale, says Gadgil. Organizers, expecting to make 50 sales per day, sold out in one afternoon.

Sosler says that donations are the biggest constraint on the number of stoves that are produced; there is plenty of capacity in Mumbai to produce more kits. But the project also is mindful to keep a low profile, lest the Sudanese government shut it down. "It's very hard to conduct humanitarian work in Sudan. The government has expelled a number of aid agencies," she says. "Our partners have wanted to increase very slowly."

On 2 May, LBNL announced that the \$100 000 Lemelson-MIT Award for Global Innovation has been awarded to Gadgil in recognition of his efforts in blending research, invention, and humanitarianism for broad social impact. Beyond stoves, that work includes developing an inexpensive ultraviolet water disinfection system that is now used by an estimated 5 million people in the developing world.

David Kramer

White House, Congress mull future of scientific journals

Publishers tout actions they have taken to increase public access to their journals, but libraries complain about mounting subscription costs.

As change continues to buffet the scientific publishing industry, the White House Office of Science and Technology Policy (OSTP) unveiled a long-awaited but largely inconclusive report on open access. Meanwhile, publishers are continuing to develop tools for improving access to journal content, and open-access journals that provide full-text articles online for free—with authors paying publication charges up front—continue to grow in number.

The OSTP report, written in response to a requirement in the 2010 America COMPETES Reauthorization Act, makes no recommendations and provides no specific guidance to the agencies. It describes in favorable terms the open-access model that has been implemented by the National Institutes

of Health. Since 2008, NIH grantees who publish articles based on their NIH-funded research are required to deposit the full text within 12 months into the agency's PubMed Central database.

According to the OSTP report, the four-year-old NIH policy has "significantly expanded public access to the results of federally funded biomedical research and to date, there has been no demonstrable harm to the business of publishing biomedical research." That is despite concerns by some scientific society publishers that the 12-month embargo wouldn't be long enough and would cause them serious financial damage, particularly for journals in fields other than biomedicine. So far, NIH has been the sole federal research-

funding agency that has an open-access mandate.

Healthy statistics

The OSTP report states that the scientific, technical, and medical (STM) publishing industry has continued to thrive throughout the recession, as the number and price of journals have both increased. From 2007 to 2011, the number of journals in the biological sciences and agriculture and in medicine and health grew by 15% and 19%, respectively. During that time, the average price of biology journals and health sciences journals leaped 26% and 23%, respectively. The OSTP report notes that a November 2011 forecast by Outsell Inc for the International Association of Scientific, Technical, and Medical Publishers showed year-to-year growth of revenues for medical journals increasing from 4.5% in 2011 to 6.3% in 2014. Annual revenue growth for all STM