Pollution Permits for Greenhouse Gases?

This week, as delegates from some 180 countries gather in Buenos Aires to figure out how to reduce greenhouse gases, they will spend much of their time pondering a strategy developed to keep down the costs of acid rain controls in the United States: trading emissions coupons in a free market (see main text). Although the notion of selling permits to pollute may seem odd, its success in reducing acid rain led the Clinton Administration to press for these so-called "flexibility mechanisms." The Administration estimates that if the market operated perfectly, such trading could save around 90% of the cost of cutting greenhouse gas emissions, bringing the price down to between $14 and $23 per ton of carbon. Without trading, cutting emissions to comply with last year's Kyoto Protocol could cost the United States $54 billion to $60 billion a year, the White House says.

But despite American high hopes, experts warn that setting up an international carbon trading program will be a delicate and difficult task. "It's not a trivial extrapolation from sulfur dioxide trading. This is a tremendously difficult challenge," says Harvard University economist Robert Stavins. "There's a possibility of doing it right, but if it's done wrong, it won't save nearly what's been predicted."

The basic idea is that each country would have a sort of "checking account" of greenhouse gas emissions allowances, set as a percentage of how much it emitted in 1990. The protocol says countries can sell allowances if they have more than they need, or they can earn credits by helping reduce emissions in other countries. The United States, for example, might simply buy allowances from Russia, or it could take on a project such as upgrading coal-fired power plants in Russia in exchange for some of the Russian emissions allowances.

Keeping the accounts straight may be tricky, however. Monitoring U.S. sulfur emissions required fitting only about 110 power plants with sulfur dioxide monitors, Stavins notes. But with greenhouse gas emissions, there are "millions" of sources in more than 100 independent countries; there are at least a half-dozen important greenhouse gases; and making sure a project really results in lower emissions may be a tremendous challenge, he says.

A more political issue likely to be on the table in Buenos Aires is whether countries must make domestic cuts before they can swap permits internationally. That argument is "partly moral, partly practical," says John Lanchbery, a policy officer at the Royal Society for the Protection of Birds in the United Kingdom, as some observers believe countries won't cut at home if they can just buy their way out abroad. Some countries also argue that there should be limits on trading by Russia and Ukraine, which will get a big break because permits are set to 1990 levels, before those countries' economies—and fossil fuel use—plummeted. But "if you wanted to get the most out of trading, you would have no cap at all," Lanchbery says. A faction known as the Umbrella Group, which includes the United States, Japan, Russia, and other nations, opposes caps, while a bloc led by the European Union favors them.

Then there's the Clean Development Mechanism (CDM), a complicated and controversial plan to help curb emissions in developing countries. This is an effort to plug what many see as a big gap in the Kyoto protocol: At present it doesn't set any emissions caps for developing countries. Under the CDM scheme, developed countries could earn credits by setting up emissions-reduction projects in developing countries—converting an Indonesian coal-fired power plant to natural gas, for example. But it will be a challenge to prove that countries aren't earning credits for "projects" that would have happened anyway. "It becomes a much squishier story," says Michael Toman of Resources for the Future, a think tank in Washington, D.C.

Also to be worked out, says Annie Petsonk of the Environmental Defense Fund's Washington, D.C., office, is how to punish countries that don't meet their emissions targets. "We don't have the equivalent of the Seventh Fleet to hammer them into compliance," she says. The proponents of flexibility mechanisms are leaning toward a system in which permits would lose some value if the selling country exceeds its targets.

Beyond the permit question, other major issues at Buenos Aires are expected to be whether developing countries should commit to voluntary emissions reductions, and how to account for carbon dioxide "sinks," such as replanted forests (*Science*, 24 July, p. 504). But no decisions on this issue will likely be made until the Intergovernmental Panel on Climate Change, the scientific group whose findings led to the treaty, issues a report on sinks in May 2000, says Alden Meyer, director of government relations at the Union of Concerned Scientists. And as with flexibility mechanisms, the main outcome of Buenos Aires will likely be to set up working groups to hammer out issues over the next few years, says Meyer, who concludes: "We don't expect the drama of Kyoto, but there should be progress forward." **–JOCELYN KAISER**

tions but let power plant operators figure out the cheapest way to control emissions. The reductions were to come in two steps. Starting in 1995, 110 mostly coal-burning plants out of thousands in the country—then emitting about 4 pounds of sulfur dioxide per million British thermal units (mBtu) of heat—would be cut back to only 2.5 pounds/mBtu. In Phase II, starting in 2000, more plants are to fall under the plan and emissions will be tightened to 1.2 pounds/mBtu. The total release expected in 2010 is 8.95 million tons per year, a reduction of 10 million tons per year from the amount projected to be released without controls.

Congress made the rules even more flexible by authorizing a limited number of emission allowances, "right-to-pollute" coupons that could be bought, sold, or saved. Such trading with a cap on total releases means emitters are "strictly accountable for the end result," says Kruger, "but they have flexibility in the way they get there."

Cost and effect

But as the final Clean Air Act Amendments neared passage in 1990, just how much money the new rules would cost was a matter of sharp debate. At the high end, some lobbyists, columnists, and industry advertisements were touting vaguely documented figures of "$3 billion to $7 billion per year, with the price tag rising to $7 billion to $25 billion by the year 2000," according to environmental policy analyst Don Munton of the University of British Columbia. The lower end of these estimates compares with the estimated cost of simply putting scrubbers on the 50 dirtiest plants. That was thought to cost $7.9 billion per year, according to a 1983 Office of Technology Assessment study, or $11.5 billion per year, according to an industry study (figures in 1995 dollars).

More rigorous cost projections came in lower. These generally fell within the range of a 1990 study for the EPA made by ICF Inc. of Fairfax, Virginia, that found annual costs (in 1995 dollars) could be as low as $1.9 billion per year through to the 2010 goal or as high as $5.5 billion per year. But the lower figures were not widely believed at the time. When EPA testified to Congress just before passage that the annual cost in 2010 could be roughly $4 billion, notes Kruger, "we were roundly criticized for being overly optimistic."