27

Smog Merchants

Pollution is undesirable, almost by definition. Most of us use the term so commonly it suggests we all know, without question, what it means. Yet there is an important sense in which "pollution is what pollution does." Consider, for example, ozone (O_3), an unstable collection of oxygen atoms. At upper levels of the atmosphere it is a naturally occurring substance that plays an essential role in protecting life from the harmful effects of ultraviolet radiation. Without the ozone layer, skin cancer would likely become a leading cause of death, and spending a day at the beach would be as healthy as snuggling up to an open barrel of radioactive waste. At lower levels of the atmosphere, however, ozone occurs as a by-product of a chemical reaction between unburned hydrocarbons (as from petroleum products), nitrogen oxides, and sunlight.[1] In this form it is a major component of smog, and breathing it can cause coughing, asthma attacks, chest pain, and possibly long-term lung-function impairment.

Consider also polychlorinated biphenyls (PCBs), molecules that exist only in human-made form. Because they are chemically quite stable, PCBs are useful in a variety of industrial applications, including insulation in large electrical transformers. Without PCBs, electricity generation would be more expensive, as would the thousands of other goods that depend on electricity for their production and distribution. Yet PCBs are also highly toxic; acute exposure (e.g., from ingestion) can result in rapid death. Chronic (long-term) exposure is suspected to cause some forms of cancer. Illegal dumping of PCBs into streams and lakes has caused massive fish kills

[1] Ozone is also produced as a by-product of lightning strikes and other electrical discharges. Wherever and however it occurs, it has a distinctive metallic taste.

and is generally regarded as a threat to drinking-water supplies. And because PCBs are chemically stable (i.e., they decompose very slowly), once they are released into the environment they remain a potential threat for generations to come.

As these examples suggest, the notion of pollution is highly sensitive to context. Even crude oil, so essential as a source of energy, can become pollution when it appears on the shores of Alaska's pristine shores. Despite this fact, we shall assume in what follows that (1) we all know what pollution is when we see, smell, taste, or even read about it, and (2) holding other things constant, less of it is preferred to more.

There are numerous ways to reduce or avoid pollution. Laws can be passed banning production processes that emit pollutants into the air and water or specifying minimum air- and water-quality levels or the maximum amount of pollution allowable. Firms would then be responsible for developing the technology and for paying the price to satisfy such standards. Or the law could specify the particular type of production technology to be used and the type of pollution-abatement equipment required in order to produce legally. Finally, subsidies could be paid to firms that reduce pollution emission, or taxes could be imposed on firms that engage in pollution emission.

No matter which methods are used to reduce pollution, costs will be incurred and problems will arise. For example, setting physical limits on the amount of pollution permitted discourages firms from developing the technology that will reduce pollution beyond those limits. The alternative of subsidizing firms that reduce pollution levels may seem a strange use of taxpayers' dollars. The latest solution to the air pollution problem—selling or trading the rights to pollute—may seem even stranger. Nevertheless, this approach is now being used around the nation, especially in Los Angeles, the smog capital of the country.

Under the plan that operates in the Los Angeles area, pollution allowances have been established for 390 of the area's largest polluters. Both nitrous oxide and sulphur dioxide, the two main ingredients of southern California's brown haze, are covered. Prior to the plan, which went into effect in 1994, the government told companies such as power plants and oil refineries what techniques they had to use to reduce pollutants. Under the new rules,

companies are simply told how much they must reduce emissions each year, and they are then allowed to use whatever means they see fit to meet the standards. Over the initial 10 years of the plan, firms had their baseline emissions limits cut by 5 to 8 percent a year. By 2005, emissions of nitrous oxides from these sources were down by 75 percent and sulphur dioxide by 60 percent.

The key element in the program is that the companies are allowed to buy and sell pollution rights. A firm that is successful in reducing pollutants below the levels to which it is entitled receives emission reduction credits (ERCs) for doing so. The firm can sell those credits to other firms, enabling the latter to exceed their baseline emissions by the amount of credits they purchase.

Presumably, firms that can cut pollutants in the lowest cost manner will do so, selling some of their credits to firms that find it more costly to meet the standards. Because the total level of emissions is determined ahead of time by the area's Air Quality Management District, the trading scheme will meet the requisite air quality standards. Yet because most of the emissions reductions will be made by firms that are the most efficient at doing so, the standards will be met at the lowest cost to society.

A similar market-based plan covering sulphur dioxide has been adopted by the Environmental Protection Agency (EPA) on a nationwide level. This program was kicked off by an auction of 150,000 air pollution allowances granted by the EPA. Each allowance permits a power utility to emit one ton of sulphur dioxide (SO_2) into the air. Based on their past records, utilities have been given rights to emit sulphur dioxide into the air at a declining rate into the future. By the year 2000, for example, utility emissions of sulphur dioxide had to be cut in half. Companies can either use their allowances to comply with the clean air regulations, or they can beat the standards and sell their unused allowances to other utilities.

As it turns out, although the EPA auctions probably helped get the trading process started, the expansion in private trades has been so rapid and extensive that the auctions are now a minor part of the market. Perhaps more importantly, the private market in allowances seems to be quite efficient at doing what it was designed to do—move allowances to their highest-valued locations, permit equalization of control costs across sources, and generate

a key source of information about the costs of reducing SO_2 emissions.

Research conducted by Paul Joskow, Richard Schmalensee, and Elizabeth Bailey has found that after an initial 12- to 18-month period in which there were few private trades and relatively high prices for the allowances—some $250 to $300 per ton—the market evolved rapidly. By mid-1994 prices had dropped below $150 per ton, and the volume of private trades exceeded the volume offered in the EPA auction. More recently prices have averaged $170 per ton, and private trading of allowances now greatly dwarfs the EPA auction.

This research also has uncovered two other quite important facts. First, the transaction costs of trading allowances are quite low—about 2 percent of the prevailing price. In addition, it appears that the prices at which trade takes place at any point in time are all quite close to one another. The spread between average bids and lowest winning bids at EPA auctions is only about 1 to 3 percent, and trading in the private market appears to be similarly concentrated around a single price at any point in time.

Because utilities can freely choose between either abating or emitting each ton of SO_2, they will pay for an allowance only what it will save them in abatement costs. Equivalently, a utility will pay no more for abatement than it would pay for an allowance to emit the SO_2. Thus, the existence of a common price for allowances assures us that the cost per ton of cutting emissions must be at that same level. That is, the costs of abating SO_2 emissions must be running about $170 per ton. According to the U.S. Council of Economic Advisers, the tradable permit plan for SO_2 has not only helped contribute to a 60 percent cut in SO_2 emissions from major sources, it has substantially reduced the costs of achieving this environmental improvement.

There are also EPA trading programs for the emissions produced by heavy-duty on-highway engines (such as found in large trucks) and for nitrogen oxide (NO_x) emissions from power plants. The general consensus seems to be that the heavy-duty engine program has significantly reduced the costs of complying with emissions standards. As yet, the nationwide NO_x program for power plants is still being implemented, so there is no data on its effectiveness, but a better established NO_x program covering the

Los Angeles area appears to be cutting the costs of achieving emissions reductions there.

Perhaps not surprisingly, the notion of selling the right to pollute has been controversial, particularly among environmental organizations. The activist group Greenpeace, for example, claims that selling pollution allowances "is like giving a pack of cigarettes to a person dying of lung cancer." Nonetheless, other environmental groups have chosen to buy some of the allowances and retire them unused. One such group was the Cleveland-based National Healthy Air License Exchange, whose president said, "It is our intent . . . to have a real effect on this market and on the quality of air."

Some observers have been disappointed that the government has taken so long to approve emissions-trading schemes. There appear to be two key reasons why progress has been so slow. First, many environmentalists are vigorously opposed to the very concept of tradable emissions, arguing that it amounts to putting a price on what traditionally has been considered a "priceless" resource—the environment. Because most of the cost savings that stem from tradable emissions rights accrue to the polluters and their customers, government agencies have proceeded carefully, to avoid charges that they are somehow selling out to polluters.

Ironically, the second reason for the delay in developing markets for tradable pollution rights has been the reluctance on the part of industry to push harder for them. Similar programs in the past involved emissions credits that could be saved up (banked) by a firm for later use or bartered on a limited basis among firms. Under these earlier programs, environmental regulators would periodically wipe out emissions credits that firms thought they owned, on the ground that doing so provided a convenient means of preventing future environmental damage.

Not surprisingly, some companies believe that any credits purchased under a tradable-rights plan might be subject to the same sort of confiscation. Under such circumstances, firms have been understandably reluctant to support a program that might not prove to be of real value.[2] Indeed, even under the tradable-emissions plan

[2] One can imagine the enthusiasm people would feel toward, say, the market for automobiles if the government announced that because cars were a source of pollution, the property rights to them might be revoked at any time, for any reason.

adopted for Los Angeles, the regulators have explicitly stated that the emissions credits are *not* property rights and that they can be revoked at any time. Sadly, unless obstacles such as these can be removed, achieving environmental improvement at the lowest **social cost** is likely to remain a goal rather than an accomplishment.

DISCUSSION QUESTIONS

1. Does marketing the right to pollute mean that we are allowing too much destruction of our environment?
2. Who implicitly has property rights to the air when the EPA auctions SO_2 permits? Does your answer depend on who gets the revenue raised by the auction?
3. Some environmental groups have opposed tradable pollution rights on the grounds that this puts a price on the environment, when in fact the environment is a priceless resource. Does this reasoning imply that we should be willing to give up *anything* (and therefore everything) to protect the environment? Does environmental quality have an infinite value? If not, how should we place a value on it?
4. Environmental regulations that prohibit emissions beyond some point implicitly allow firms and individuals to pollute up to that point at no charge. Don't such regulations amount to giving away environmental quality at no charge? Would it be better to charge a price via emissions taxes, for example, for the initial amount of pollutants? Would doing so reduce the amount of pollution?