CHAPTER 5

CHANGING THE INCENTIVES

CHAPTER PROLOGUE

Like many other environmentally concerned Americans, I (Paul Stern) want to minimize my personal contribution to environmental degradation. I know that one of the most effective things I can do to reduce air pollution and the threat of global warming is to avoid using a car, especially for traveling alone. I could do a lot by not driving to and from work. But my choices are limited.

The place I live, just outside Washington, D.C., is about 13 miles from where I work in the city—much too far to walk. Commuting by bicycle would be possible but still time-consuming—and also dangerous. There are no bicycle paths on my way to work, and lots of rush-hour traffic—fast-moving in some areas, and tightly packed with frustrated drivers in others. I do not want to risk life and limb. What's more, if I biked, the extra time in traffic and the exertion would leave me breathing far more than my share of auto exhaust, while the auto commuters, who are not doing their part for the environment, breathe more easily. This would not only endanger my health (I suffer from asthma, and would be one of the first encouraged not to exercise on Washington's hot, polluted summer days), but it also would make me resentful and angry toward those who are harming both the environment and me while enjoying the comfort of an air-conditioned ride. So I don't bike.

Joining a carpool or vanpool might be possible, but then again, it might be very inconvenient. Although there may be people living near me who work near where I work, I don't know them. There is no easy way to identify them, because neither my neighborhood nor my employer keeps the sort of records I could check to find them. And if I did find them, I might have to change my work hours to join a pool, and I would probably still have to drive a car to the place the pool leaves from. So I don't even try to find out whether I should carpool.

I could move closer to work. But housing near my office costs at least two or three times what it does where I live now. There is lower-cost housing in Washington, but it is in areas nationally famous for their high crime rates, and I would not be safe traveling there by foot or bicycle, especially after dark. Besides, my wife and I like the rural feel of the area immediately around our home. So I don't move.

I could look for another job where commuting wouldn't be so difficult. Although I often wish this solution would work out, it hasn't so far. The challenges and enjoyments of my work are a strong tie to it, so I would need a stronger inducement than just making a personal contribution to environmental quality to get me to give up my job. Besides, I tell myself that by working on environmental policy issues in Washington, I am doing good for the environment to compensate for the harm I do by transporting myself.

It would be possible, although slow and inconvenient, for me to take public transportation. I would walk five minutes to the nearest bus stop to catch a bus that runs every thirty minutes in rush hour and takes thirty minutes on a circuitous route to get to the Washington Metro, three miles away. The Metro trains run often and stop within 1-1/2 miles of my office, where I can catch a city bus or my employer's interoffice shuttle van. The 13-mile trip would take between 1-1/2 and 2 hours each way, depending on whether I made the bus connections.

What do I do? I compromise by driving a car to a parking lot at the nearest Metro stop, and catching the Metro and then the bus or van. Instead of driving 13 miles each way, I drive only 3 miles each way. The trip takes about sixty-five minutes in each direction—more time than I would like, but much less than it would take if I gave up the car. Compared to driving all the way, I save 20 miles of car travel a day, or 100 miles a week, and reduce my contribution to air pollution and global warming accordingly.

In honesty, though, that is not why I don't drive all the way to work. The main reason isn't the environment but the traffic. I have found, on occasions when I need to take a car into the city, that the traffic is slow and frustrating. The trip usually takes fifty to sixty minutes, which doesn't save much time over my present route, and fighting the traffic would put me in a foul mood when I got to work or got home. In addition, I enjoy the 25-minute Metro ride, on which I can usually read, write, or think without interruption or frustration. In fact, I wrote most of this account while riding on the Metro. I take my present route to work because it is the best of the alternatives for me. It is better for the environment than driving all the way to work, but that is just a bonus. My proenvironmental attitudes are not the main cause of my proenvironmental behavior. If I could drive to work in twenty-five minutes, as I once did when I commuted 13 miles to work in the small city of Elmira, New York, most likely I would do it in preference to a two-hour trip on public transport or my present sixty-five-minute route.

What is the significance of this story for saving the environment? It illustrates the many factors other than saving the environment that determine people's transportation choices and the importance of external barriers to proenvironmental action. For me, and I think the great majority of other American workers, the environment is not the deciding factor in how we travel to work. Time and inconvenience are major barriers: Few people would sacrifice over an hour a day from time with their families to spend it on a more environmentally benign but slower trip to work. Unavailability of alternatives is an important barrier for many people. When I worked in Elmira in the 1970s, for example, there was no public transit alternative there. This is effectively the case for most Americans, because they either live or work in places that are far from public transport. Cost is a major barrier. I can afford a car to get to the Metro, but many of my neighbors cannot, and find themselves being even more proenvironmental than I am—but not by choice. They ride the bus when they would rather drive.

The same considerations of time, convenience, available alternatives, and cost dominate most choices about travel—for shopping, visiting friends and family, and taking vacations. Even among the environmentally concerned, I suspect that it is the configuration of barriers like these that determines how far

people travel to shop and whether they visit relatives on holidays or stay home and use the mail or phone to stay in contact.

The point is that people make transportation choices mainly as a function of their immediate, personal consequences, because these are often more important to us when it comes down to action than our commitment to the environment. It would be a mistake to conclude that someone with proenvironmental attitudes is being hypocritical by driving to work in the face of all the barriers to other modes of transportation, and given that so few others are giving up their cars. The cause of behavior that damages the environment is not necessarily a lack of the right attitudes. If I could join an organized national or even citywide effort to reduce car travel, for example, as part of a campaign for cleaner air, I might well change my behavior and give up my car ride. For one thing, the organized effort would make behavior change easier. Someone might make a centralized effort to set up car pools, for example. The antidriving movement would offer social support, the good feeling of being part of a group working for a better earth, and something to talk about with people on the bus or in the carpool. It would lower the barriers to behavior change. But as it is, my attitudes are outweighed by the society's incentives. If I acted on my own to help the environment, any contribution would be vanishingly small. And if I chose to help in certain ways, such as by riding a bike, I might come to see myself as either a masochist or a fool. I would have to breathe an increased volume of polluted air and thus threaten my health. I would also resent the comfortable drivers who leave me in their exhaust while they benefit from my contribution to lighter traffic and continue to harm the environment. Who but a masochist or a fool, I might ask myself, would go out in summer heat, exercising in dangerously polluted air, while everyone else is driving in comfort and staying within health guidelines?

In Garrett Hardin's classic analysis of the tragedy of the commons, he encompasses all of this in a simple theory of why people destroy environmental resources: It pays. His theory does not imply that people are crass or amoral. Rather, the tragedy lies in human nature—we have no choice. According to Hardin, whenever human beings have free access to a valuable but depletable resource, we are in a situation that ensures that by acting to promote our own well-being and the well-being of our families, we inevitably destroy the resource base.

As we explained in Chapter 2, Hardin shows how a resource user on a commons—we used the example of the crab fisher—is better off by taking more of the resource so long as the additional effort, with costs taken into account, brings in more food or money than not making the effort. Anyone who, out of religious belief or proenvironmental attitudes, refrains from taking more crabs does nothing to help the situation because someone else will catch them. In fact, the result may well be to punish the conserver because the increased supply will drive down the price of the conserver's catch. I am in just this kind of situation when I decide whether to drive to work. If everyone else is polluting the air, I get punished for riding a bike.

According to Hardin, the tragic flaw in the tragedy of the commons is people's desire to better themselves as individuals. That characteristic, combined with a free but finite resource and unlimited access to it, is a potent barrier to conservation and results in destruction of the environment. What solution is possible? It is impossible to make a finite resource infinite. Adopting environmentalist religions or changing attitudes is unlikely to work because those who do not change their morals or attitudes can get rich off other people's restraint, while they destroy the resource. According to Hardin, there are only two solutions. One is to restrict access; the other is to make the resource costly. What these approaches have in common is that they change the individuals' incentives—that is, the positive and negative conditions surrounding their behavior—so that it pays them to get as much as they can out of a limited amount of the resource rather than to harvest as much as possible. This chapter concerns the theory and practice of changing the external conditions. We call these *incentives* although they can be both positive and negative; that is, they include what are sometimes called disin-

centives as well. Changing incentives is Hardin's recommended approach to environmental problems. We emphasize, however, that some of the premises of Hardin's argument—particularly that human behavior is by nature egoistic—are highly controversial. We return to the question of egoism and altruism in human nature in Chapter 8.

THE THEORY OF INCENTIVES FOR ENVIRONMENTAL PROTECTION

There are innumerable ways to end common access or make a resource costly. A crabbing area can be divided and fishers given rights to identified areas; government can charge fishing fees, sell licenses, ration access, or rent or auction fishing rights; and so on. All these approaches, Hardin argues, require an authority strong enough to keep individuals in line. Because of the need for an authority, Hardin calls the general strategy *coercion.* He proposes, with a nod to democracy, that it be "mutual coercion, mutually agreed upon." The implied threat of physical force will not need to be carried out if individuals abide by the rules, but in Hardin's view there must be some authority that has the right to use force, if necessary, to protect the commons. (As we show in Chapter 6, the argument that coercion is necessary has also been called seriously into question.)

Hardin's solution is familiar from political theory, as noted in Chapter 2. It is the solution political philosopher Thomas Hobbes offered in the seventeenth century to the eternal problem of government: How to protect the common good from the acts of bad individuals. People allow kings and democratic governments the right to use force to protect them from criminals, invading armies, and other threats to the common good. Hardin argues that environmental destruction is such a threat, and the same solution should be applied.

Hardin's solution also has a psychological basis in B. F. Skinner's theory of operant behavior. Skinner argued that except for a small number of biologically predetermined ("unconditioned") and classically conditioned (or Pavlovian) reflexes, behavior is learned by a process in which people (and other animals) repeat behaviors as a function of their consequences. Whatever is rewarding to an individual is repeated until it is no longer rewarding or until the individual finds a more rewarding behavior. Skinner and his followers demonstrated in hundreds of carefully controlled experiments that animals repeat behavior that is rewarded, stop repeating it when the reward is removed, stop doing things that are punished, and so forth. Careful analysis of the ways behavior responds to its consequences has proved to be a powerful model for predicting animal—and human—behavior.

Let us see how it explains tragedies of the commons, and what solutions it suggests. For a crabber, harvesting an additional crab is rewarding (that is, it has a positive immediate consequence) so long as it increases the total value of the individual's catch. But there is also a long-term negative consequence: Enough of this rewarding behavior harms the environment so much that it depletes the crab population, with the result that it takes more and more work to earn the same amount and with the eventual result that there are no more crabs. Early in this process, catching more crabs still benefits the fisher, although at the expense of others. Some continue to catch crabs out of greed, and the others do the same out of self-protection. They are aware that if the greedy catch more crabs, prices will fall and their incomes will suffer. If uncontrolled, the process goes on inexorably until catching another crab is so difficult that it is not worth the extra time or money of operating the boat. Only when conditions get that bad—at a time when overfishing may have already ruined the crab grounds—does a self-interested crabber stop fishing.

In Skinnerian terms, there are two reasons for tragedies of the commons. One is that the rewards for using the environment's resources go to the individual who uses them, but most of the costs are paid by others. The tragedy occurs, according to Skinner, because behavior changes only as a result of consequences to oneself. People do not stop doing things that reward them just because those things also harm others. They stop only when the behavior stops benefiting themselves. With open access to a common-pool resource, it follows that they overuse the environment. The other reason for the tragedy is that

the rewards are much closer in time to the behavior than the costs are. Skinner's experiments show that the effect of a consequence on behavior drops off rapidly as the consequence is removed in time from the behavior. Immediate consequences shape behavior much more effectively than delayed ones. A consequence that is delayed by years or decades, such as depleting a crab fishery, is likely to have almost no effect on behavior. The tragedy of the commons is what John Platt (1973) called a social trap: Free access entices fishers to keep taking crabs, but they do not see—until they have gone too far into the trap—the larger punishment that is the ultimate result of their behavior.

This analysis implies a strategy for solution. If the shared, long-term costs of resource use could somehow be charged to the individuals responsible and brought closer in time to the behavior, people would not do things that harm the environment. To put it positively, if the rewards for environmentally appropriate behavior accrued to the environmentally responsible individual immediately, instead of requiring an initial sacrifice followed by a long waiting period, and instead of being shared with people who may not have done anything to help, people would take care of the environment by taking care of themselves. (A dominant theory in economics offers much the same analysis, although it uses different language. The economic version is summarized in Box 5-1.)

Consider, for example, an impoverished country where small farmers raise large families that overtax the ability of the land to provide food and firewood for cooking. In countries such as India, Nepal, and Madagascar, this pattern, driven by rapid population growth, is one of the causes of deforestation. Skinner would presume that the families are large because children are rewarding to parents. As discussed in Chapter 2, children provide more hands to work in the fields, and they are valued because they will care for their parents in sickness or old age. Families are even larger where the local peasants experience a high rate of infant and child mortality, because this prospect gives parents a reason to "invest" in extra children, just in case. The result, sooner or later, is that people produce a greater population than the country can support. Although people do not want to impoverish the country, their only alternative is to put their own well-being at risk.

How would Skinner recommend that such a country change the incentive structure and lower its birth rate? There are many possibilities, involving both positive and aversive consequences. It might legally limit childbearing, applying financial and other penalties against violators. This approach has been a cornerstone of Chinese population policy in recent years. It might provide benefits to families so long as they have two or fewer children. It might create social security programs to care for people in sickness or old age, so that they no longer need large families for that purpose. It might invest in rural education and economic development programs so that people have an alternative to living off the land. This policy makes children less of an economic asset because they have to be supported while in school, but it gives each child a better chance to earn enough in adulthood to support aging parents. Government might aim education programs at women, so that families are better off if mothers work than if they have additional children, as we discuss in Chapter 12. Creativity can suggest almost endless possibilities. Among them, behavior theory prefers rewards to punishments on the grounds that they are more effective. A reward increases the frequency of a specific behavior, while it is highly unpredictable what behavior will result from punishment. People who are punished for having children may instead engage in all sorts of other behavior—including evading or changing the policy that threatens to punish them. When India tried to control population growth with a coercive sterilization policy in 1975 (one province, for example, ordered teachers to be sterilized or lose a month's salary), one demographer remarked that the policy was more likely to bring down the government than the birth rate. And indeed, the government was defeated and the policy reversed (Visaria and Visaria, 1981).

In this chapter, we look at changing incentives as a strategy for promoting proenvironmental behavior. We show that for any kind of proenvironmental behavior there are many barriers that can be lowered and

Box 5-1

The Economic Theory of Externalities

An economic analysis of the causes of environmental problems begins with an account of how markets work. In market transactions, buyers are willing to pay only for the value they expect to receive; the price of a good or service therefore depends on the values individual buyers place on it. If a transaction has effects beyond the buyer and the seller, those effects—known as externalities—are not reflected in the price. Externalities can be positive or negative. A homeowner who buys flowering shrubs beautifies the neighborhood; the neighbors benefit even though they do not pay. Environmental problems, however, involve negative externalities. Someone who drives a car pollutes the air but pays no more for pollution control than someone who rides a bus or bicycle. Someone who buys groceries in nondegradable packaging causes solid-waste problems but pays nothing extra for municipal waste services.

Markets have difficulty solving environmental problems because the environment is a *public good.* Because no individual can own the clean air, no one can charge polluters for using it. The same is true for clean water, beautiful views, endangered species, the ozone layer, and so on. Moreover, it is unrealistic to ask people to make voluntary contributions to preserve the environment because of the "free rider problem": any individual is better off by letting other people make the contributions because no one can keep a noncontributor from enjoying the benefits of a public good.

Economists offer a number of solutions to environmental problems, all of which are based on the principle of "internalizing" the externalities. The idea is that if people who benefit from environmentally damaging goods and services can be made to pay individually for the environmental damage they are indirectly causing, they will have an incentive to maintain environmental quality.

One way of internalizing externalities is to establish property rights. This approach can work with grazing lands—a commons can be divided into family plots, giving each family an incentive not to overgraze. In the arid western United States, the national government grants water rights to ranchers, farmers, and municipalities and leaves them to manage their own allotments. This approach is not practical for some problems, such as managing ocean fisheries or preventing air or water pollution.

Another approach is for government to auction rights to use the environment up to a limit that is considered safe. For example, it could auction hunting licences for threatened species or licences to release waste materials into a river. In either case, a public decision would have to be made about how much hunting or waste the environment could stand, and enforcement would be required to prevent unlicensed or excessive use. The purpose of using an auction rather than, say, a lottery, is to guarantee that the resources being allocated are put to their most highly valued use.

A third approach is for government to charge people and organizations for the use of resources in excess of what a supplier would charge, so as to include the value of the negative externalities in the price. An example is the idea of a carbon tax on the use of coal, oil, and natural gas to discourage their use, encourage the use of substitutes, and thus help solve the problem of greenhouse warming, which is caused in large part by the burning of those fuels. The theory is that if the social costs of greenhouse warming—for example, to future generations that will live with its effects—were estimated and added to the price of fuel, people and businesses would use fuel more sparingly. If the price is set right, people would decrease use enough that the taxes collected would compensate future generations for the burdens they may face but not so much that the present generation is unfairly penalized.

It may occur to you that the economists' solutions are often hard to implement. You can't make some parts of the environment private (the climate system, for example), proposals for auctions and taxes often meet strong political opposition, and finding the right price for damages to future generations may be a task beyond the ability of any economist. We agree that it is much easier to state the principle of internalizing the externalities than it is to make it practical. Nevertheless, the principle provides a very useful way of thinking about environmental problems. And as the chapter shows, incentive systems that work are those that put the principle into practice.

many ways to lower them (and for environmentally dangerous behaviors, many barriers that can be raised). We consider in some depth three examples of behavior changes that could significantly benefit the environment: increasing the use of carpools and mass transit, recycling and waste reduction, and reducing energy use in homes. We show that incentives can be effective in encouraging these behaviors, but that they are not effective automatically. Not all incentives that seem appropriate can be implemented, and not all of those are effective. Incentives can also have unexpected side effects, both positive and negative, and effectiveness sometimes depends critically on what is being done simultaneously with other strategies, particularly information.

INCENTIVES FOR RIDE SHARING AND MASS TRANSIT USE

We look first at the problem raised at the start of the chapter—reducing use of the automobile. To use incentives to this end, it is necessary to understand the incentives that lead people to use automobiles. We have already seen the incentive structure for Paul Stern's trip to work; Peter Everett and Barry Watson (1987) have offered a more comprehensive list of the rewarding and punishing aspects of driving and of using mass transit for a typical American (see Table 5-1). Everett is a psychologist who has devoted his career to applying behavioral insights to transportation planning and management.

It is clear from the table why most people prefer driving to mass transit: The benefits outweigh the disadvantages. The same would be true if we compared driving with ride sharing (using carpools or vanpools), although some of the items in a table of incentives would change. The imbalance of incentives explains behavior and also offers many ideas for changing it. In principle, one could weaken any of the rewards for driving or strengthen the punishments, strengthen any of the rewards for using transit or weaken any of the punishments. One could also invent new rewards for using transit or punishments for driving. Let us look at some examples of incentive approaches that have been tried in practice.

Everett and his colleagues have experimented with rewarding patrons of city buses with a token for each trip, exchangeable for discounts in participating city stores. In a pilot experiment in a university bus system, the reward increased bus ridership by 27 percent (Deslauriers and Everett, 1977). The system was later adapted for use in municipal bus systems in Spokane and Seattle, Washington, and a few other cities (Everett and Watson, 1987). In Spokane, although the tokens were widely used, the system produced only a small increase in bus ridership. The program was considered a success because it induced businesses to market the bus system, and it may also have prevented the decline in bus ridership that most U.S. cities experienced in the early 1980s.

In Seattle, people who bought a monthly "flash pass" for the bus system got, in addition to unlimited bus rides for the month, discounts at some of the best restaurants in the city, movie and performing arts theaters, health spas, and several retail establishments. These incentives were chosen to attract middle- and upper-income residents, who normally did not ride the buses. By 1985, sales of passes had increased 37 percent under the system, and the program was declared a success. We do not know, however, whether the sales were mainly to new bus riders or to people who had previously paid by the ride.

It is important to note that these incentive programs were carefully designed to reward everybody involved: Bus patrons saved on their consumer purchases, the bus system gained ridership, and the participating businesses attracted new customers. Peter Everett believes that a reward system has to have this character if it is to stay in operation.

But do incentives for bus riding reduce automobile use? The studies suggest that they may have only limited effect in the short run, even though they seem to pay for themselves and to have secondary benefits to local businesses. Helping downtown businesses, however, may indirectly benefit the environment. In many U.S. cities, downtown businesses face bankruptcy because of competition with suburban malls that offer easy access and convenient parking. As downtowns decline, fewer people travel there to work or shop, and eventually there are not enough travelers to fill the buses. Bus lines become increasingly uneco-

TABLE 5-1 Rewarding and Punishing Aspects of Car Driving and Mass Transit Use

	REWARDING	PUNISHING
Car Driving	Short travel time Prestige Arrival/departure flexibility Privacy Route selection Cargo capacity Predictability Delayed costs Enjoyment of driving	Traffic congestion Gas and maintenance costs
Using Mass Transit	Making friends Time to read	Exposure to weather Discomfort Noise Dirt Surly personnel Long walk to stops Danger (crime) Immediate costs Unpredictability Small cargo capacity Limited route selection Crowded Limited time flexibility Low prestige Long travel time

Source: Everett, P., and Watson, B. Psychological contributions to transportation. In Stokols, D., and Altman, I., (Eds.), *Handbook of Environmental Psyschology,* Volume 2, p. 999. Copyright 1987. Reprinted by permission of John Wiley & Sons, Inc.

nomic and local governments phase them out, with the result that bus riders are forced into less energy-efficient auto travel. So, the kinds of incentive plans Everett describes do benefit the environment by slowing the broader trend toward sprawling and totally auto-dependent cities.

Some municipalities have tried to get commuters out of their cars by making car driving less convenient compared to the alternatives. One way to do this has been to reserve lanes on heavily traveled commuter roads for high-occupancy vehicles and buses, so that people who give up driving can shorten their commuting time. This strategy has increased bus ridership and ride sharing in a number of cities, although there are enforcement problems. Where it is easy to use a carpool lane without being caught, such as when it is a center lane of a multilane highway, violations are frequent. And people sometimes ride with mannequins or pick up riders at bus stops so that they can use the fast lanes. Of course, these evasive strategies undermine the purpose of the programs—to reduce the number of cars on the road. They can be countered with lane designs that discourage evasion and with increased enforcement.

Some companies have tried to induce ride sharing by offering their employees the service of matching them with neighbors who might be able to pool with them, by reserving the best spaces in their parking lots

for carpools and vanpools, or by a combination of these methods. Both approaches reduce the time and inconvenience that are otherwise part of ride sharing. In a number of efforts during the energy crisis period of the 1970s, matching services added from 7 to 30 percent to the proportion of employees ride sharing; incentive systems that featured priority parking added from 22 to 55 percent (Geller, Winett, and Everett, 1982). The evidence indicates that in the companies that used them, parking benefits were much more attractive to employees, and were sometimes sufficient to induce carpooling even when matching services were not offered.

The experience with ridesharing and transit incentives suggests that incentives can work, that some incentives are much more effective than others, and that it is not obvious in advance which ones will be best. It is also hard to predict which incentive systems will be easy for people to evade. Finding an effective incentive package seems to require a certain amount of trial-and-error learning.

Despite the successes with some incentive programs, the big picture is still discouraging. As of 1990, only 5 percent of U.S. workers traveled to work on mass transit and 13 percent shared rides, while 73 percent drove alone. These figures are down from 1980, when they were 6 and 20 percent, with 64 percent driving alone (data are from the U.S. census, reported in Davis and Strang, 1993, Table 4.7). Why has the overall progress been negative? The answers, we think, lie in forces that are much stronger than these incentives and that have the opposite effect. Consider three factors that combine to put city buses and subways on the endangered technology list. First, the price of gasoline. For generations, U.S. gasoline prices have been much lower than those of Western Europe, and since the energy crisis of 1979, they have been declining in real terms (that is, gasoline has become less expensive after accounting for inflation). In Western Europe, where consumers pay at least three times as much for gasoline as we do in North America, there is a very strong incentive to avoid driving and to use small, fuel-efficient cars when driving is necessary. This incentive structure helps keep people riding the railroads in Europe, where the average citizen travels four to eight times as far by rail in a year as the average American, despite the shorter distances (data from Davis and Strang, 1993, Table 1.15, converted to per capita rates). Second, highways. Since the 1950s, the United States has invested billions of dollars annually ($7 billion in 1991, for example; Federal Highway Administration, 1991) in an interstate highway system that shortens travel time for long commutes and makes it easier for people to live far from where they work. Third, the income tax deduction for home mortgage interest, which encourages the American dream of owning a detached house on a plot of ground.

Many Americans benefit from relatively low gasoline prices, good highways, and incentives for home ownership, but these incentives hurt mass transit. They have made it convenient for Americans to move out of central cities by the millions into dispersed suburban settlements from which commuting by mass transit is highly inconvenient or impossible. Once people live in such places, it takes large incentives indeed to get them on a bus. Moreover, they are likely to oppose policies, such as sharp increases in gasoline taxes, that would provide the needed incentives but that they would see as punishing them for living where they choose.

These barriers to ride sharing and mass transit use can be called *structural* barriers because they are literally built into society (for example, by the locations of buildings and roads). They cannot be changed quickly by any policy because they are shaped by the history of past decisions that necessarily take a long time to reverse. The past decisions to build highways and support home ownership have created incentives for people to oppose policies that would change them, and powerful institutions as well: The interests of commuters and homeowners are institutionalized in lobby groups and in the person of legislators who depend on their votes. In this sense, past decisions have been built into the social structure as well as the physical. For these reasons, structural barriers are more difficult to change than other kinds of incentives. It usually takes slow historical processes to remove them.

The structural barriers to reducing energy use in transportation are so strong that transportation analysts have focused most of their proenvironmental

sulting waste stream pollutes water, land, and air and taxes the resources of local governments responsible for disposal. It is a problem facing rich and poor, rural and urban. Although the greatest potential for reducing waste lies in preventing it (see Chapter 10)—for example, by using less packaging material for consumer goods—this strategy usually requires changing the behavior of corporations. It is possible to make significant advances, however, by changing individual behavior. Getting people to purchase products that have minimal packaging or that are made from used materials, or encouraging repair rather than disposal of products that stop working, are among the ways that individuals can reduce waste by preventing it. Recycling waste material is usually a second-best choice. We discuss it here because this is the approach most commonly studied by behavioral researchers.

An early example of such behavioral research was the work of E. Scott Geller and his students in the 1970s, who offered rewards to students in dormitories at Virginia Polytechnic Institute and State University and James Madison University for recycling wastepaper (see Geller et al., 1982, 133–136). The researchers tried two kinds of rewards. Students in some dorms who brought wastepaper to the recycling location at the appointed time received raffle tickets, usually one per pound of paper delivered, for a weekly drawing with prizes donated by local merchants (valued at between $1 and $30). Other dorms were paired in a contest in which the dorm that produced more paper per resident received a $15 cash prize. Both rewards were effective in increasing recycling, and Geller considered the program cost-effective because of the low cost of the program and its positive advertising value to participating merchants. However, Geller was disappointed at the low proportion of residents who delivered paper and the low yield of recyclable paper from the drives (see Table 5-2). He concluded that it would be more worthwhile to try incentives in homes and offices, which produce more wastepaper than dorms.

Harvey Jacobs (1978, cited by Geller et al., 1982) tried the same kinds of incentives on households in Tallahassee, Florida. He offered some of the households one cent per pound for newspapers left at the curb for recycling every other Saturday. (One cent per pound was the approximate salvage value for newspaper at the time.) Other households were offered a chance for a $5 prize given by lottery to one participating household on the day after the trash pickup. These households were compared with others that received only reminder notices announcing the dates of the pickups and the procedures for participating. Before the experiment, each group contained 3 to 4 percent recyclers; afterward, 8 percent of the households receiving only information put recyclables at the curb, compared to 9 percent of those offered payment and 14 percent of those offered a chance in the lottery. The increase in the amount of recyclables collected was too small to make the program practi-

ABLE 5-2 Responses to Contests and Raffles as Rewards for Recycling Wastepaper in niversity Dormitories, 1970s

TUDY	PAPER RECOVERED (LBS./WK.)			PERCENT PARTICIPATION		
	BASELINE	CONTEST	RAFFLE	BASELINE	CONTEST	RAFFLE
eller et al., 1975	141	237	253	2.2	3.7	7.3
gram and Geller, 1975	58	—	113	2.9	—	4.9
itmer and Geller, 1976	49	544	820	2.6	5.9	12.2
uch et al., 1979	134	—	763	—	—	—

urce: Geller, E., Winett, R., and Everett, P. *Preserving the environment: New strategies for behavior change.* Copyright 82. Adapted by permission of Allyn & Bacon.

te: Participation is defined as delivering at least one sheet of 8-1/2 × 11-inch paper during a one-week period.

A Large Suburban Residential Area Near San Francisco Bay
This sort of dispersed housing makes ride sharing and mass transit impractical for most residents because of the long distances they would have to go to get their rides.
(Louisa Preston/Photo Researchers)

efforts on encouraging use of less-polluting and more fuel-efficient automobiles rather than on alternatives to the private car. Incentives, including regulations that attach financial costs to noncompliance, are the predominant policy tools for this goal as well. In the United States, the major policy options have been raising the Corporate Average Fuel Economy requirement on auto manufacturers, raising taxes on motor fuel, introducing "gas guzzler" taxes or "gas sipper" incentives for new automobiles, and recently, a proposal to offer more than the market value to buy and scrap old, inefficient, and polluting vehicles. We will not review the evidence on the effectiveness of these incentives here. But we emphasize that most of these incentives directly affect the behavior of manufacturers and oil companies, and only affect individual consumers indirectly. Consequently, they have the potential to make a huge difference when they can be enacted, but they also meet fierce and well-organized opposition from the political lobbies that represent the present structure of transportation.

INCENTIVES FOR RECYCLING AND WASTE REDUCTION

The United States produces 1,900 pounds (864 kg.) of municipal solid waste per person per year (1986 data are from World Resources Institute, 1992). The re-

sulting waste stream pollutes water, land, and air and taxes the resources of local governments responsible for disposal. It is a problem facing rich and poor, rural and urban. Although the greatest potential for reducing waste lies in preventing it (see Chapter 10)—for example, by using less packaging material for consumer goods—this strategy usually requires changing the behavior of corporations. It is possible to make significant advances, however, by changing individual behavior. Getting people to purchase products that have minimal packaging or that are made from used materials, or encouraging repair rather than disposal of products that stop working, are among the ways that individuals can reduce waste by preventing it. Recycling waste material is usually a second-best choice. We discuss it here because this is the approach most commonly studied by behavioral researchers.

An early example of such behavioral research was the work of E. Scott Geller and his students in the 1970s, who offered rewards to students in dormitories at Virginia Polytechnic Institute and State University and James Madison University for recycling wastepaper (see Geller et al., 1982, 133–136). The researchers tried two kinds of rewards. Students in some dorms who brought wastepaper to the recycling location at the appointed time received raffle tickets, usually one per pound of paper delivered, for a weekly drawing with prizes donated by local merchants (valued at between $1 and $30). Other dorms were paired in a contest in which the dorm that produced more paper per resident received a $15 cash prize. Both rewards were effective in increasing recycling, and Geller considered the program cost-effective because of the low cost of the program and its positive advertising value to participating merchants. However, Geller was disappointed at the low proportion of residents who delivered paper and the low yield of recyclable paper from the drives (see Table 5-2). He concluded that it would be more worthwhile to try incentives in homes and offices, which produce more wastepaper than dorms.

Harvey Jacobs (1978, cited by Geller et al., 1982) tried the same kinds of incentives on households in Tallahassee, Florida. He offered some of the households one cent per pound for newspapers left at the curb for recycling every other Saturday. (One cent per pound was the approximate salvage value for newspaper at the time.) Other households were offered a chance for a $5 prize given by lottery to one participating household on the day after the trash pickup. These households were compared with others that received only reminder notices announcing the dates of the pickups and the procedures for participating. Before the experiment, each group contained 3 to 4 percent recyclers; afterward, 8 percent of the households receiving only information put recyclables at the curb, compared to 9 percent of those offered payment and 14 percent of those offered a chance in the lottery. The increase in the amount of recyclables collected was too small to make the program practi-

TABLE 5-2 Responses to Contests and Raffles as Rewards for Recycling Wastepaper in University Dormitories, 1970s

STUDY	PAPER RECOVERED (LBS./WK.)			PERCENT PARTICIPATION		
	BASELINE	CONTEST	RAFFLE	BASELINE	CONTEST	RAFFLE
Geller et al., 1975	141	237	253	2.2	3.7	7.3
Ingram and Geller, 1975	58	—	113	2.9	—	4.9
Witmer and Geller, 1976	49	544	820	2.6	5.9	12.2
Couch et al., 1979	134	—	763	—	—	—

Source: Geller, E., Winett, R., and Everett, P. *Preserving the environment: New strategies for behavior change.* Copyright 1992. Adapted by permission of Allyn & Bacon.

Note: Participation is defined as delivering at least one sheet of 8-1/2 × 11-inch paper during a one-week period.

cal. No group provided enough additional material to pay more than one-third of the cost of the program.

These incentives were relatively ineffective, even though the penny a pound essentially returned the salvage value of the wastepaper to those who recycled it. Apparently, this was not enough money to make a large difference for householders or college students. Incentives might still make a difference if a different and more effective kind of incentive could be found, or if a larger financial reward could be justified.

To find a more effective incentive, one should begin by asking why people fail to recycle. As we saw in Chapter 4, inconvenience is a major barrier to recycling. So, it is no surprise that successful recycling programs have been built on making the behavior more convenient. In Jacobs's work in Tallahassee, increasing the frequency of collecting recyclables had as much effect on participation as offering one cent per pound of wastepaper. Another good example of successful efforts based on convenience are the programs that encourage recycling of high-quality office paper by providing specially designed receptacles at each worker's desk. In an early program of this type, the U.S. Environmental Protection Agency collected 12.5 tons of high-grade wastepaper per month from its 2,700 Washington employees beginning in 1975 (see Geller et al., 1982). Such programs collect large amounts of paper nearly uncontaminated by other kinds of waste because of the receptacle design, and they work without offering financial incentives.

For recycling household wastes, it is possible to maximize convenience by using curbside pickup rather than recycling centers, picking up recyclables and trash at the same place and time, using identifiable receptacles (e.g., different colors or shapes for different types of waste), and so on. We believe much can still be done to raise rates of recycling by concerted efforts to make it easier for people to do what they want to do. The way to find effective convenience interventions is to ask people what would make recycling easier, try out some of the suggestions, and keep those that work.

One of the most familiar incentive systems for recycling, and one of the most effective, is the so-called bottle bill—a system of legislatively mandated deposits on containers for soft drinks and sometimes other beverages as well. In this system, people pay a deposit at the time of purchase, usually 5 cents, for each container covered under the law. The deposit is returned when the empty container is returned to a designated location (usually, a store that sells soft drinks). Bottle bills have benefited the environment by reducing littering, saving space in landfills, and saving the extra energy that would be needed to make glass and aluminum containers from raw materials rather then recycled ones (see Chapter 10). They sometimes also encourage reuse of containers, which is even more environmentally beneficial than recycling. Despite these environmental benefits, bottle bills have been vigorously opposed by the soft-drink industry wherever they have been introduced. They now operate in nine U.S. states.

Bottle bills work by providing a rather large incentive—much greater than the one cent per pound used in the early recycling experiments—for recycling materials that have special environmental benefits if returned to the same industry that produced them. In effect, people who fail to recycle are made to pay the cost of litter and trash pickup and disposal, and people who recycle—even if they did not purchase the containers in the first place—are rewarded for reducing these costs. The bottle bill is thus a good example of incentive theory in action.

Even better for the environment than recycling are methods that reduce the quantity of waste that needs to be recycled or disposed of. Incentives can also be used to promote waste reduction, as an increasing number of communities are learning. Many cities, towns, and counties are now paying for trash disposal by charging per-trash-can fees to those who put out trash, rather than using older methods financed by property taxes or flat monthly fees per household. The effect is to create an incentive for each household to produce less trash.

In Seattle, where a pay-per-can system has been in effect since the early 1980s, households pay $10.70 per month for pickup of a 19-gallon "mini-can" or $13.75 per month for a standard 32-gallon can, plus $9 for each additional can. Seattle households put out an average of three and one-half cans per week in the

early 1980s, but only one can per week by 1992 (Cohn, 1992). People accomplish the reduction in many ways, from buying fewer throwaway products to doing the "Seattle stomp," a dance on top of trash to get more of it to fit in a can. Both methods reduce demand on garbage trucks and landfills. Illegal dumping of household waste, which some feared would be a side effect of the program, has not become a serious problem. The Seattle Solid Waste Utility attributes success in part to the strong environmentalism of city residents.

Over 200 U.S. communities now offer incentives of various types for reducing household waste. Some charge by the can, some by the pound, and others charge for stickers that must be affixed to a trash can or bag for it to be picked up. Seattle and other communities offer a discount for low-income households so that the system is not unfair to the poor. And in some communities, pay-per-can is an option rather than a requirement, and is enthusiastically accepted by small households.

Pay-per-can is another practical application of incentive theory. It directly rewards any behavior that reduces trash volume (or, in pay-per-pound, trash weight) and punishes increases in trash. It leaves the household the choice of finding ways to reduce waste that fit family needs, but it creates a more or less constant reminder to think about how to reduce waste. This sort of system may lead people to buy fewer disposable products and choose products that use minimal packaging, and thus put pressure indirectly on manufacturers. Of course, the system is not perfect. Wealthy people who feel they can afford to make trash are completely unconstrained by the system, a fact that could lead to objections on the ground of unfairness. Pay-per-can is often resisted by people who see it as adding a new cost to daily living. And the possibility of illegal dumping is always there for people who want to evade the system or cannot afford the fees. In addition, there are implementation problems, ranging from trash stickers that fall off and cause complaints from people whose trash has not been collected to the difficulty of working out a system of contracts with the dozens of small, private trash haulers that serve some municipalities. But the system is working in a growing number of communities. Success is partly due to the large incentives that can be offered. A saving of $9 per trash can not filled is enough to make a real difference to many families, and the large incentive is justified by the avoided cost of trash hauling and disposal.

These few examples show the significant potential that exists for reducing household wastes by offering incentives. We should not leave the topic, however, without commenting on why incentive approaches were adopted so slowly for decades and why they came to look so encouraging in the early 1990s. Much of the reason lies in the changing physical, legal, and social context of municipal waste disposal in the United States. A generation ago, landfills were easy to locate and most had plenty of room to expand. By the early 1990s, many old landfills were getting full and cities had expanded so far that it was hard to locate new ones within reasonable distance. Moreover, citizens had come to place a higher value on environmental quality, particularly in the area of toxic waste disposal, and had caused laws and regulations to be enacted. Because people know that hazardous wastes can be dumped in landfills, no one wants a landfill for a neighbor. Alternatives, such as trash incineration plants, also meet public opposition because of concerns about air pollution. All these changes greatly increased the financial cost of waste removal, and all indications are that these costs will continue to increase. When waste removal is expensive or new disposal sites are politically unacceptable, even fairly large incentives for waste reduction and recycling look like bargains. In short, incentives became more practical because the structural conditions changed over a twenty-year period. New physical, legal, and social conditions made the environmental costs of waste disposal more visible to those who managed waste disposal—that is, they have helped internalize the externalities. The incentives for local governments changed, so they became more willing to pass those incentives on to individuals. And people grew more aware of the environmental costs of disposal. In short, incentives became more effective because environmental attitudes changed in ways that made larger incentives justified.

REDUCING ENERGY USE IN HOMES

Reducing the use of fossil fuels and electricity can do great things for environmental quality. Burning coal, oil, and natural gas pollutes the air and contributes the majority of all greenhouse-warming gases produced by human activity. Nuclear-powered electricity does not cause these problems but is responsible for environmental threats from long-lived radioactive waste. Households account for about one-third of all energy consumption in the United States, and most of that—amounting to almost 20 percent of the national total—is used in homes (most of the rest is used in vehicles; see Chapter 10). So, residential energy conservation can do a lot to improve the environment.

Three kinds of incentives have been used to promote energy conservation in homes: energy price changes, financial rewards for desired behavior, and methods that simplify the task of conserving energy and thus make conservation more convenient. This section discusses examples of each approach.

Energy Price Changes

Economic theory holds that people find ways to economize on things if they are sufficiently expensive. It follows that if Americans use too much energy, it is because the prices consumers experience are too low. Here are a few things that have been tried to address the problem in homes.

Many apartment houses include heat and electricity costs in the rental charge, either because local authorities require landlords to provide heat or because a large building has only one furnace or electric meter. If instead of getting energy at no apparent cost, each household paid directly for the energy it used, it would have an incentive to economize. One way to internalize the costs is to provide electric or gas meters for each household. This may require each apartment to have its own heating and cooling system. When the individualized approach is tried, it usually results in reduced energy use in the building, but the change can be very expensive. It often results in a change to electric heating, which is simpler and cheaper to install in apartments but can be less energy-efficient than having one heating plant for a large building. Less expensive alternatives include submeters on the steam or hot water flowing through each apartment and an allocation system that divides the total energy cost for a building among the apartments proportionally to the amount of floor space in each. This last system creates an incentive to economize for the group of apartments rather than for each individual, but has the advantage of requiring no new equipment. Even this simple system, called the Residential Utility Billing System, has resulted in building-wide energy savings of 5 to 8 percent (McClelland, 1980).

It is also possible to build conservation incentives into the energy price system. Electricity, which accounts for over half of all the energy used in U.S. homes (Hirst et al., 1986), has traditionally been billed under a "declining-block" rate system that rewards overuse. The system essentially gives volume discounts: The more electricity you use, the less each additional kilowatt-hour costs. This system made sense in terms of marketing electricity, but when excessive energy use became a national concern, several state utility regulatory agencies began to change the rate structures, either introducing flat rates (the same charge for each kilowatt-hour) or increasing-block or "lifeline" rates, which offer enough electricity for household necessities at a lower rate, with a higher rate for usage beyond the basic level.

Another form of electricity price incentive is called time-of-use pricing. Although most people are unaware of this fact, electricity costs different amounts to produce at different times of the day and year. Every electric company is responsible for having the capacity to meet demand at the day and time when it is greatest—in most of the United States, on the hottest summer afternoons; in a few of the coldest areas, on the coldest winter mornings. To meet this demand, many companies have power plants that they operate only at the high-demand or "peak" times. They use their most inexpensive power plants all the time and leave the expensive ones for infrequent operation, so peak power is by far the most expensive to produce. It is also often more polluting, because the peak plants tend to use older technology. To give people an incen-

tive to use less power at peak times, many utility companies now charge a higher rate at those times—sometimes as much as eight times the usual rate, but only for a few hours a day in the peak part of the year. They install new meters in homes that record the times when power is being used.

The idea of time-of-use pricing is, of course, completely new to most people who are first exposed to it, so utility companies have needed to explain it to people, much as we have done in the previous paragraph. As one might expect, a large incentive induces people to shift some of their electricity use to off-peak hours. But nonprice factors can have a larger effect than the size of the incentive. Thomas Heberlein and Keith Warriner (1983) analyzed energy use among participants in an experiment in the state of Wisconsin that set the cost of electricity during peak periods at rates between twice and eight times the cost of off-peak power. The price differential between 2:1 and 8:1 had a significant but small effect on the amount of electricity people used in peak periods: It accounted for two percent of the variation across households. Behavioral commitment—a measure of how important the household considered it to be to reduce peak-period electricity use and of whether doing this was considered a moral obligation within the household—accounted for 11 percent of the variation. One reason that the price effect was so weak was that many people in the experiment did not know or did not believe that the price differential was as large as it was. They knew there was a sizable incentive to use electricity at off-peak times, but beyond that, the exact size of the incentive mattered relatively little.

These results suggest that the effectiveness of the price incentive will depend on how it is explained to people. Heberlein showed this in another study (Heberlein and Baumgartner, 1985) that compared two different ways of explaining time-of-use rates. The electric company's usual information package consisted of notification letters, a brochure, and two bill-stuffer notices. The enhanced communications package added frequent reminders about the rates, letters from the state Consumer Advisory Council, detailed information about rates, advice on how to monitor home energy use, and other information. Consumers receiving the enhanced package reduced peak-period energy use 16 percent below the level attained with the utility's information package.

Financial Rewards

Since the 1970s, psychologists have experimented with systems of rewards to encourage households to use less energy. Early experiments, for example, offered financial payments to households that reduced energy use by a certain percentage on a weekly basis (e.g., Hayes and Cone, 1977) or that had their air conditioners set above 74 degrees Fahrenheit when an inspector stopped by (Walker, 1979). Such rewards changed behavior, but they are inherently limited because they only affect people's daily behavior and do not change the inefficient equipment many people have in their homes. In addition, people who use less often perceive themselves as sacrificing comfort because their homes are colder in winter or warmer in summer (see Chapter 10). People usually resist making major cuts in energy use when it involves sacrifice, only doing so when they perceive a general emergency or when the household is financially strapped. Sacrifice-type responses are often only temporary. (A significant exception to this rule is that people sometimes adapt to changes they have made that they may have considered temporary. People can and do adapt to lower indoor temperatures in winter [Winett et al., 1982], and there is evidence that average indoor winter temperatures in the United States have decreased since the early 1970s [Kempton, Darley, and Stern, 1992].)

The limitations of changing daily behavior do not affect energy-saving approaches that change household technology so that people have the same comfort with less energy use. Improving the energy efficiency of buildings with measures such as added insulation in attics and walls can yield substantial savings in household energy used for space heat—30 to 50 percent, according to many estimates—while holding indoor temperatures constant (Hirst et al., 1986, see Chapter 10). Replacing old, energy-inefficient furnaces can save almost as much (the precise figures vary widely, depending on the condition of the house, the fuel, the

climate, and so on). Of course, these changes are expensive, so money is a barrier to action. Here is where incentives come in.

Two kinds of incentives that governments and utility companies have used are loan subsidies—offers to lend money for energy efficiency at below the usual rate of interest—and partial rebates that effectively reduce the cost of new household equipment. In the United States in the 1980s, the incentive programs typically worked as follows: A utility company, usually acting on the insistence of a state regulatory agency, would offer incentives to households for upgrading the energy efficiency of their homes. To qualify, a householder would have to call the company to request a home energy audit. An energy auditor would arrive and assess the status of the home's insulation, storm windows, and so forth, and recommend measures that met the utility's standard of cost-effectiveness. Then the householder could have recommended measures installed by a qualified contractor under a low-interest loan contract with the utility company or, if the utility offered a rebate program, could pay for the contractor's work and exchange the receipt for a partial reimbursement from the utility. Some utility companies also made the incentives available for do-it-yourself work.

Several conclusions emerge from the experience of these incentive programs (Stern et al., 1986; Berry, 1990). One unsurprising conclusion is that the stronger the incentive, the greater the percentage of eligible households that use it. In addition, households vary in their preference for different types of incentive (such as grants or rebates versus loan subsidies), even when the incentives have the same monetary value. On average, households prefer grants or rebates to loans, but many higher-income households and people skilled in managing budgets prefer loans. The difference seems to depend on willingness to go into debt for energy conservation and people's expectations about being able to maintain enough income to repay the debt. The repayment issue may explain the great success of one type of loan subsidy—a loan that does not need to be repaid until the home is sold.

What is clearest in the reviews is that the size of an incentive is not the most important factor affecting the proportion of people who use it. We looked closely at three regional programs in which several utility companies in the same geographic area offered exactly the same incentive package to encourage households to invest in insulation and other major efficiency improvements (Stern et al., 1986). The evidence shows that a strong financial incentive was necessary for a highly successful program, but far from sufficient. In New York State, where nine utility companies offered loans for energy-efficiency improvements at slightly below-market interest rates, no company got more than one-half of 1 percent of its customers to take advantage of the incentive within a year. In the Pacific Northwest, when eleven companies offered interest-free loans, the most successful program attracted over 10 percent of the eligible households per year, but the average rate was only 4 percent per year. When seven northwestern utilities offered an even stronger incentive, a rebate that covered 93 percent of the cost of the recommended energy improvements, the most successful program involved almost 20 percent of its customers in a year—but the average program reached only 5 percent. Figure 5-1 shows these results. It shows that with small incentives, no program was very effective, and that large incentives made much greater success possible. But success depended on much more than the incentive, as shown by the tremendous variation in effectiveness between programs offering exactly the same incentive. In fact, the stronger the incentive, the more difference nonincentive factors make.

We gained some understanding of how the nonincentive factors work by examining the two steps consumers went through during these programs: requesting energy audits, and deciding to invest in what the auditors recommended. Figure 5-2 shows that larger incentives affect household behavior primarily after they receive energy audits. Once people get their energy audits, the size of the incentive has a strong effect on household decisions—a sufficiently strong incentive, such as that offered in the 93 percent rebate program, means almost certain action among those who received audits. So, once people are seriously considering their energy choices, a large incentive strongly influences behavior. But the size of the in-

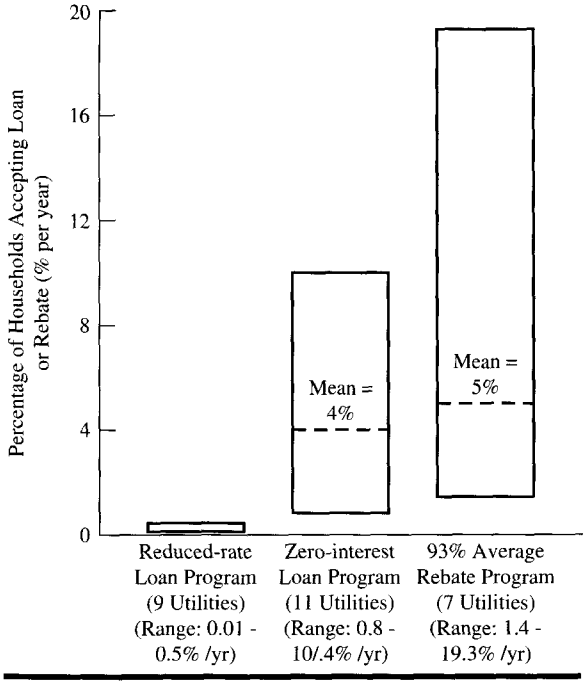

FIGURE 5-1 Effectiveness of Three Home Energy Conservation Programs.

Source: Stern et al., 1986.

Dotted line signifies mean percentage across programs; bar covers range from most successful to least successful program.

Our review uncovered another interesting fact: Incentive programs in the United States were systematically less effective than those we reviewed in Canada and Western Europe. After considering various possible explanations, we concluded that the most likely reason was the procedures required for people to take advantage of the incentives. The U.S. programs all used the same two-step procedure. To get the incentive, consumers first had to request a home energy audit and then, after waiting for the audit to be scheduled and conducted, act on the auditor's recommendations and file a claim for the rebate or loan. The U.S. utility companies used this procedure to ensure that people were not getting rewarded for installing uneconomic energy improvements. The non-U.S. programs did not require audits. They simply listed the improvements that were covered and paid the incentive on receiving proof (a receipt) that the improvements had been installed. They took the chance of paying for some ill-advised improvements in return for getting more homes improved. The more convenient procedure made the programs more successful, apparently because it required consumers to take one less action. In the terms of Chapter 4, it lessened a barrier to final action and also tightened the link between attitude and action by requiring less of the consumer's attention.

centive makes little difference in attracting people's attention. As the white bars in Figure 5-2 show, strong-incentive programs did not do very much better than weak-incentive programs at getting people to request energy audits. This is why so many of the strong-incentive programs had only moderate success in changing behavior. Attracting people's attention is a job for information (sometimes called marketing), and it is an absolutely critical job—especially when a very strong incentive is being offered. It seems clear that once an incentive is fairly large, it may be more effective for an energy incentive program to invest in information than to increase the incentive. In terms of Figure 5-1, it is often more cost-effective to move a program up one of the columns than to shift it to a column farther right.

Making Conservation Convenient

Convenience is very important for home energy efficiency because, as we noted in Chapter 4, it is so difficult to make and carry out wise decisions about making one's home more energy efficient. One must select from many possible improvements—adding insulation, installing storm windows and doors, sealing cracks around windows, maintaining or replacing furnaces, and so on. Most of these measures are expensive, and it is difficult to judge in advance how much each measure will save in one's home. Moreover, many of them require experts, such as heating or insulating contractors, to install them. The consumer is faced with a range of choices and may have to rely for information and installation on experts whose trustworthiness is unknown. So, lack of knowledge,

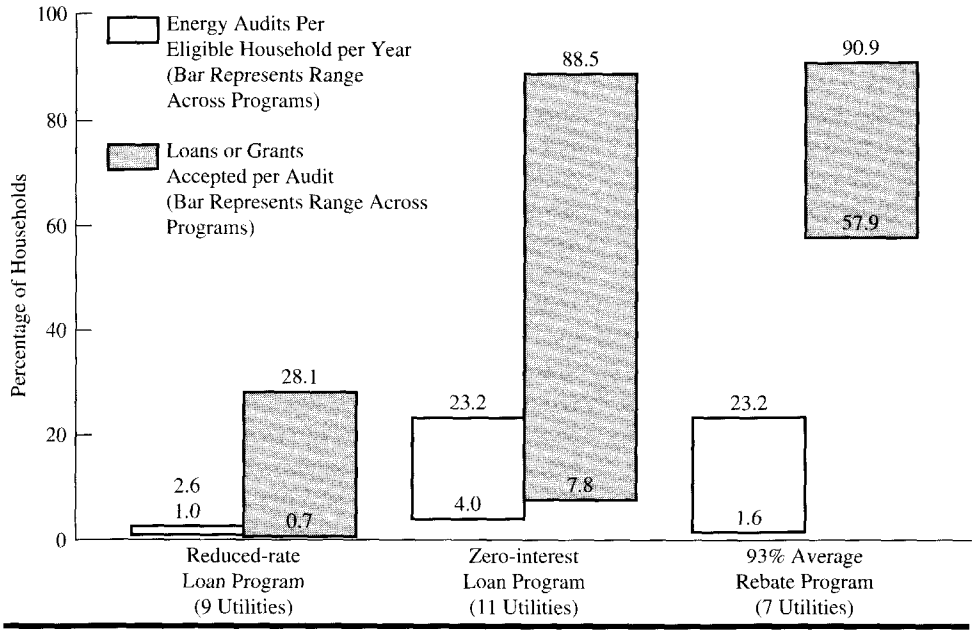

FIGURE 5-2 Households Requesting Energy Audits (White Bars) and Accepting Incentives Once They Have Received Audits (Shaded Bars) in Three Home Energy Conservation Incentive Programs
Source: Stern et al., 1986.

uncertainty, and the need to devote significant attention to the choice are major barriers to action. A consumer may understandably take the attitude that "if it's not broken, don't fix it," and do nothing, even if energy improvements would save money in the long run. Doing nothing may not save energy, but it certainly saves time, planning, and effort.

When home energy conservation programs make efforts to emphasize convenience, it helps. The Canadian and European incentive programs that dispensed with energy audits were noticeably more successful than programs that required audits. Many programs in the United States have provided other services to increase convenience and consumer confidence in the program. For example, an early program in the state of Rhode Island offered free energy audits, an approved list of contractors to perform the recommended work, assistance with low-cost bank financing, inspections of the completed work, and follow-up to make sure the contractors corrected any problems the inspection revealed (Stern, Black, and Elworth, 1981).

A few programs have gone even further, by allowing people with one simple action to learn what energy improvements they need, and to have them installed and paid for. One such program was implemented in the small city of Fitchburg, Massachusetts, in the fall of 1979 (Stern, Black, and Elworth, 1981). Fitchburg is a northern city of old, oil-heated houses that were poorly insulated when built and that, as they aged, developed cracks around windows and doors. There was a large population of older and low-income people who had neither the money nor knowledge to make the improvements their homes needed, and the price of home heating oil was rising rapidly. A crash program was needed to improve energy efficiency in the city's houses and protect the people's income and comfort.

The city government, working with an advisory council of prominent citizens and the labor of city

workers and volunteers, created FACE (Fitchburg Action to Conserve Energy), an ad hoc group that held instructional workshops and distributed home weatherization kits free to anyone earning less than 80 percent of the median income in the city (the federal government provided grants for the kits, which cost under $20 each). People were encouraged to install the kits themselves after receiving training, but for people who could not do this, volunteers came around to install them. In six weeks, one-sixth of the homes in the city were weatherized through the program.

The strategy of giving away energy-saving equipment recalls the educational program discussed in Chapter 4 (Geller, 1981) that achieved its only measurable success when it distributed water-flow restrictors for shower heads, along with information on how to install them. The strategy of giving away equipment combines the tangible reward of cost-free equipment with the convenience of avoiding the considerable effort of deciding what equipment to buy and shopping for the lowest price. Installing the equipment, as was done for the Fitchburgers who could not do it themselves, increases the incentive further. (We should emphasize that the Fitchburg program, successful as it was, was a low-cost, relatively low-effect program. Given the status of older homes in Fitchburg, much larger investments in energy efficiency would have been warranted, and would have saved much greater amounts of energy and money, cost-effectively. However, the money to make larger investments was not available.)

We close this section by reporting on what is probably the ultimate in the use of incentives for energy conservation. An experimental program in metropolitan Minneapolis, Minnesota, in 1984 offered homeowners a free energy audit, free installation of the recommended conservation measures (which were estimated to save an average of almost $1,300 per home in energy costs over the first three years), and a guarantee that as a result, their monthly utility bills would decrease from that time on. A wary reader or consumer may well say, "What's the catch? I know there's no such thing as a free lunch." So before reporting the results of the program, it is worth explaining how it was possible to offer such incentives.

Energy analysts have long realized that in most U.S. homes, it is possible to make investments in improving energy efficiency that offer a far greater economic return in terms of money saved than people could get by putting their money into a bank account, a money-market fund, or even the stock market. If this is so, it should pay people to invest in home energy efficiency rather than the alternatives. It should even pay people to borrow money for energy efficiency. Yet, this is not what most people do. There are many good reasons. For one, as we have already pointed out, people would need to develop a great deal of specialized knowledge—about how to choose the best energy investments; where to find low-cost, reliable contractors; how to get the best loan rates; and so on. For another, people may not expect to live in the home for the full five to ten years it will take for the investment to pay off. For such people, the investment is not worth making unless they are confident that it will increase the resale value of the home. Also, because most people do not think of energy efficiency as one of the options for financial investing, they may not reason out the alternatives as we have done here.

There is a way to overcome all these barriers at once. Imagine a private, profit-making company that developed the specialized knowledge on how to do energy audits, calculate the best energy investments for each home, install the improvements, and borrow the capital to pay for the work. Most of this knowledge applies to a large number of homes, so the company could gain the knowledge at lower cost per home than a homeowner could. Because of such cost-cutting economies of scale, the company should be able to make a better investment than the average homeowner. It should therefore be possible for the company to install the energy improvements at no cost to the consumer and earn a profit by collecting part of the money that the customers save on their utility bills. The company and its investors profit, and the homeowner saves money, probably ending up with a home that is more salable because of its low energy costs. Everybody wins. This is the concept of the shared-savings conservation program. It relies on the efforts of an energy services company—a firm that, in effect, sells home heating, cooling, lighting, and the

other services energy provides at lower cost than the local utility company. And the environment benefits because people get their energy services without burning fossil fuels or using nuclear power.

The reason energy services companies have not already covered all of the North American market is that it is impossible to put a meter on the gas and electricity people no longer use. With no way to measure the savings actually achieved, it is not easy to divide their value equitably between the homeowner and the energy service company. This is a problem for which a simple and generally accepted solution has not yet been worked out. The Minneapolis program worked this way: The energy service company, after completing its energy audit, calculated the expected energy savings from installing the package of improvements it recommended. It offered the homeowner a contract in which the homeowner would agree to pay the company 75 percent of the projected savings for the first three years and 50 percent for the fourth and fifth years. After three years, the projected savings would be compared with the actual savings so that the consumer's cost could be adjusted to reflect actual savings, and after five years, the contract would end, with the homeowner retaining the improvements and all future savings they produce (Miller and Ford, 1985). The plan guarantees homeowners a negative cost for the investment in energy efficiency, and enables an efficient company to make a profit at the same time.

Although this arrangement is not fully convenient—it gives consumers an additional bill to pay—it proved quite attractive to the Minnesota homeowners. The program was initially marketed in early summer of 1984, and despite that being a time of low interest in energy conservation in a cold climate, the most successful of the marketing strategies attracted interest from 20 percent of the eligible households, and resulted in signed contracts with 6 percent. For a program in operation only a few months, this is a very high rate of participation.

The Minnesota experiment showed that a program that removed all the financial barriers to energy efficiency could rapidly attract participants. But it also demonstrated that incentives are not the only key to success. Within the experiment with incentives, the program conducted an experiment in marketing technique. Anticipating that consumers would be skeptical of a company that seemed to be offering something for nothing, the program tried three different ways of introducing the program to homeowners. In one method, the energy service company sent letters on its letterhead to the eligible homeowners, explaining the program and encouraging them to request a free home energy audit. In the second method, the same letter included mention of the fact that the county government was cosponsoring the program. In the third marketing approach, the invitation letter came from the chairman of the county Board of Commissioners, on his letterhead. It contained the same information, and introduced the energy service company as the county government's selected contractor.

As Figure 5-3 shows, the effect of marketing techniques was dramatic. The letter from the county government was over five times as effective as the letter from the private company that did not mention the government, both in encouraging energy audits and in getting contracts signed. It is easy to see why the letter made such a difference. People tend to be suspicious of unknown private companies making offers that sound too good to be true. They are well aware of consumer fraud and deceptive sales techniques, and the energy service company's offer must certainly have looked suspicious to many consumers. But they probably did not believe their local government would sponsor a fraud. On receiving an invitation letter from the county government, people were much more likely to accept the claim that the program was in the public interest and their personal interest. (County officials, well aware that public trust and well-being—not to mention their own careers—were at stake, made sure the energy service company was offering a good program.)

The Minnesota experiment demonstrates once again that incentives do not work automatically and that they need an effective informational component to work well. Figure 5-3 also reinforces the lessons of Figure 5-2 about the different roles of information and incentives. It shows that regardless of the marketing strategy, about 25 to 30 percent of the people who

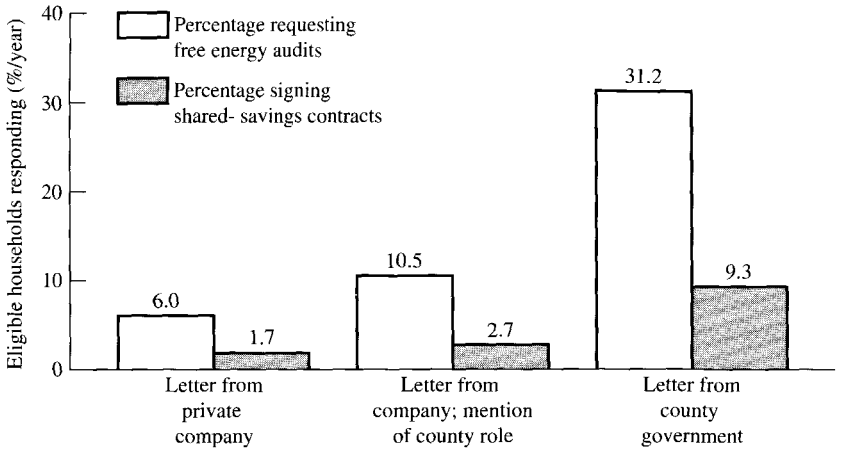

FIGURE 5-3 Consumer Response to a Shared-Savings Energy Efficiency Program under Three Marketing Strategies
Source: Miller and Ford, 1985.

received energy audits went on to sign contracts. That proportion is what this particular package of incentives—financial savings, convenience, and so forth—could accomplish. Where the letters mattered was in getting people to make initial contact with the program by requesting energy audits. The invitation letters worked by attracting people's attention—getting them to think seriously about what the program offered. Once they were paying attention, the incentive sold many of them on taking action. Information and incentives addressed different barriers to action; an effective program needs both.

The experience with energy conservation programs shows how different kinds of incentives can complement each other. Programs work better when they combine convenience with financial savings. And needless to say, they are likely to work still better when high or rising energy prices give people an added reason to improve efficiency and bring a higher payoff from any particular improvement. It is important to point out, however, that price increases by themselves have only moderate effects on consumers' decisions to improve home energy efficiency. In the 1970s, when energy prices increased rapidly and were expected to rise even further, reinsulation of attics and walls in existing homes, and other major energy-saving improvements, proceeded rather slowly, compared to what one would expect if everyone who could save money by taking action did so. One of the major effects of the price increases of that period was on public policy. Seeing the slow pace of energy improvements in homes, local and national governments implemented incentive and information programs to encourage people to take energy-saving actions they were not taking but that would be in their own economic interest.

A look at the evidence in this chapter shows why price increases had to be supplemented by policies that supplied information and additional incentives. As we have noted, improving the energy efficiency of a home is not a simple matter. Someone in the household must learn about the energy condition of the home and how to improve it; decide what actions are best for the household; shop for the needed materials and services; find, interact with, and wisely judge the providers of these services; make the relevant financial choices; and keep track of the whole complex process. These things require considerable knowledge, time, and effort and thus present barriers to action that a price increase does nothing to remove.

To effectively promote energy conservation—even when fuel prices are high and rising—requires overcoming all these barriers. This is why programs that combine convenience, cost reduction, and information are the most effective.

We should note that even the most successful incentive-based home energy conservation programs have trouble overcoming structural barriers. In housing, the most serious ones arise in rental units, where the occupant usually lacks the ability to take action on home improvements. As a result, the most ambitious programs, such as the one in Minneapolis, have generally been restricted to homeowners. Incentives directed to individuals cannot overcome the problem that arises when one set of individuals (the owners) has the authority to make decisions and a different set (the occupants) pays the energy bills and would get most of the benefit of those decisions. This structural problem, in which there are two actors with two different incentive structures, is among the most difficult in the area of residential energy conservation. The effect is to hold back progress in the homes of low-income people, who tend to rent rather than own.

PRINCIPLES FOR DESIGNING EFFECTIVE INCENTIVES

The most general principle is probably that of the economists: Internalize the externalities. But as the great variety of effective incentive programs suggests, there is no one sure way to apply this principle. There are many ways to match costs to environmental damage, but no set rule for deciding when it is best to offer rewards, charge fees for services like waste disposal, make it more convenient to do things that provide environmental benefits, or employ some other method. Experience shows that there is an art to designing effective proenvironmental incentives. Good design follows these principles:

Make the incentive large enough. This is not the same as saying that with incentives, the bigger the better. Rather, as the experiments with time-of-use electricity pricing and with energy efficiency suggest, there is a sort of law of diminishing returns for incentives. An incentive must be large enough for people to take it seriously, but beyond that point, increasing the incentive may have little added effect. Once a financial incentive is large enough, it may be more cost-effective to make an effort to reduce other barriers to action—for example, to advertise the program more or focus incentives on increasing convenience—than to add further financial inducements.

We should mention that it is possible to make an incentive so large that it undermines people's intrinsic motives to act. People can come to believe that they are acting only for the incentive, so that they begin to require large incentives to do things that they might previously have done with only small ones. This social-psychological process of "overjustification" of behavior may reduce the long-term effectiveness of incentives that work well in the short term (Lepper and Greene, 1978; Katzev and Johnson, 1987; DeYoung, 1993).

In some situations it is easy to get the incentives large enough, but in others it is not. Energy efficiency presents a good opportunity, because even though it is difficult for a homeowner to learn what improvements to make and to get them done properly, an entrepreneur such as an energy service company can earn money by providing incentives that remove those barriers. Recycling is presenting an increasingly attractive situation as the cost of waste disposal rises. Municipalities can afford to offer larger incentives than ever before, and still save money. Providing large enough incentives is much more difficult, however, for getting commuters out of their automobiles and into alternative transport. There, the combination of a lack of convenient alternatives to the car, the relatively low price of motor fuel, and the various structural elements of an automotive society combine to make it extremely costly to provide strong enough incentives. Structural barriers also stand in the way of improving energy efficiency in rental housing.

Match the incentives to the barriers that prevent action. We have seen that the external barriers to proenvironmental behavior are different for each behavior, and also that different people respond well to

different kinds of incentives. An incentive that changes one behavior may have very little effect on another. A small, well-placed financial inducement for recycling, such as a deposit on returnable drink containers, can work wonders to reduce that part of the solid waste stream. But fairly large tangible rewards to get commuters out of their cars and into buses have had only moderate effects, while improved convenience—access to preferred parking spaces in large industrial parking lots—addressed a more significant barrier and produced a surge in carpooling.

Similarly, an incentive that works well for some people may have little effect on others, even when the behavior is the same. In home energy conservation, some people prefer grants while others prefer loan subsidies, because of differences in household incomes, living situations, and attitudes toward indebtedness. In general, the most effective incentives are the ones that attack the most significant external barriers for the individual. But it is not always obvious in advance which barrier is the greatest or which incentive will best surmount it.

Because people's situations vary, an incentive that looks appropriate in advance may turn out to be ineffective or even counterproductive. A single incentive can have positive and negative effects at once, though on different individuals. Consider the short-term effect of an energy price increase—say, a large increase in gasoline taxes—intended to reduce energy consumption in automobiles. Among people who can afford new cars, there would be a shift toward more fuel-efficient models, with the result that more of these models would be produced and total gasoline use would decline. For most people, who have no immediate plans to buy cars, the price increase would not get them into more efficient cars immediately, though it might induce them to make fewer trips. For lower-income people, especially rural people who commute long distances to work, the price increase would be an economic hardship, and it might even force them to keep fuel-inefficient cars longer because they would have less disposable income available for replacing them. The reason the incentive has these different effects is that the barriers to owning fuel-efficient cars are different for different people. Where income is a significant barrier, price increases may only make matters worse in the short term.

There is no formula for finding the best incentive for each behavior and each individual, but there is an effective process for designing incentive programs. We discuss it at the end of this section.

Get people to notice the incentives and the behaviors they are meant to change. We saw in Chapter 4 that information had no effect unless it was noticed. The same is true for incentives, because incentives do not always advertise their own existence. Some are easier to notice than others. Bottle deposits and trash-bag fees are hard to ignore because they require people to take some additional action every time they engage in a target behavior. Gasoline taxes are somewhat less noticeable because they are included in the price, so they do not require special action. They can still have powerful effects, though, because people are likely to notice higher gasoline prices whenever they take long trips or select between models when buying a car. Changes in electricity prices are less noticeable because the bill comes only after a month or more of assorted electricity-using behaviors (and nonbehaviors, such as leaving a basement water heater on even when a household is on vacation). It can be hard to notice electricity price increases because usage tends to fluctuate with the seasons. And because the bills are infrequent and cover many appliances, it is extremely hard to tell which specific behaviors could significantly lower the bill. It should follow that electricity price changes will have greater effect if they are supplemented with information about how the rates work and how to keep track of home energy use so as to keep costs down. This is exactly what was learned from Heberlein's experiments with time-of-use electricity pricing.

Among the least noticeable kinds of incentives are the loan subsidies and rebates that utility companies have offered for energy-efficient home improvements and appliance purchases. With these incentives, if people who go on behaving as usual, nothing changes at all. Someone must notice the incentive and actively connect it to behavior, for example, by requesting a home energy audit or filing a claim for a rebate, in

order to benefit. Because such incentives do not advertise their own existence, program managers use direct-mail advertising, telephone banks, community advisory groups, and many other methods of getting them noticed, just as they do with information programs. As we saw with the home energy conservation incentive programs, marketing can be increasingly important as incentives get larger.

In sum, the experience of incentive programs teaches that *incentives work better when combined with information* or when designed so as to have useful information built in, as with trash-bag fees. This is an instance of a broader point we make throughout the book: that any single solution approach is likely to work better in combination with other approaches.

Make the incentives credible. Sometimes credibility can be a problem for incentives. It has been a problem for utility companies that sponsor programs to get people to use less of their product and with private companies that offer incentives that may seem too good to be true. As the Minneapolis shared-savings program demonstrates, such programs may need to find a credible sponsor to overcome consumer doubts that the program is genuine and that they will actually receive the savings promised.

Find politically acceptable forms of incentive. It is tempting to conclude that incentives that are inherently noticeable are always preferable to those that must be advertised. This is not necessarily so. Some of the most noticeable incentives, especially those that impose new costs on identifiable political interests, are not feasible politically precisely because they are noticeable. Those who would pay the costs anticipate them and organize political opposition to prevent their ever being put into practice. For two decades, proposals for higher gasoline taxes in the United States have been blocked by opposition from the oil industry, advocates for low-income people, and other affected groups. Efforts to require automobile companies to produce a more fuel-efficient fleet of cars by strengthening the Corporate Average Fuel Economy regulations, which include stiff fines for noncompliance, have met strong opposition from the automobile industry.

Generally, positive incentives are more acceptable than regulations, price increases, or other mechanisms that impose new costs on individuals or organizations. Regulations, which generally limit behaviors that had previously been unlimited, draw opposition from those who would be regulated. For this reason, consumers oppose limits on driving to control air pollution and prefer regulations that would make car manufacturers adopt cleaner-exhaust technology; car manufacturers, however, tend to oppose regulations on their behavior. Despite the prevalence of opposition, regulatory solutions that apply across whole industries have been among the most effective of environmental policies. In the U.S. transportation industry, for example, these have included abolition of leaded gasoline, required installation of catalytic converters on automobile exhaust systems, and auto emissions inspection programs, as well as the Corporate Average Fuel Economy regulations. These and related regulations have drastically reduced emissions of nitrogen oxides and carbon monoxide from motor vehicles. Note that most of these regulations affect the behavior of corporations. Although they are mostly out of the awareness of motorists, they alter the set of choices available for individuals.

Regulations and other new costs are more likely to be accepted if they are perceived as fair, either because they are shared evenly by everyone or because greater costs tend to be borne by those who benefit most. Also, policies that are politically impractical in normal times because of the costs or restrictions they impose are sometimes enacted during a crisis situation that creates strong pressure to act quickly. For example, pay-per-can waste removal systems, which are often perceived as increasing consumers' costs or limiting their freedom, are more acceptable in cities facing a waste disposal crisis because they have run out of landfill space and have no easy choices.

Design the incentive system to discourage evasion. People can evade both positive incentives and penalties. For example, several early experiments used rewards to encourage the pickup of litter in public

places such as parks, stadiums, and the yards of public housing projects (Geller et al., 1982). When experimenters offered payment for bags of litter, the public spaces became significantly cleaner—but it also turned out that some people were bringing trash from home to get the rewards. By trial and error, the researchers discovered that offering rewards for clean yards was much more cost-effective than offering them for bags of trash. Drivers who evade carpool-lane restrictions by putting mannequins in their cars are another instructive example.

These few examples can serve as reminders of the ingenuity of people and organizations that are motivated to take advantage of incentives and avoid penalties and that can make aspiring social engineers look very foolish. Designing an evasion-proof incentive system can take tremendous ingenuity. There is no formula for success, but the best single principle is to look for ways to make the desired behavior coincide with narrow self-interest, so that people have an interest in using the incentive instead of evading it. Container deposit laws are a good example of this principle in action. A deposit gives people an incentive to return their own containers and, if they discard them anyway, gives other people who need the money an incentive to pick up after the litterers. It is possible to design such self-enforcing incentive systems to fit many environmental problems, but experience shows that systems that look good in theory are often outwitted in practice. The best rule is to try systems that look good and then closely watch what happens, being prepared to make adjustments.

The above principles are much more specific than the advice to "internalize the externalities" (see Box 5-1), yet they can still be very difficult to put into practice. Finding an incentive that is highly noticeable but not politically objectionable can be a hard task. So is finding an incentive that cannot be easily evaded. So, although the principles above provide useful guidance for creating effective incentive programs, they fall far short of a recipe for foolproof program design. We believe it is a mistake to look for such a recipe. Changing human behavior is not like baking a cake or fixing a piece of machinery, because the "materials" one works with—people and their interactions—are not interchangeable parts, and they are always in flux. As we have noted, different people respond to different incentives. Also, what people notice is always subject to change, as is the range of interventions that are politically acceptable. People can defeat an incentive program at any time, either by ignoring it or, in the case of government programs, by actively opposing it. Consequently, anyone who would design an incentive program should plan for individual variation and be prepared to modify the program to meet changing conditions. Program designers should follow two additional principles for the *process* of program design.

Interact with people to understand the barriers to environmentally desirable behavior. As we have noted, the barriers—and the most attractive incentives for overcoming them—vary with the behavior and the individual. Sometimes the best way to understand the barriers is to observe people's behavior, but it is usually far better to ask people—with questionnaires, or in conversation—why they do not behave differently and what might induce them to change. The most common form of structured interaction is a sample survey in which people from the group whose incentives are to be changed are asked questions about the incentive structure facing them. Another valuable method is the detailed interview, using ethnographic techniques from anthropology, to get a deeper understanding that questionnaires normally give or to reveal things that survey researchers may not even have thought to ask (see, e.g., Kempton et al., 1995). The goal of such interactions is to help program managers find effective incentive packages for changing a particular behavior in a particular place and time. Although they can get good ideas from experience in other places and times, they need to determine what will work in the current, local situation. This means that to some extent, incentives must be reinvented in each situation.

The most effective way to learn what incentives can work is often to *involve some of the people who are the targets of behavior change in actually designing the program.* After all, many people would like to

engage in proenvironmental behaviors but are prevented from doing so by the incentive structures they face. Who is in a better position to understand the barriers than the people most frustrated by them? And who can know better what incentives will work than the people they will be offered to? Often, a community has organized groups that would gladly send representatives to help design effective environmental programs. They may be general civic groups, like the school and church groups that sometimes mobilize to clean roadsides or riverbeds, or groups that represent a specific constituency. For example, advocacy groups for low-income housing have helped develop effective energy conservation programs, and groups that oppose waste incinerators can be encouraged to help design programs to make the incinerators unnecessary.

Involving the target population in program design has advantages that go far beyond research. Nothing is more politically acceptable than a system designed by the people who will be asked to follow it. In the case of regulations and other costly or restrictive external conditions, opposition is almost guaranteed unless the people who will pay the costs or face the restrictions come to a decision that the goal justifies them. Moreover, the process of public involvement can attract volunteer help in implementing a program and building a sense of community support for the program and its environmental goals. It can thus combine the incentive strategy with the community-based strategy for promoting proenvironmental action that we discuss in Chapter 6.

Continually reassess the program. Throughout this section, we have been offering advice like this: "Try systems that look good and then closely watch what happens, being prepared to make adjustments." More than advice, this is a general principle for designing effective programs, especially incentive programs. What fails may need only slight modification to succeed, and what succeeds at first may not continue working. Program design is unavoidably a process of trial and error, and proenvironmental programs are a kind of experiment that must be monitored.

Sometimes program managers resist evaluation out of fear that their programs may be evaluated negatively and be discontinued. But evaluation can be used to improve a program's design rather than to give a simple passing or failing grade, and systematic evaluation efforts used for this purpose can greatly benefit a program. Specialists in program evaluation are constantly improving quantitative techniques for monitoring how people respond to programs, how much their behavior changes in response, their attitudes toward the programs, and the reasons the programs have the effects they do. Even when the resources for a formal evaluation are lacking, managers can monitor programs informally by continued interaction with the target population or by seeing that it is well represented in a group created to advise on program reassessment. This procedure, like that of public involvement in program design, has the advantage of strengthening community support for programs.

CONCLUSION: WHAT CAN INCENTIVES ACCOMPLISH?

Incentives present a powerful strategy for promoting proenvironmental behavior, but as with information, there are limits. The chapter supports the following conclusions:

Incentives can overcome specific external barriers to action. They are especially effective at removing financial barriers such as cost and access to money, as well as a variety of barriers we have grouped under the general heading of inconvenience. In short, incentives can reduce the cost or the effort involved in following one's proenvironmental attitudes. They can also make it attractive for a person who lacks such attitudes to engage in proenvironmental behaviors. In addition, incentives can create barriers to actions that harm the environment. Sometimes, a single well-designed incentive can do both, as with the container deposit law. Since behavior is so dependent on the incentive structure facing individuals, changing the incentives is a powerful approach.

Incentives for individuals fail when significant barriers to action lie in the larger social system. Energy conservation in the U.S. automobile sector faces several of these structural barriers. Any car

owner could switch to a more fuel-efficient vehicle if there was the political will to offer incentives large enough to compensate for losses of comfort or performance that may be associated with the change and for the cost of switching cars before one is ready. But it is much more difficult to conceive of incentives that would get people out of cars entirely. As we noted at the start of the chapter, the geography of American homes, workplaces, and shopping would make the shift tremendously inconvenient and time-consuming for millions. Incentives to individuals can have little effect on where corporations build their offices or developers build housing or shopping developments. Similarly, incentives will not get people to buy 70-mile-per-gallon cars or superinsulated homes, because they are not yet on the market. And incentives to individuals cannot stop manufacturers or retailers from using nondegradable packaging for their products.

Incentives can sometimes be most effective when aimed at organizations. When the key decisions are made by corporations, government agencies, or other large institutions, incentives aimed at individuals do not work, but incentives that affect the actual decision makers can be very effective. We saw this in the example of municipal solid waste, where the increasing financial and political costs of waste disposal in landfills changed the incentives for the managers of municipal waste disposal programs and led many cities and towns to sponsor recycling programs and other initiatives that made it possible for individuals to recycle, where it would have been virtually impossible without action by local government.

In fact, the great majority of government environmental programs are aimed at changing the incentives for organizations rather than individuals. These include regulations on average automobile fuel economy; emissions from automobiles, power plants, and factories; toxic waste disposal; sewage disposal; and so on. In the future, government programs may increasingly replace regulations with financial incentives. An example is the idea of issuing tradable permits to release air pollutants up to a limit set by government (see Box 5-1). The design of regulations and incentives for corporate polluters is beyond the scope of this book because our focus is on what individuals can do and how to change individual behavior. Many of the same principles that apply to individuals also apply to corporations, but the incentives are sometimes different, and it is probably necessary to find different ways to apply them. We offer an intriguing example at the end of the chapter.

Under some conditions, incentives can be counterproductive. When a new incentive effectively limits people's freedom to act, it tends to be experienced as punishment. An example is price increases for energy that force low-income people to make hard choices, such as between heating their homes in winter and buying food or clothing. Regulatory restrictions are often experienced as punishing. People might react in this way to restrictions on driving automobiles because of air pollution or rules against disposal of toxic household wastes in ordinary trash. Sometimes, incentives that are seen as punishments generate enough political opposition to prevent their being put into practice; and even if they are put into practice, the result may be that their proenvironmental goals become distasteful to people who suffer under the incentive system. It is very difficult to tell in advance, however, whether a particular new regulation will be seen as a punishment, or as something that must be done for the common good. Changing ethical and value systems are one factor that can alter a population's willingness to support changes in incentives.

Incentives work best in combination with other influence techniques. We have said throughout the book that no single influence strategy is optimal by itself for promoting proenvironmental behavior, and this general point is true of the incentive strategy. This chapter identifies many situations in which incentives are much more effective when accompanied by well-designed information: in promoting energy efficiency rebates, shifting electricity use to off-peak periods, and increasing the use of curbside recycling programs, for example. We have also seen that moral and ethical concerns about the environment can help provide the public support needed for incentives to be acceptable. And the chapter also shows that incentive

programs sometimes need to draw on resources in the communities where they operate—credible local institutions to respond to consumer skepticism, and representatives of the target population to help in program design, evaluation, and redesign. These features take advantage of social support systems—either preexisting ones in the local community or new ones created to improve the incentive program. They are examples of the community-based strategy of changing behavior. We devote Chapter 6 to a discussion of this strategy.

EPILOGUE: HOW PEOPLE CHANGED THE INCENTIVES FACING A CORPORATION

Most of our discussion of incentives has been from the top down—we have presumed that some high-level entity, such as a government agency or a utility company, creates programs to change the incentives facing individuals or businesses under its jurisdiction. But governments and utilities also face incentives, and these can be affected by the organized actions of individuals. So, incentives can flow from the bottom up. A well-known example is public opposition to nuclear power in the United States, which has made it increasingly difficult and expensive for utility companies to get all the necessary regulatory approvals to operate a power plant and has for over fifteen years discouraged the American electric utility industry from ordering any new nuclear plants.

Another example, less well known but also very instructive, concerns the decision by the McDonald's Corporation in 1990 to stop using plastic packaging for its hamburgers and other products. The story of this victory for environmental activism holds important lessons about how individuals can help the environment by changing the incentives that affect corporate behavior.

Before November 1990, anyone who ate McDonald's Big Mac hamburgers got them in "clamshell" packages made of polystyrene (better known by the brand name Styrofoam). Polystyrene is environmentally damaging in at least two ways. Its manufacture (about 5 billion pounds per year in the United States) left millions of pounds of toxic waste products, chiefly benzene and toluene, in the environment, and the process of blowing polystyrene into foam used chlorofluorocarbon (CFC) gases that deplete the earth's ozone layer and contribute to the greenhouse effect. Many environmentally concerned individuals were offended by the clamshells, which also took up large amounts of landfill space and were vivid symbols of a wasteful, environmentally destructive, throwaway society. Although concerned individuals could stop buying Big Macs, there was nothing an individual could do to make a larger difference.

During the late 1980s, a small, focused social movement changed all that. A key event occurred in the summer of 1987 when a statewide protest was held by the grassroots group, Vermonters Organized for Cleanup, in which parents and children organized boycotts and picketed McDonald's restaurants around the state of Vermont. This was the opening event in the national McToxics campaign, organized by the Citizens' Clearinghouse on Hazardous Waste (CCHW), a national organization that provides technical assistance to local groups organizing to reduce hazardous wastes. CCHW's network spread the word around the country, and local groups organized to ban polystyrene from local landfills and to conduct boycotts and demonstrations at McDonald's restaurants. The sight of children on picket lines generated lots of news coverage, and McDonald's—and the plastic packaging industry—took note. They announced a goal of phasing out CFCs in packaging by the end of 1988.

The story does not end here, though. The movement's goal was to eliminate polystyrene packaging entirely (not only the CFCs), but McDonald's and the packaging industry resisted a change to paper and cardboard. They engaged in several countering actions. One involved switching the material used to blow the foam. Instead of CFC-11 and CFC-12, the compounds that had been used, McDonald's switched to CFC-22, a compound estimated to be about 95 percent safer to the earth's ozone layer (although no different in the amount of benzene and styrene waste is produced). Because CFC-22 contains a hydrogen (H) atom in addition to the chlorine (Cl), fluorine (F), and carbon (C) atoms that give the name CFC to CFC-

11 and CFC-12, the leading manufacturer, the DuPont Corporation, began calling it HCFC-22, and the U.S. Environmental Protection Agency soon accepted the name change. By early 1989, the packaging trade industry was able to make the misleading announcement that it had totally eliminated CFCs in food service products, and McDonald's was making the same claim on its place mats.

Three national environmental organizations other than CCHW had a role in this change in company policy—the Natural Resources Defense Council (NRDC), the Environmental Defense Fund (EDF), and the Friends of the Earth. They had advised McDonald's to switch to CFC-22, and then defended the partial measure as a great step forward and the most they could reasonably accomplish. David Doniger of NRDC said, "I didn't see that we had any leverage on them to say, 'You all ought to go to cardboard.'" CCHW, other activist groups, and a *Washington Post* article criticized McDonalds—and the three environmental groups—for trying to deceive the public.

The industry also responded with a major campaign for plastics recycling as an alternative to eliminating production of the clamshells. Recycling could improve the industry's environmental image and at the same time circumvent a growing number of local ordinances that banned polystyrene from the solid waste disposal system unless it was recyclable. Starting in late 1988, with contributions of $16 million from the major manufacturers and a supply of Styrofoam trash from McDonald's, polystyrene recycling plants began opening, with a goal of recycling 250 million pounds per year (5 percent of the national output) by 1995. But the program had problems. Though McDonald's set up recycling bins at its restaurants and publicized them, half the clamshells continued to be sold to take-out customers, and the remainder had enough food waste mixed in to make the recycled product unacceptable to potential buyers. Moreover, the recycling program did not stop the consumer pressure. As one protestor shouted when the program was unveiled at Boston Children's Hospital, "Why do you produce so much trash in the first place?" CCHW encouraged people to "help" McDonald's recycle by sending loads of Styrofoam trash to corporate headquarters.

Third, the industry engaged in public relations campaigns. In addition to making the misleading claim about phasing out CFCs and advertising its commitment to recycling, McDonald's sought partners within the environmental movement. It offered the Sierra Club a $700,000 grant for its youth activities at Earth Day 1990 (which was refused), and it got EDF to join it in a task force on solid waste management. And in late 1989, in a confidential memorandum obtained by CCHW, the president of the Society of the Plastics Industry put out a call for a $150 million campaign to counter "the image of plastics among consumers," warning the manufacturers that "Business is being lost. Product growth rates are being dampened. And stock analysts are beginning to take notice." Clearly, the stakes had grown beyond hamburger packages—public pressure had significantly changed the incentive structure for the entire plastics industry.

Through all this, consumer pressure continued. Church groups organized to stop using Styrofoam and initiated a resolution at McDonald's annual stockholders' meeting. School children organized boycotts of school cafeterias that used Styrofoam, and received prominent news coverage. More communities banned Styrofoam from dumps. Finally, in November of 1990, McDonald's announced that it would end nearly all Styrofoam packaging at U.S. restaurants within 60 days. Other fast-food chains quickly followed suit, and Burger King, which had been using paper and plastic all along, claimed credit for its environmental foresight. The decision by McDonald's sharply affected the nascent polystyrene recycling industry.

McDonald's at first denied any environmental reason for its actions. Its president, Ed Rensi, said, "Our customers just don't feel good about" Styrofoam. Both EDF and CCHW claimed victories, with EDF getting most of the media attention. And the EDF-McDonald's partnership continued. With advice from EDF, McDonald's set a goal of an 80 percent reduction of solid waste, and by 1991, the corporation was being hailed in *Advertising Age* as "a leader in environmentally sensitive marketing."

What are the lessons in this story? First, small-scale, grass-roots action can make a difference by changing corporate incentives. Second, the target must be carefully chosen. The activists chose to focus on a product that was ubiquitous, that had symbolic value as an icon of waste and environmental degradation, and that was also nontrivial in its local and national impact. Polystyrene food packaging produced huge amounts of solid waste a year and large quantities of toxic benzene and styrene. Third, the corporate target was easy to organize against because nearly any community that wanted to could find a nearby McDonald's restaurant—and involving children assured media interest. Fourth, the incentives that the movement used were meaningful to the corporation. Not only are children an environmentally concerned group, but they are major customers of McDonald's, so the corporation was especially sensitive to the kind of publicity the movement generated. McDonald's was a large enough and prominent enough customer that even the polystyrene industry became concerned.

Another lesson is that changing corporate behavior is different from changing individual behavior. Not only do corporations respond to different kinds of incentives (boycotts, bad publicity concerns about attracting and keeping investors), but they can also organize very strong resistance, including working to divide the environmental movement and influence public opinion. But the McDonald's story shows that activity by collections of citizens can be effective nevertheless.

The McDonald's story is also, in part, a victory for environmental education. It shows that people who understand the negative environmental consequences of using a product can produce change, if they organize effectively, of a much larger order than they could ever hope to achieve by altering their behavior as individual consumers. Education was an important element in a strategy that also involved political organizing to change the incentives facing the producers of the target product.

Of course, the story is full of ironies. McDonald's had dragged its feet and wound up with kudos for environmentalism. EDF, after settling for a half-measure, took credit for the full success and gained the opportunity to work with a newly greened McDonald's to make even further environmental improvements. Burger King got little or no credit for its decades of paper packaging, and CCHW was barely mentioned in mass media accounts despite its strong efforts, so that many citizens may have come to believe that McDonald's changed its long-standing practices simply because of its foresight and its cooperative discussions with EDF and NRDC. Nevertheless, the victory proved that individuals can, through political action to change the incentives for larger social organizations, make changes they could never make on their own. They can create a sort of structural change, in the sense of changing the possibilities for future individual action. Now, nobody who buys a Big Mac gets foam packaging, and the success has had ripple effects across the fast-food industry.[1]

NOTE

1. This account was pieced together from the following sources: *Everyone's Backyard,* Dec. 1990; Lipsett (1990); Moore (1989); Holusha (1990); Hume (1991); Hamilton (1991), James (1989); Citizens' Clearinghouse for Hazardous Wastes.