

ENERGY AND THE ENVIRONMENT



DEFINING *POLLUTION*

Every action of every living thing uses resources and produces pollution. Even while you are just sitting and reading this book, you are consuming oxygen (a resource) and producing carbon dioxide (a pollutant). Similarly, trees consume carbon dioxide (a resource) and produce oxygen (a pollutant).

Wait! First we called oxygen a resource and carbon dioxide a pollutant, and then we turned around and called carbon dioxide a resource and oxygen a pollutant! That doesn't make sense, does it? Well, it all depends on which side of the fence you are sitting. If you happen to be a tree, oxygen is something you are trying to get rid of (remember, trees give off oxygen), and carbon dioxide is something that you need to survive. If you are a human, on the other hand, you need oxygen to breathe, and you have to get rid of carbon dioxide. Nature has a way of balancing things out. We need trees, and trees need us.

So when is a substance a resource, and when is it a pollutant?¹⁶⁵ The question is best answered by example. There are a number of natural *oil seeps* in the floor of the Pacific Ocean off the coast of California. The amount of oil flowing into the water is small and poses no danger to sea life in the area. In fact, given that petroleum is an organic substance (that is, it is carbon-based), it is biodegradable and serves as food for microbes, which are, in turn, eaten by larger organisms, and so on up the food chain. In small amounts, then, crude oil actually acts as a fertilizer.

¹⁶⁵Currently, carbon dioxide generated by human activity is called an "emission," while carbon monoxide is designated as a "pollutant." The distinction is important for legal reasons because the U.S. Environmental Protection Agency has the authority to regulate substances designated as pollutants. There is ongoing debate about how to determine the point at which an "emission" becomes a "pollutant."

However, suppose that an oil tanker were to run aground and spill millions of gallons of crude into the water. That amount of oil would be so overwhelming that it might take years for microbes to break it all down. In the meantime, it would almost certainly kill thousands of fish, birds, sea mammals, and other creatures. In this case, the oil is clearly a pollutant.

Similarly, while we think of sewage as pollution, a small amount of it in a river does no harm and maybe even a little good for some passing bacteria. But dump an entire city's waste into a river day after day, and the river will quickly become a stinking cesspool devoid of any life larger than a germ.

Finally, consider a piece of radioactive material. Though small, the material may emit radiation that can harm living things many feet away. Worse, the material may remain dangerous for tens of thousands of years. Even a small amount of such material could be considered a pollutant. As with other types of pollution, however, the danger is in the dose. A little radiation exposure is safe; a lot can be harmful or even fatal.

In sum, if the substance in question decays fairly rapidly and provides benefit to some living creature, it's probably a "resource." If it lingers on and especially if it harms or destroys life, it is a "pollutant."

Even when toxic substances are involved, the most important factor in determining whether something is a serious pollutant is quantity and nature's ability to deal with that quantity. Smoke from a few campfires is of little concern. Wind will disperse the smoke, and the next rain will clean any remaining particulates from the air. However, concentrate thousands of people in a city—all burning wood, peat, or coal to cook their meals and keep warm—and the sky turns black. Fill the local river with the city's sewage and refuse, and you have Shakespeare's London of sixteenth century England. Pollution is not a new problem.

So what is the answer? Should we turn back the clock and live as Stone Age peoples did? Anthropologists are beginning to suspect that that way of life was not as environmentally friendly as previously believed. The extinction of a number of species around the world including "the moas of New Zealand, the giant lemurs of Madagascar, and the big flightless geese of Hawaii" coincided with the appearance of humans.¹⁶⁶

In the Americas, early hunters are probably responsible for the demise of mammoths, the Shasta ground sloth, and Harrington's mountain goat.¹⁶⁷ American Indians often hunted in wasteful and destructive ways. One of their techniques was to lead whole herds of buffalo over a cliff.¹⁶⁸ Another common tactic, known as "box burning," was to set fires all around a herd.

¹⁶⁶Jared Diamond, *Guns, Germs, and Steel*, p. 43.

¹⁶⁷*Ibid.*, p. 47.

¹⁶⁸Head-Smashed-In Buffalo Jump, near Calgary in Alberta, Canada, is one of the best-known and well-preserved buffalo jumps. Aboriginal peoples used the site continuously for more than 5,500 years.

Such a way of life is so unproductive and wasteful that it could only support a fraction of the people now living in the world today. That might not be so bad if you are one of the few chosen to live, but even then it would be no picnic. Typically, Indians led relatively short, disease-ridden lives. Tribal members too old or sick to pull their own weight were often, quite literally, left for the wolves. All in all, there is a lot to be said for indoor plumbing, painless dentistry, and retirement plans.

If the answer is not for us all to go back to living in buffalo skin tepees or mud huts, what *do* we do? A growing number of economists believe that the answer lies in the efficiency and inventiveness unique to people living in free societies.

INEFFICIENCY, WASTE, AND POLLUTION

Inefficiency is waste, and waste is pollution. For example, there is waste when fuel does not burn completely (i.e., when it burns inefficiently). The unburned portion of the fuel either goes up the chimney or must be hauled away to a dumpsite—pollution.

Before wood can be used as a fuel, it must first be hauled to the site where it will be used (this includes hauling the part of the wood that will not be burned as well as the part that will). Transportation costs resources (fuel) and produces pollution (engine or animal emissions). When the wood is burned, soot, smoke, and ashes (unburned materials) either go up the chimney (pollution) or must be carted away (more transportation costs and more pollution).

Natural gas, on the other hand, is a very efficient fuel. It burns almost completely so that little energy is expended or pollution created in either transporting useless material to the power plant or in hauling unburned ashes away. In addition, far fewer emissions go up the chimney.

So should people be forced to act more efficiently? Fortunately, free markets automatically provide incentives. In a free market, people are encouraged to act efficiently in order to save money. In doing so, they usually end up saving resources thereby reducing waste and pollution.

In the book, *On the Economy of Machinery and Manufactures*, written more than 170 years ago, Charles Babbage, inventor of the first mechanical computer, observed, “amongst the causes which tend to the cheap production of any article, and which are connected with the employment of additional capital, may be mentioned, the care which is taken to prevent the absolute waste of any part of the raw material.”¹⁶⁹

In 1862, journalist Peter Simmonds explained how the waste from woolen mills became a source of profit. “By means of mechanical appliances and chemical action, the refuse formerly turned into the river Nith to the injury of

¹⁶⁹Charles Babbage, *On the Economy of Machinery and Manufactures* (London: Charles Knight, 1832).

the salmon, is made to produce stearine, which forms the basis of composite candles, as well as a cake manure that sells at 40s [shillings] per ton."¹⁷⁰

In the early nineteenth century, coal gas (methane plus some amount of impurities) was used as an illuminant (i.e., a fuel burned to provide light) in parts of England, but it was not popular because of the unpleasant smells that were produced when it was burned. Chemists learned to purify coal gas and remove the noxious substances, however. These substances became profitable by-products of the coal gasification process. As an observer of the time put it, "the waste and badly-smelling products of gas-making appeared almost too bad and foetid for utilization, and yet every one of them, Chemistry, in its thriftiness, has made almost indispensable to human progress."¹⁷¹

Or consider the early days of the petroleum refining industry. Petroleum was originally valued chiefly because it could be refined to produce kerosene, which was used as an illuminant. Naphtha was an unwanted by-product of the refining process. Most refiners either burned it or simply let it evaporate. Naphtha, a low-grade illuminant, could occasionally be sold at a profit, however. William Rockefeller, a partner with his brother, John D. Rockefeller, found that he could increase his company's profits by storing naphtha in tanks when prices were low for later sale when prices recovered.¹⁷²

These early businessmen probably had no intention of protecting the environment. Yet their desire to reduce costs and increase their profits led them to take actions that did exactly that.

This market-driven search for profits has, over time, moved people in western nations to reduce waste and use resources ever more efficiently. As a result, the air and water in these countries have been getting progressively cleaner even as population, production, and fuel combustion have increased.

OUR IMPROVING ENVIRONMENT

Within just a few decades, market incentives and improving technology combined with laws and regulations have had a dramatic effect on our country's environment. Between 1970 and 2002, emissions of the six so-called "criteria air pollutants" in the United States dropped anywhere between 17 percent (nitrogen oxides) and 98 percent (lead).¹⁷³

¹⁷⁰Quoted by Pierre Desrochers, "Saving the Environment for a Profit, Victorian-Style," *Ideas on Liberty*, May 2003, p. 32.

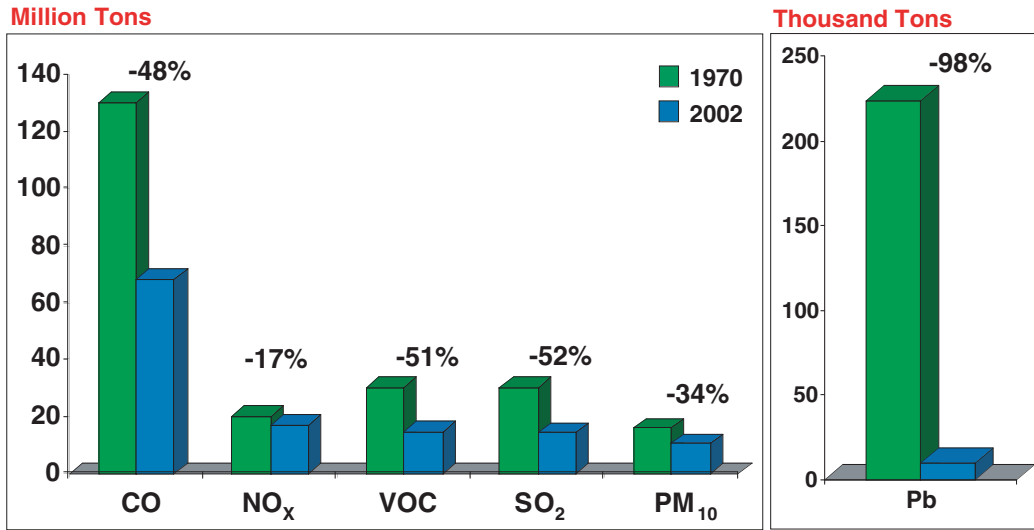
¹⁷¹*Ibid.*, 34.

¹⁷²David Hawke, *John D.: The Founding Father of the Rockefellers* (New York: Harper & Row, 1980), p. 55.

¹⁷³U.S. Environmental Protection Agency, *Latest Findings on National Air Quality: 2002 Status and Trends* (Washington: EPA, 2003), p. 2.

U.S. AIR EMISSIONS: 1970 vs 2002

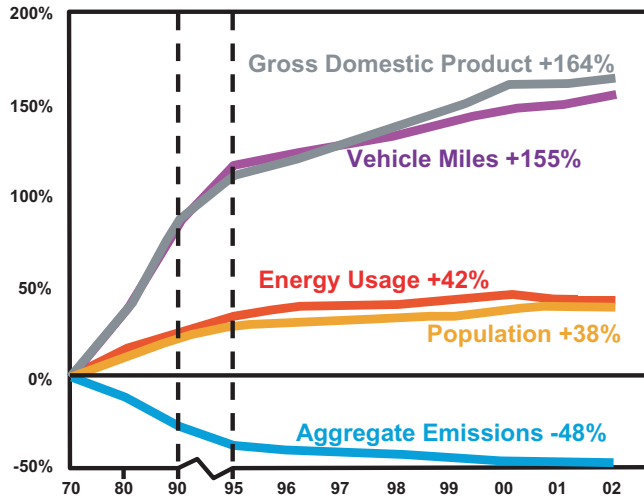
Data compiled by U.S. Environmental Protection Agency indicate a significant decline in all six of the criteria air pollutants in the past three decades. *Source:* U.S. Environmental Protection Agency, *National Air Quality: 2002 Status and Trends*, p. 2.



In aggregate, air pollution fell by nearly half despite significant increases in population, gross domestic product (GDP), vehicle-miles driven, and energy usage.¹⁷⁴

U.S. GROWTH VS. AIR POLLUTANT EMISSIONS

Air pollution in the United States dropped significantly while, at the same time, the country was growing in both population and wealth. *Source:* U.S. Environmental Protection Agency, *National Air Quality: 2002 Status and Trends*, p. 4.



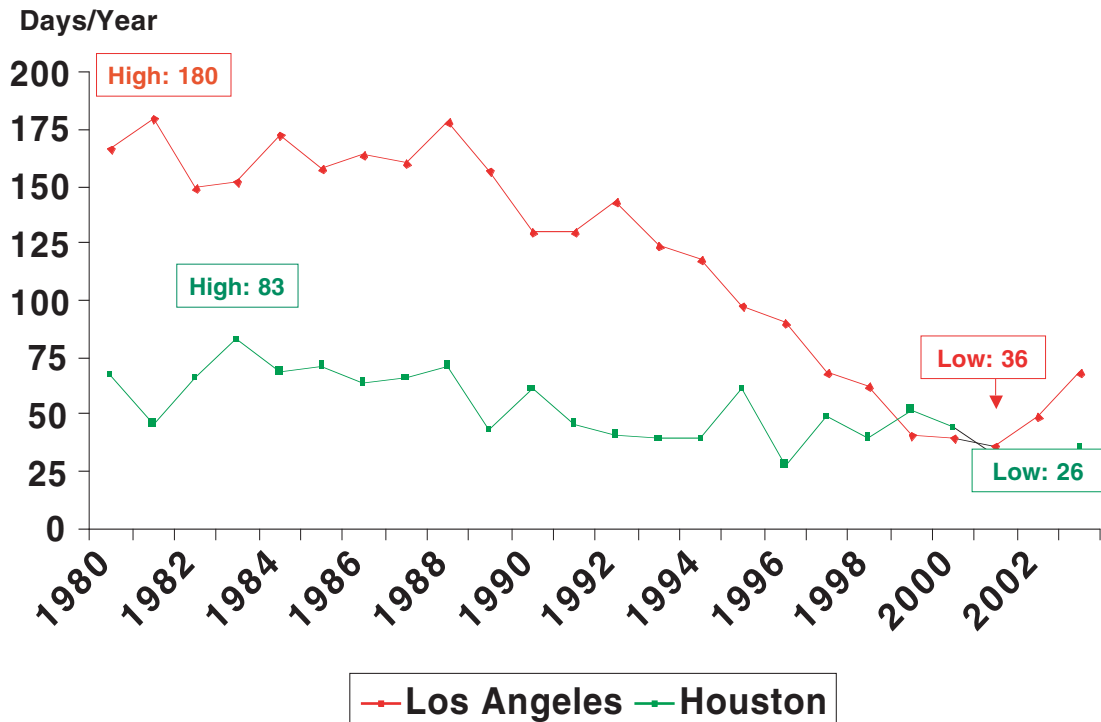
¹⁷⁴Ibid., 2.

For decades, Pittsburgh was one of the most polluted cities in America. Between 1930 and 1950 the city experienced about 350 smoky days each year! However, by 1970 (the year the Clean Air Act was passed), that number had dropped to 200 days out of the year, and by 1990 to fewer than 20.¹⁷⁵

Smog in Los Angeles and Houston is currently considered to be the worst among cities in the United States, yet the air quality in both cities has rapidly improved. Over the last two decades, the number of days in which the ozone levels exceed limits set by the U.S. Environmental Protection Agency (EPA) has been steadily dropping.

LOS ANGELES VS. HOUSTON OZONE VIOLATION DAYS

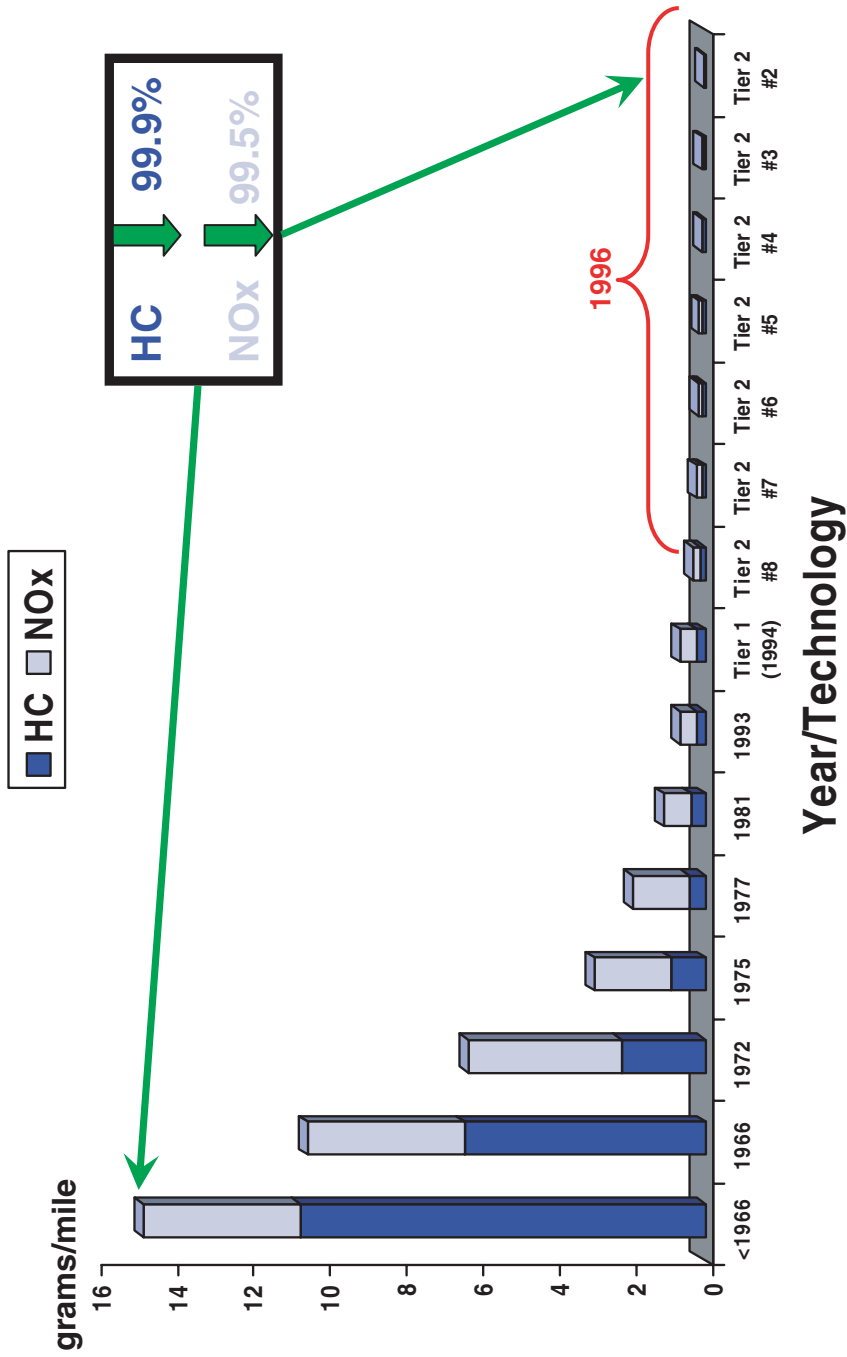
Ozone (smog) violation days have decreased by almost three-fourths in Los Angeles and one-fourth in Houston since the early 1980s. Houston recorded more “episode days” than Los Angeles for the first time in 1999–2000. *Source:* See Appendix F.



¹⁷⁵Cliff Davidson, “Air Pollution in Pittsburgh: A Historical Perspective,” *Journal of Air Pollution Control Association* 29 (1979), pp. 1035–41 and various issues of *Council on Environmental Quality Annual Report*.

U.S. MOTOR VEHICLE EMISSION REDUCTIONS

EPA emission standards for volatile organic compounds (VOC) and nitrogen oxides (NO_x)—the precursors to smog—are expected to reduce concentrations of these gases by 99 percent as compared to levels in the mid-1960s. Source: U.S. Environmental Protection Agency; Alliance of Automobile Manufacturers.





Corbis

The Clean Water Act of 1972 gave the federal government the power to set and enforce national water quality standards and to regulate the dumping of industrial and municipal wastes. Within 25 years most easily identifiable sources of water pollution were brought under control.¹⁷⁶ According to Stephen Moore and Julian Simon, “by 1994, 86 percent of U.S. rivers and streams were usable for fishing and swimming—up from 36 percent in 1972.”¹⁷⁷

The number and size of oil spills in the United States have decreased significantly since 1990, in part because major oil companies have replaced single-hull oil tankers with double-hull ships since the Valdez oil spill.

Over the same period, farms have become far more productive so less land is needed for agriculture. Because of this, and because less wood is being burned for fuel, our nation’s forests are expanding.

In other parts of the developed world, the environment has been getting better as well. London’s air pollution peaked around 1890 and has been dropping ever since. In fact, the city’s air is cleaner than it has been since the late 1500s, and the famous London fogs are becoming things of the past.¹⁷⁸ The Thames River, which had been without fish for a century, by 1968 boasted some 40 varieties.

Some former Eastern-bloc countries such as Poland and the Czech Republic have also seen improvements. As Andrew Steer with the World Bank noted, eastern European lead smelters have cut emissions to about one-sixtieth of their previous levels “as a result of improved housekeeping and modest investments.”¹⁷⁹

¹⁷⁶Paul Ehrlich and Anne Ehrlich, *Betrayal of Science and Reason*, p. 52.

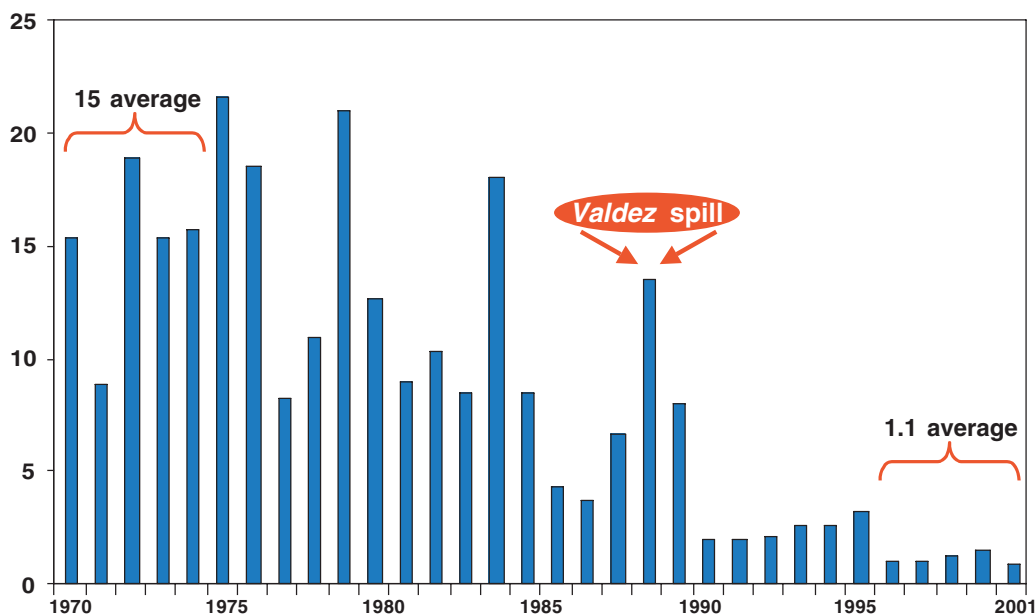
¹⁷⁷Stephen Moore and Julian Simon, *It’s Getting Better All the Time* (Washington: Cato Institute, 2000), p. 188.

¹⁷⁸Bjørn Lomborg, “The Truth About the Environment,” *The Economist*, August 4, 2001, p. 64.

¹⁷⁹Andrew Steer, *Ten Principles of the New Environmentalism* (Washington: The World Bank, 1996), p. 6, available at <http://www.worldbank.org/fandd/english/1296/articles/0111296.htm>

OIL SPILLS IN U.S. WATERS (MILLIONS OF GALLONS PER YEAR)

Oil-spill volumes have significantly decreased, especially after industry and regulatory reforms were made in response to the 1989 Valdez spill. *Source: U.S. Coast Guard, Annual Data and Graphics.*

**SOME COMPARISONS**

The environmental picture is not nearly as bright in other parts of the world. In 1996, Paul and Anne Ehrlich observed, "Huge cities such as Mexico City, Sao Paulo, Jakarta, Bangkok, Beijing, Delhi, and Nairobi have horrific smog despite being located in countries with far less industry than the United States. Tens of thousands to millions of cars, trucks, and buses with no smog controls cram the streets; hundreds of uncontrolled factories, smelters, and power stations belch smoke and pollutants; and in some cities millions of open cooking fires foul the air. Third-world rivers are often essentially open sewers spiked with pesticide cocktails."¹⁸⁰

In some of the countries that made up the former Soviet Union, pollution-control laws are ignored and little attention is paid to energy efficiency. As a result, the environment in these countries is in such terrible shape that it has significantly damaged the health of the people who live there. The Ehrlichs pointed out that, "During the 1970s, mortality rates in the Soviet Union stopped

¹⁸⁰Paul Ehrlich and Anne Ehrlich, *Betrayal of Science and Reason*, p. 59.

falling and began rising, and the government, presumably embarrassed, stopped publishing mortality statistics. The trend worsened after the Soviet Union's breakup."¹⁸¹

Other than global warming (discussed in the next chapter), the main environmental issues that the world faces center on the Third World. Air and water pollution do not respect international borders—dirty air created in one country can quickly become another's problem. How can these nations move toward cleaner, more efficient fuel sources? Can they make this switch and achieve their own Industrial Revolution without reproducing the same environmental problems created during the West's revolution?

Before these questions can be addressed, another more basic question must be answered. *Why is there such a difference between the environments in these countries and those of the countries in the industrialized West?*

Some believe that the problem is a lack of proper environmental laws in the Third World. Yet the Soviet Union had strong laws on the books—they were simply ignored.

The difference is poverty. Third World countries are much poorer than western nations. When people are worried about where their next meal is coming from, they are much less concerned with such things as clean air and water.

Clean and efficient technology is generally more expensive than dirty, inefficient technology. No high-tech equipment is needed to burn wood for heat. But it takes a lot of costly machinery and know-how to locate, produce, transport, and use natural gas as a fuel.

“[The] dirtiest water and air are not found in the rich countries, rather they are found in the developing nations. As pollution is rapidly becoming a global issue, worldwide prosperity should be viewed as the solution to, not the cause of the problem.”¹⁸²

- Ziock, Lackner, and Harrison

The next question, then, is why are these countries poor? Some suggest that it has to do with natural resources. America has plentiful resources; therefore, America is rich. But Russia also has huge resources, as do Africa, Mexico, and South America, and yet these areas are poor. At the same time, wealthy nations such as Japan, Taiwan, and Switzerland have almost no natural resources.

¹⁸¹Ibid., p. 60.

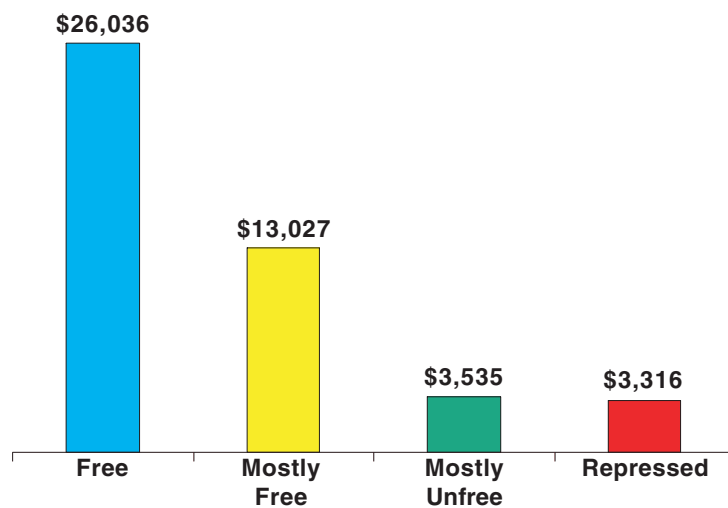
¹⁸²Han-Joachim Ziock, Klaus Lackner, and Douglas Harrison, “Zero Emission Coal,” *Energy 2000: The Beginning of a New Millennium* (Lancaster, PA: Technomic Publishing, 2000), p. 1274.

Others point to overpopulation as the problem; India and China have high population densities, so they are poor. Yet the Netherlands, Japan, Hong Kong, Belgium, South Korea, Taiwan, and Great Britain all have much higher population densities than either of these countries, and they are wealthy. At the same time, extremely impoverished nations like Ethiopia have very low population densities.

Then there are those who claim that some are poor precisely because others are rich. They believe that the world is a zero-sum game in which a few can win only if others lose. But this view can be proven wrong simply by looking around. Wealth surrounds us. Not dollar bills, but real wealth: books, computers, buildings, cars, supermarkets, houses, and factories. These are evidence that wealth can be created, and created without limit, not just redistributed. When people first appeared on Earth they had nothing. If it were true that one can gain only what another loses, we would still have nothing.¹⁸³

While it is true that Americans consume more resources per capita than do people in other countries, we also produce more than anyone else, and there are many around the world who live off of our surplus. Moore and Simon point out that “American workers are the most productive in the world. Most industrialized nations of Europe, for example, still only have productivity rates of about 80 percent of levels in the United States. The workers in Asian nations

ECONOMIC FREEDOM & PER CAPITA ANNUAL INCOME: 2001
 Grouping the countries by levels of freedom reveals stark differences in levels of per capita income. *Source:* Marc Miles et al., *2004 Index of Economic Freedom* (New York: The Heritage Foundation, 2004), p. 18.



¹⁸³It is easy for individuals in government to fall into zero-sum thinking because that's how their world operates—every dollar that government spends must first be taken or borrowed from a private citizen or company. Politics is concerned with dividing the pie (that is, distributing tax dollars), while industry is concerned with making the pie bigger.

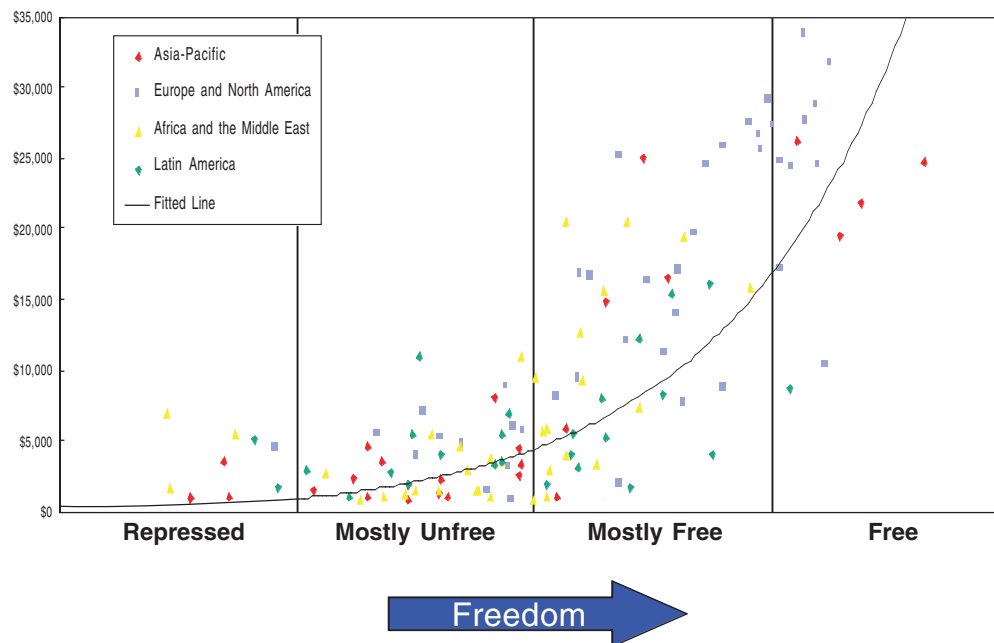
have less than 60 percent the productivity rate of American workers,"¹⁸⁴ while in 1999 Russian labor productivity averaged only 18 percent of U.S. levels.¹⁸⁵

What wealthy nations have in common is *liberty*—the right of individuals to act as they choose without interference, so long as they don't interfere with the rights of others to do the same. Each year, the Heritage Foundation publishes its Index of Economic Freedom (*Appendix B*). The Foundation ranks the world's nations by a number of economic variables to determine which are the freest. The average person living in a repressed economy lives in poverty on an income equivalent to about \$3,300 a year. People living in the world's free economies enjoy an average per-capita income of \$26,000. This should not be surprising. In free societies, where life, liberty and property are protected, people have much greater incentive to create wealth, because such protections ensure that people control and benefit from the fruits of their own labors.

The problems in the Third World come not from a lack of governmental regulations, but from a lack of freedom to create, own, trade, and sell property.

FREEDOM, INCOME, & LOCATION

This scatter diagram shows that annual income rises with increasing freedom regardless of location. Freedom works in Asia and Africa as well as it does in Europe and North America. *Source: Marc Miles et al., 2004 Index of Economic Freedom* (New York: The Heritage Foundation, 2004), p. 18.



¹⁸⁴Stephen Moore and Julian Simon, *It's Getting Better All the Time*, p. 96.

¹⁸⁵Brink Lindsey, *Against the Dead Hand*, p. 123.

“[Keys to sustainable development] “laid out in the Brundtland Commission Report in 1987 and in the Rio de Janeiro Earth Summit’s Agenda 21 in 1992 [include]:

- . . . a crucial and potentially positive link between economic development and the environment. . .
- Addressing environmental problems requires that poverty be reduced.”¹⁸⁶

Andrew Steer

RETHINKING THE ROLE OF GOVERNMENT

Laws and regulations, however well meant, often make things worse. In the early nineteenth century, our government and courts decided that damage to an individual’s property caused by a factory’s air or water pollution was outweighed by the factory’s benefit to the general public.¹⁸⁷ Therefore, individuals were denied the right to sue for damages caused by such pollution. However, if private property rights had been enforced, factory owners would have been required to reimburse property owners, and would have had a strong incentive to clean up their plants’ waste. In the long run, this would have benefited everyone.¹⁸⁸

A more recent example is the mandated use of oxygenates in gasoline to promote more complete combustion and reduce emissions. There are two oxygenates available: a chemical called MTBE (methyl tertiary-butyl ether), and ethanol. Unfortunately, both of these chemicals have serious side effects. MTBE is a suspected carcinogen, and it has been seeping into the groundwater. Traces of MTBE have been found in the groundwater of 49 of the 50 states, and a number of water wells in California have had to be shut in because of contamination.

Ethanol, on the other hand, costs more resources (and energy) to produce than MTBE and, as a consequence, is much more expensive. It also makes gasoline more volatile, causing more of it to evaporate, which adds to air pollution.

Moreover, any moisture in pipelines and storage tanks will cause ethanol to separate from gasoline.¹⁸⁹ As a consequence, gasoline and ethanol are shipped separately and are mixed at distribution terminals before being

¹⁸⁶Steer, Andrew, *Ten Principles of the New Environmentalism*, p. 1.

¹⁸⁷Morton Horwitz, *The Transformation of American Law, 1790–1860* (Cambridge, MA: Harvard University Press, 1977), pp. 74–101.

¹⁸⁸Robert Bradley, Jr., *Oil, Gas and Government: The U.S. Experience*, pp. 1268–69.

¹⁸⁹U.S. Energy Information Administration, *Annual Energy Outlook 2001* (Washington: Department of Energy, 2001), p. 36.

loaded onto trucks for delivery to gas stations. This additional handling increases the relative cost of using ethanol even more.

Finally, the use of either ethanol or MTBE increases NO_x emissions and thus helps to produce smog.

These types of unfortunate and unforeseen effects of well-intentioned regulations are all too common.

ARE REGULATIONS NECESSARY?

Some free marketers advocate doing away with regulations altogether. They argue that market incentives and property rights enforcement are sufficient to protect the environment. Certainly people who own a piece of land have more interest in maintaining its value than anyone else. They do not want their property to lose its value by being stripped of trees, fouled by factory effluent, or clouded with smog.¹⁹⁰ If, it is argued, the government would simply allow people to protect their property through the courts, our environment would be much cleaner.

Strengthening and expanding property laws is an important step in the right direction. Under such a system, if a company's factory polluted the air above someone's land, thereby reducing its value or harming its residents, the landowner could sue the company and receive damages. This system would achieve two important things:

1. *Justice.* The landowner would be compensated for the harm done to him by the factory.
2. *Environmental protection.* The company would be penalized for polluting, and, therefore would have a strong incentive to reduce emissions in the future.

This would work well in cases where the source of the pollution is obvious—in this example, a factory. But what if the air pollution that is damaging the landowner's property is caused by hundreds of cars that drive by every day? Whom does he take to court?

Another sort of problem occurs in situations in which no one owns the property or resource being damaged. Such cases are referred to by the phrase, "the tragedy of the commons."¹⁹¹ When no one owns an object, no one has any

¹⁹⁰People's ability to leave property to their children gives them an incentive to work to maintain their property's value beyond their own lifetimes.

¹⁹¹Garrett Hardin, "The Tragedy of the Commons," *Science*, December 13, 1968, pp. 1243–48.

incentive to maintain it. In fact, the incentive is to strip away anything of value before someone else gets it first.¹⁹²

“What is common to many is taken least care of; for all men have greater regard for what is their own than for what they possess in common with others.”¹⁹³

Aristotle

In such cases, government regulation may be the only way to protect the environment. The challenge is to create regulations that do more good than harm.

SETTING MEANS . . .

Often regulators specify the means rather than the ends. That is, instead of establishing goals (e.g., clean air or clean water), local, state, and federal government agencies may write laws and regulations that either ban or require certain methods, technologies, or materials. This means-setting, *command-and-control* approach creates a number of problems:

1. *Laws and regulations may institutionalize the tragedy of the commons.*¹⁹⁴ As discussed in an earlier chapter, the *rule of capture* and related regulation led companies to drill as many wells as possible in order to pump oil out of the ground before their competitors could. By encouraging companies to drill otherwise unnecessary wells, the rule led to wasted resources and sometimes to reservoir damage.

Groundwater in the United States is still a common property resource; because no one owns it, no one has an incentive to conserve it.¹⁹⁵

2. *Special interests lobby the government to get their products or services mandated by regulation.* The use of oxygenates in gasoline is a good example. Ethanol, one of the two available oxygenates, is made from corn. Farmers who grow corn, and companies that make ethanol from it, have heavily pressured Congress to require its use.

¹⁹²Terry Anderson and Donald Leal, *Free Market Environmentalism* (New York: Palgrave, 2001), pp. 12–13.

¹⁹³Aristotle quoted by Will Durant, *The Story of Civilization Vol. II: The Life of Greece* (New York: Simon and Schuster, 1939), p. 536.

¹⁹⁴Fred Smith, “Enclosing the Environmental Commons,” in Ronald Bailey, ed., *Global Warming and Other Eco-Myths: How the Environmental Movement Uses False Science to Scare Us to Death* (Roseville, CA: Prima Publishing, 2002), p. 300.

¹⁹⁵*Ibid.*, p. 297.

3. *Regulations can create (or destroy) entire industries overnight.* The use of such power adds uncertainty and risk to the market. If risk reaches unacceptable levels, investors put their money elsewhere. The concentration of political power in Washington forces companies to lobby Congress and the White House for protection against its arbitrary use. Corporate lobbying, in turn, increases people's distrust of the system.
4. *Regulations are often the result of compromise.* After concessions have been made to this powerful congressman or that influential senator, the resulting law or regulation may be very different from the original proposal and have very different consequences. Politics may be "the art of the possible," but what is politically possible may be neither practical nor environmentally friendly.

Compromise can also result in laws so vaguely worded that they can be interpreted in any number of ways. In the end, it is left up to regulatory agencies and the courts to decide what a bill actually means. Their interpretations may be very different from the original intentions of the bill's proponents.

The Clean Air Act amendments of 1977, for example, stated that only new factories and power plants would have to meet the tighter emissions standards imposed by the Act. Existing plants would continue to be regulated under the pre-existing standards unless the old plants were "substantially modified." Unfortunately, Congress did not precisely specify what "substantially modified" meant.

In 1998, the EPA sued the owners of a number of old plants, charging that the upgrades done over the years to these plants had cumulatively added up to "substantial modifications." The owners responded, with some justification, that the EPA had originally approved their changes, and that altering the rules after-the-fact amounted to the passage of a retroactive law, something explicitly forbidden by the U.S. Constitution.

5. *Lobbyists may support regulations as a way of hurting their competition.* Utility companies with "old source" power plants, for example, welcomed the Clean Air Act's 1977 amendments because it put potential competitors at a disadvantage by raising the cost of market entry.

Other amendments to the Clean Air Act required power companies to reduce sulfur dioxide emissions by installing scrubbers. A less expensive way to lower emissions would have been to switch to low-sulfur coal, but eastern labor unions and coal mining companies (which produce high-sulfur coal) successfully lobbied to get the re-

quirement for scrubbers enacted into law.¹⁹⁶ This resulted in a waste of resources as (otherwise unnecessary) scrubbers had to be built, installed, and powered.

In the United States during the twentieth century, government intervention in the energy market has commonly been industry driven. Firms often organized lobbying groups to obtain favorable regulation or special subsidies. Free-market economist Milton Friedman complained, "Time and again, I have castigated the oil companies for . . . seeking and getting governmental privilege."¹⁹⁷

6. *Regulations can eliminate or alter feedback.* Feedback is an essential component of any activity. Imagine how dangerous the world would be for a person who had lost the ability to feel pain (as happens with certain forms of leprosy). Such a person could do serious damage to himself by continuing to walk on a badly sprained ankle, or putting his hand on a hot stove without knowing it.

Government action can create a sort of institutional leprosy by weakening or even destroying the feedback loops that make it possible for companies to know whether their activities are of any value. For instance, by taxing productive companies in order to subsidize unproductive ones, governments perpetuate the waste of resources.

7. *"Hard cases make bad law."*¹⁹⁸ All too often, regulations are hastily written in response to the public's demands that the government "do something" in the face of a crisis. Petroleum price controls during the 1970s are a case in point. Under the provisions of the rules, refiners could charge more for higher-octane fuels, so they were encouraged to increase the lead content to artificially boost octane ratings.

At the same time that crises lead to demands for action, they tend to increase the cost of any action. For instance, in response to the power shortage of 2000–2001, the state of California negotiated long-term contracts for the purchase of electricity. Within a few months market electricity prices had dropped well below what, in the midst of the crisis, had appeared to be justified. This multi-billion dollar mistake, borne by California taxpayers, was one reason Gray Davis lost his job as state governor to Arnold Schwarzenegger.

¹⁹⁶Robert Crandall, "Air Pollution, Environmentalists, and the Coal Lobby," in Roger Noll and Bruce Owen, ed., *The Political Economy of Deregulation: Interest Groups in the Regulatory Process* (Washington: American Enterprise Institute, 1983), pp. 84–96.

¹⁹⁷Milton Friedman, "Why Some Prices Should Rise," *Newsweek*, November 19, 1973, p. 130.

¹⁹⁸Oliver Wendell Holmes, Jr., *Northern Securities Co. vs. United States*, 193 U.S. 197 at 400 (1904).

8. *Regulations often have unintended side effects.* New laws or regulations may change the incentives people face and encourage them to act in ways that the lawmakers had not foreseen.

Recall the 1977 Clean Air Act amendments that placed strict emissions regulations on new power plants, while leaving existing facilities under the older standards (a practice known as “grandfathering”). Those rules increased the costs of new plants relative to existing ones, encouraging power companies to keep older plants in service longer than they otherwise would have been. Old plants are less efficient than new ones and the result was more fuel used and more pollution created.

Fears of oil spills have led lawmakers to prohibit offshore drilling in many of America’s coastal areas. As a result, the nation must import more oil than would otherwise be the case. However, imported oil is delivered via tanker. Tankers pose a greater oil spill danger than does offshore oil production. American coastlines are, therefore, actually less safe thanks to such legislative “protection.”

9. *Regulators do not bear the costs of their regulations* and have little incentive to ensure that the benefits outweigh those costs.
10. *Public officials are self-interested, and their self-interest may not always be in the public interest.* As Nobel Prize-winning economist James Buchanan pointed out, “government policy emerges from a highly complex and intricate institutional structure peopled by ordinary men and women, very little different from the rest of us.”¹⁹⁹ Buchanan and Gordon Tullock, the main developers of *Public Choice Theory*, argued that public officials have their own self-interests as much at heart as anyone else, and they may promote these interests at public expense.

For instance, managers with the federal government are often paid in proportion to the number of people who report to them. Their incentive, therefore, is to increase the size of their departments. All too often, they act in accordance with this incentive regardless of the cost to taxpayers.

More familiar are the politicians who purchase votes by using tax dollars to pay for projects of questionable value, or city officials who get kickbacks in return for construction contracts.

11. *Once in place, regulations are difficult to eliminate—the “tyranny of the status quo.”*²⁰⁰ Again, the example of oxygenates. Even though the problems of MTBE groundwater pollution and the increased gasoline evapora-

¹⁹⁹James Buchanan, “From Private Preferences to Public Philosophy: The Development of Public Choice,” in *The Economics of Politics* (London: Institute of Economic Affairs, 1978), p. 4.

²⁰⁰Milton Friedman, *The Tyranny of the Status Quo* (New York: Harcourt Brace Jovanovich, 1984).

tion caused by adding ethanol have been known for years, the regulations that require oxygenates have yet to be repealed. Oil companies are still required to put these harmful chemicals in their gasoline.²⁰¹

No matter how harmful a regulation is, or how outdated it has become, there is usually someone who benefits by it. The beneficiaries of the regulation generally have a stronger interest in keeping the regulation in place than anyone else has in getting rid of it. As a result, they are willing to spend time and money lobbying the government to support their position. While the benefits of a regulation may be enjoyed by a relative few, the costs are often spread out among many. If the per person cost of a regulation is only a dollar or two, no one has a financial incentive to travel to Washington to lobby against it. Economists call this the *concentrated benefits and diffuse costs problem*.

Moreover, the benefits of any particular government action are usually quite visible while the costs are often hidden. For example, if the recycling industry receives a subsidy, the impact on that industry is very apparent in terms of new facilities and jobs. However, these gains may be more than offset by loss of facilities and jobs in other industries. Because of the taxes that must be raised in order to subsidize the recycling industry, consumers have fewer dollars with which to purchase goods and services from other companies. These losses, however, are diffuse and invisible.

Perhaps most importantly, people just do not like to admit when they have made a mistake, and politicians are no exception. If the "Smith Act" causes problems, Senator Smith is unlikely to apologize and propose that his Act be repealed. Instead, the senator will probably argue that his legislation was not properly funded or enforced. In the end, the law is more likely to be expanded than repealed.

12. *Industries exert enormous influence over the government agencies created to regulate them.* Reformers, believing this problem is due to an imbalance of power, often seek to remedy the situation by increasing the authority of the regulatory agency. Such measures will likely serve only to solidify the positions of those companies that already dominate the regulated business.

Industry sway over government agencies is a natural result of the incentives inherent in the regulatory process. As has already been pointed out, no one has more incentive to lobby regulatory agencies than do the companies they regulate. And regulators' self-interest gives them a powerful incentive to listen.

²⁰¹The use of MTBE is being phased out over the next few years. However, other oxygenates, i.e., ethanol (currently the only practical alternative), will still be required.

There is also the “revolving door” phenomenon whereby personnel leave industry for jobs with government agencies and vice versa. Some see this as proof of corruption, but there is a simpler and less sinister explanation. When an agency is created to oversee a business, one of its first needs is employees with knowledge of that business. Where can it go for such people but to the industry itself? Similarly, when government employees retire and wish to begin second careers, where can they go other than to the business about which they have spent their professional lives learning?

13. *Laws and regulations stifle innovation.* Once a particular solution is written into law, there is little incentive for companies to try and develop a better one. Laws are notoriously difficult to change and are particularly so when lobbyists’ businesses depend upon the mandated solution. Even if the mandated solution was cutting-edge technology at the time the law was signed, technology becomes outdated very quickly in a free market system.
14. *National regulations can create nationwide problems.* In 1978, the Carter Administration, mistakenly convinced that the country was running out of oil and natural gas, passed the *Powerplant and Industrial Fuel Use Act*. Under the Act, existing power plants were prohibited from increasing their use of natural gas, and new plants were prohibited from using either natural gas or fuel oil. This restriction left coal as the only alternative despite the fact that coal emits more pollution and CO₂ than does natural gas. President Reagan lifted the restrictions on existing plants in 1981 and on new plants in 1987.

“The art of economics consists in looking not merely at the immediate but at the longer effects of any act or policy; it consists in tracing the consequences of that policy not merely for one group but for all groups.”²⁰²

Henry Hazlitt, American journalist and economist

. . . OR SETTING GOALS

Means-setting can pervert the goals. The objective ceases to be clean air, clean water, or whatever other laudable end, and instead becomes adhering to the *means* mandated by the regulation.

²⁰²Henry Hazlitt, *Economics in One Lesson*, p. 17.

Perhaps a better way to regulate is to simply define the goals and then get out of the way. That is:

1. Establish a goal (e.g., clean water).
2. Define a yardstick for determining whether the goal has been met (like specifying the maximum allowable levels of contaminants in wastewater that may be dumped into rivers, lakes, or oceans).
3. Establish the penalties for failing to meet the goal (e.g., monetary fines).
4. Let individuals and companies figure out how to meet the targets themselves.

People are amazingly creative. Given clear and reasonable goals, they will find ways to achieve them. And, with hundreds or thousands of people working towards a goal—trying different solutions, failing, then trying again, sharing information about what works and what does not—it is almost certain that their solutions will be far better than anything a regulator could devise.

The main problem with goal-setting is deciding what a reasonable target is. How clean is clean enough? Nowadays, chemical concentrations can be measured down to parts per trillion. Is water clean only if all measurable contaminants are removed? That can be done, but only at the cost of a lot of resources, energy, and pollution (from burning the fuel needed to power the contaminant removal process, disposing of the chemicals removed from the water, etc.).

Usually water is considered clean when contaminants are below levels that might cause harm to plant and animal life. This seems like a straightforward yardstick, but determining harm is anything but straightforward. For example, to determine whether a given chemical is carcinogenic (that is, if it will cause cancer), laboratory animals are typically fed the chemical at the highest non-lethal level (i.e., at amounts just below a dose that would kill them outright) for long periods. If the test animals develop cancer at a rate that is higher than normal, the chemical is considered to be a carcinogen.

There are many problems with identifying carcinogens in this way, however. Some chemicals are poisonous to some animals but not to others. In addition, chemicals that are toxic at high concentrations may actually be beneficial at lower levels (e.g., zinc, magnesium, and potassium). Reducing the concentration of such chemicals below their beneficial levels could actually be harmful to public health.

Also, there are *opportunity costs*. That is, when resources are used to make water absolutely pure, those resources are not available for other, perhaps more important, things. If billions of dollars are spent to reduce a pollutant to save an estimated ten lives per year, those dollars cannot be spent on highway improvements that could save a hundred lives a year. At what point do the costs exceed the benefits?

Clearly, it is important to balance the cost of cleaning the environment against the risk of leaving it less than perfectly clean.²⁰³ Earlier in this chapter, we proposed a definition of pollution that included consideration of the volume of the pollutant and the ability of nature to deal with that volume. Perhaps a more practical definition of “clean” would allow emissions as long as they did not exceed a level that the local environment could handle.

CAP-AND-TRADE

A number of economists and environmentalists have championed a “market-based” alliance between government and industry to help clean the environment. Under this scheme, businesses would purchase the right to pollute. Certificates, known as pollution allowances, would grant the owner the right to emit a given quantity of a pollutant into the atmosphere each year. The total amount allowed by all the certificates issued would equal a level determined to be acceptable given local conditions.

These allowances could be bought and sold in the market like any other commodity. Companies could compare the price of buying allowances to the cost of reducing their emissions. Those companies able to reduce emissions for less than the market price of allowances would do so, and sell any unneeded allowances to others. Companies facing high emission control costs could purchase them instead.²⁰⁴

Environmental organizations could also buy certificates and remove them from circulation, thereby reducing the total amount of pollution allowable in their area.

Cap-and-trade combines the concept of government goal-setting with the market’s ability to allocate resources to their best effect. Many economists believe that such a system would enable cities to control pollution far more efficiently than with traditional “command-and-control” regulations.

This scheme is not a cure-all. It offers an efficient mechanism to achieve an environmental goal, but the goal must be chosen with care. A job that is not worth doing is not worth doing efficiently. Moreover, once in place, cap-and-trade programs are difficult to eliminate. While such a program lasts, the pol-

²⁰³This issue can get very emotional. It is not unusual to hear people who advocate cleaning up the environment regardless of the cost ask, “How can we put a price on a human life?” The fact is we do just that every day of our lives. There is no doubt that a family would be safer if they drove, say, a Mercedes Benz instead of an economy car. However, they might reasonably choose a less expensive car so that they would have money to spend on food, clothing, shelter, and education for the children. By the same token, people who drive Mercedes might be safer if they drove Hummers, and Hummer drivers would be safer if they drove armored cars.

²⁰⁴John Swinton, “At What Cost Do We Reduce Pollution? Shadow Prices of SO₂ Emissions,” *The Energy Journal*, Vol. 19, No. 1 (1998), pp. 66–67.

lution allowances have a monetary value that would disappear the moment the program ends. Participants that have a lot of money tied up in allowances would fight to keep the program going rather than lose their investment.

There could also be political problems if researchers were to determine that the environment could handle higher levels of a controlled substance than previously thought. Theoretically, such a finding should result in the issuance of more allowances. However, doing so would reduce the value of the certificates already in circulation, and would almost certainly create conflicts between people who already had allowances and those who needed them. Worse, one side or the other in such a debate might commission researchers to present misleading data in an effort to bolster their own position.

Some economists prefer emission taxes to cap-and-trade. Taxes are simpler to administer and easier to adjust or eliminate as conditions change or new information becomes available.²⁰⁵

HOW GREEN IS "GREEN?"²⁰⁶

Some power companies and independent marketers have begun offering *green energy*, or electric power generated from sources that are considered to be environmentally friendly. Consumers who choose to purchase such power pay a higher rate given that such energy is more expensive to generate. Some states, like California, help defray some of the costs to make green power more competitive with "nongreen" electricity.

The concept of green energy assumes that renewable technologies such as solar, wind, tidal, geothermal, and biomass have less environmental impact than do either hydrocarbon or nuclear power generation. Even though hydroelectric power produces no emissions, it is usually not considered green because it requires damming rivers and altering the local environment.

But are so-called green technologies really green? Windmills and solar panels provide only intermittent service, and conventional, nongreen, power sources must make up the difference when the wind is not blowing or the sun is not shining. Should solar and wind generation be considered less green because of this?

In addition, spinning wind turbine blades can kill birds (a Sierra Club official once described wind turbines as "Cuisinarts of the air"²⁰⁷). Should wind

²⁰⁵Bruce Stram, "A Carbon Tax Strategy for Global Climate Change," in Henry Lee, ed., *Shaping National Responses to Climate Change: A Post-Rio Guide* (Washington: Island Press, 1995), pp. 219–35.

²⁰⁶This section is adapted from Robert Bradley, Jr., "Green Pricing" in John Zumerchik, ed., 3 vols., *Macmillan Encyclopedia of Energy*, vol. 2, pp. 598–601.

²⁰⁷Paul Gipe, *Wind Energy Comes of Age* (New York: John Wiley & Sons, 1995), p. 450.

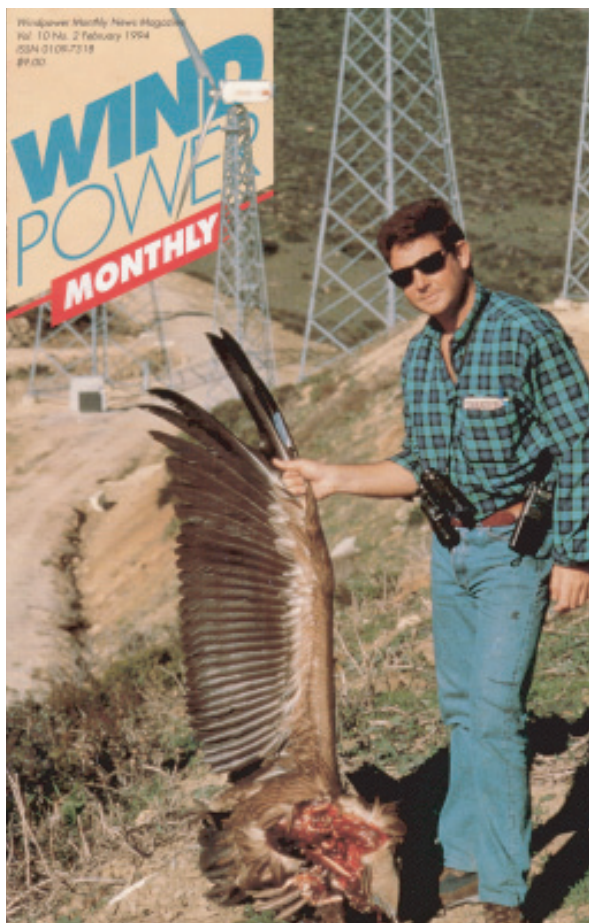
farms located in areas providing habitat for endangered species be rated lower than farms located in less sensitive regions?

Should geothermal energy be rated green, given that naturally occurring heat sources deplete with time, and some geothermal plants release toxic chemicals into the environment?

Should biomass be included as a green technology given that it produces air emissions and may encourage deforestation?

DIFFERENT ENVIRONMENTAL ISSUES

(Left) The body of a bird killed by a wind turbine at Spain's Tarifa wind farm. Tarifa successfully addressed its avian mortality problem, but other prominent wind sites like Altamont Pass wind farm, near San Francisco, continue to have problems with protected bird-species. *Source:* February 2, 1994 cover courtesy of Wind Power Monthly. (Right) An oil-soaked bird from a tanker spill. *Source:* Digitalvision.



On the other hand, should power from natural gas be added to the green list given that it is the cleanest of the fossil fuels and compares favorably with renewables on such measures as wildlife disturbance, noise, land use, and visual blight?

The definition of “green” will, and should, change with improving technology, regulatory reform, and new information about the environment. In the end, though, no power source is perfect; there will always be trade-offs.