Once you understand the destruction taking place, unless you do something to change it, even if you never intended to cause such destruction, you become involved in a strategy of tragedy. You can continue to be engaged in that strategy of tragedy, or you can design and implement *a strategy of change*.

Perhaps you imagine that a viable strategy for change already exists. Aren't a number of "green," "environmental," and "eco-efficient" movements already afoot? The next chapter takes a closer look at these movements and the solutions they offer.

McDONOUGH, W. & BRAUNGART M. CRADLE TO CRADLE: REMAKING THE WAY WE MAKE THINGS, NORTH POINT PRESS, NS, 2000

Chapter Two

Why Being "Less Bad" Is No Good

The drive to make industry less destructive goes back to the earliest stages of the Industrial Revolution, when factories were so destructive and polluting that they had to be controlled in order to prevent immediate sickness and death. Since then the typical response to industrial destruction has been to find a less bad approach. This approach has its own vocabulary, with which most of us are familiar: *reduce, avoid, minimize, sustain, limit, halt.* These terms have long been central to environmental agendas, and they have become central to most of the environmental agendas taken up by industry today.

One early dark messenger was Thomas Malthus, who warned at the end of the eighteenth century that humans would reproduce exponentially, with devastating consequences for humankind. Malthus's position was unpopular during the explosive excitement of early industry, when much was made of humanity's potential for good, when its increasing ability to mold the earth to its own purposes was seen as largely constructive; and when even population growth was viewed as a boon. Malthus envisioned not great, gleaming advancement but darkness, scarcity, poverty, and famine. His *Population: The First Essay*, published in 1798, was framed as a response to essayist and utopian William Godwin, who often espoused man's "perfectibility." "I have read some of the speculations on the perfectibility of man and of society with great pleasure," Malthus wrote. "I have been warmed and delighted with the en-

chanting picture which they hold forth." But, he concluded, "The power of population is so superior to the power in the earth to produce subsistence for man, that premature death must in some shape or other visit the human race." Because of his pessimism (and his suggestion that people should have less sex), Malthus became a cultural caricature. Even now his name is equated with a Scrooge-like attitude toward the world.

While Malthus was making his somber predictions about human population and resources, others were noticing changes in nature (and spirit) as industry spread. English Romantic writers such as William Wordsworth and William Blake described the spiritual and imaginative depth that nature could inspire, and they spoke out against an increasingly mechanistic urban society that was turning even more of its attention toward getting and spending. The Americans George Perkins Marsh, Henry David Thoreau, John Muir, Aldo Leopold, and others continued this literary tradition into the nineteenth and twentieth centuries and in the New World. From the Maine woods, Canada, Alaska, the Midwest, and the Southwest, these voices from the wilderness preserved in language the landscape they loved, lamented its destruction, and reaffirmed the belief that, as Thoreau famously put it, "in Wildness is the preservation of the world." Marsh was one of the first to understand man's capacity to wreak lasting destruction on the environment, and Leopold anticipated some of the feelings of guilt that characterize much environmentalism today:

> When I submit these thoughts to a printing press, I am helping cut down the woods. When I pour cream in my coffee, I am helping to drain a marsh for cows to graze, and to exterminate the birds of Brazil. When I go birding or hunting in my Ford, I am devastating an oil field, and re-electing an imperialist to get me rubber. Nay more: when I father more than two children I am creating an insatiable need for more printing presses, more cows, more coffee, more oil, to supply which more birds, more trees, and more flowers will either be killed, or . . . evicted from their several environments.

Some of these men helped to form conservation societies, such as the Sierra Club and the Wilderness Society, to preserve wilderness and keep it untouched by industrial growth. Their writings inspired new generations of environmentalists and nature lovers, and they still do.

But it wasn't until the publication of Rachel Carson's *Silent Spring* in 1962 that this romantic strain of wilderness appreciation merged with a scientific basis for concern. Up until that point, environmentalism meant protesting the obvious damage—deforestation, mining destruction, factory pollution, and other visible changes—and seeking to conserve especially appreciated landscapes, like the White Mountains of New Hampshire or Yosemite in California. Carson pointed out something more insidious; she imagined a landscape in which no birds sang, and moved on to explain that human-made chemicals—particularly pesticides such as DDT—were devastating the natural world.

Although it took almost a decade, *Silent Spring* led to the banning of DDT in the United States and Germany and sparked

a continuing controversy about the dangers of industrial chemicals. It influenced scientists and politicians to take up the cause and to form groups such as Environmental Defense, the Natural Resources Defense Council, the World Wildlife Federation, and BUND (the German Federation for Environmental and Nature Conservation). Environmentalists were no longer interested simply in preservation but in monitoring and reducing toxins. Declining wilderness and diminishing resources merged with pollution and toxic waste as the major realms of concern.

Malthus's legacy continued to hold strong. Shortly after *Silent Spring*, in 1968, Paul Ehrlich, a pioneer of modern environmentalism and an eminent biologist working at Stanford, published an alarm of Malthusian proportions, *The Population Bomb*, in which he declared that the 1970s and 1980s would be a dark era of resource shortages and famine, during which "hundreds of millions of people will starve to death." He also pointed out humans' habit of "using the atmosphere as a garbage dump." "Do we want to keep it up and find out what will happen?" he asked. "What do we gain by playing 'environmental roulette'?"

In 1984 Ehrlich and his wife, Anne, followed up the first book with another, *The Population Explosion*. In this second warning to humanity, they asserted, "Then the fuse was burning; now the population bomb has detonated." Primary among "the underlying causes of our planet's unease," the two posited, "is the overgrowth of the human population and its impacts on both ecosystems and human communities." Their first chapter is entitled "Why Isn't Everyone as Scared as We Are?" and

their parting suggestion for humanity begins with two urgent suggestions: "Halt human population growth as quickly and humanely as possible," and "Convert the economic system from one of growthism to one of sustainability, lowering per-capita consumption."

The association of growth with negative consequences has become a major theme of environmentalists in the modern age. In 1972, between the publication of the Ehrlichs' first and second warnings, Donella and Dennis Meadows and the Club of Rome (a group of international business, state, and scientific leaders) published another serious warning, *The Limits to Growth*. The authors noted that resources were plummeting due to population growth and destructive industry and concluded, "If the present growth trends in world population, industrialization, pollution, food production, and resource depletion continue unchanged, the limits to growth on this planet will be reached sometime within the next one hundred years. The most probable result will be a sudden and uncontrollable decline in both population and industrial capacity." Twenty years later a follow-up, *Beyond the Limits*, concluded with more warnings: "Minimize the use of nonrenewable resources." "Prevent the erosion of renewable resources." "Use all resources with maximum efficiency." "Slow and eventually stop exponential growth of population and physical capital."

In 1973 Fritz Schumacher's *Small Is Beautiful: Economics as If People Mattered* tackled the issue of growth from a philosophical vantage point. "The idea of unlimited economic growth," he wrote, "more and more until everybody is saturated with wealth, needs to be seriously questioned." In addition to

advocating small-scale, nonviolent technologies that would "reverse the destructive trends now threatening us all," Schumacher posited that people must make a serious shift in what they consider to be wealth and progress: "Ever-bigger machines, entailing ever-bigger concentrations of economic power and exerting ever-greater violence against the environment, do not represent progress: they are a denial of wisdom." Real wisdom, he claimed, "can be found only inside oneself," enabling one to "see the hollowness and fundamental unsatisfactoriness of a life devoted primarily to the pursuit of material ends."

At the same time that these environmentalists were issuing important warnings, others were suggesting ways consumers could reduce their negative impact on the environment. A recent version of this message is found in Robert Lilienfeld and William Rathje's 1998 *Use Less Stuff: Environmental Solutions for Who We Really Are*. Consumers must take the lead in reducing negative environmental impact, the authors argue: "The simple truth is that all of our major environmental concerns are either caused by, or contribute to, the ever-increasing consumption of goods and services." This devouring impulse in Western culture is comparable, they maintain, to a drug or alcohol addiction: "Recycling is an aspirin, alleviating a rather large collective hangover . . . overconsumption." Or again, "The best way to reduce any environmental impact is not to recycle more, but to produce and dispose of less."

The tradition of issuing urgent, often moving messages to producers and consumers is rich and long-standing. But it took decades for industries themselves to really listen to them. In fact, it was not until the 1990s that leading industrialists began

to recognize causes for concern. "What we thought was boundless has limits," Robert Shapiro, the chairman and chief executive officer of Monsanto, said in a 1997 interview, "and we're beginning to hit them."

The 1992 Rio Earth Summit, coinitiated by Canadian businessman Maurice Strong, was organized in response to this concern. Approximately thirty thousand people from around the world, more than a hundred world leaders, and representatives of 167 countries gathered in Rio de Janeiro to respond to troubling signals of environmental decline. To the sharp disappointment of many, no binding agreements were reached. (Strong is reported to have quipped, "There were many heads of state, but no real leaders.") But one major strategy emerged from the industrial participants: eco-efficiency. The machines of industry would be refitted with cleaner, faster, quieter engines. Industry would redeem its reputation without significantly changing its structures or compromising its drive for profit. Eco-efficiency would transform human industry from a system that takes, makes, and wastes into one that integrates economic, environmental, and ethical concerns. Industries across the globe now consider eco-efficiency to be the choice strategy of change.

What is eco-efficiency? Primarily the term means "doing more with less," a precept that has its roots in early industrialization. Henry Ford himself was adamant about lean and clean operating policies, saving his company millions of dollars by reducing waste and setting new standards with his time-saving assembly line. "You must get the most out of the power, out of the material, and out of the time," he wrote in 1926, a credo

that most contemporary CEOs would proudly hang on their office walls. The linkage of efficiency with sustaining the environment was perhaps most famously articulated in *Our Common Future*, a report published in 1987 by the United Nations' World Commission on Environment and Development. *Our Common Future* warned that if pollution control was not intensified, human health, property, and ecosystems would be seriously threatened, and urban existence would become intolerable: "Industries and industrial operations should be encouraged that are more efficient in terms of resource use, that generate less pollution and waste, that are based on the use of renewable rather than non-renewable resources, and that minimize irreversible adverse impacts on human health and the environment," stated the commission in its agenda for change.

The term eco-efficiency was officially coined five years later by the Business Council for Sustainable Development, a group of forty-eight industrial sponsors including Dow, DuPont, Conagra, and Chevron, who had been asked to bring a business perspective to the Earth Summit. The council couched its call for change in practical terms, focusing on what businesses had to gain from a new ecological awareness rather than on what the environment stood to lose if industry continued current patterns. The group's report, *Changing Course*, timed for simultaneous release with the summit, stressed the importance of eco-efficiency for all companies that aimed to be competitive, sustainable, and successful in the long term. "Within a decade," predicted Stephan Schmidheiney, one of the council's founders, "it is going to be next to impossible for a business to be competitive without also being 'eco-efficient'—adding more

value to a good or service while using fewer resources and releasing less pollution."

Even more quickly than Schmidheiney predicted, eco-efficiency has wended its way into industry with extraordinary success. The number of corporations adopting it continues to rise, including such big names as Monsanto, 3M (whose 3P—"Pollution Pays Program"—went into effect in 1986, before eco-efficiency was a common term), and Johnson & Johnson. The movement's famous three Rs—reduce, reuse, recycle—are steadily gaining popularity in the home as well as in the workplace. The trend stems in part from eco-efficiency's economic benefits, which can be considerable; 3M, for example, announced that by 1997 it had saved more than $750 million through pollution-prevention projects, and other companies too claim to be realizing big savings. Naturally, reducing resource consumption, energy use, emissions, and wastes has a beneficial effect on the environment as well—and on public morale. When you hear that a company like DuPont has cut its emissions of cancer-causing chemicals by almost 70 percent since 1987, you feel better. Eco-efficient industries can do something good for the environment, and people can feel less fearful about the future. Or can they?

The Four R's: Reduce, Reuse, Recycle—and Regulate

Whether it is a matter of cutting the amount of toxic waste created or emitted, or the quantity of raw materials used, or the product size itself (known in business circles as "dematerial-

ization"), reduction is a central tenet of eco-efficiency. But reduction in any of these areas does not halt depletion and destruction—it only slows them down, allowing them to take place in smaller increments over a longer period of time.

For example, reducing the amounts of dangerous toxins and emissions released by industry is an important eco-efficient goal. It sounds unassailable, but current studies show that over time even tiny amounts of dangerous emissions can have disastrous effects on biological systems. This is a particular concern in the case of endocrine disrupters—industrial chemicals found in a variety of modern plastics and other consumer goods that appear to mimic hormones and connect with receptors in humans and other organisms. In *Our Stolen Future*, a groundbreaking report on certain synthetic chemicals and the environment, Theo Colburn, Dianne Dumanoski, and John Peterson Myers assert that "astoundingly small quantities of these hormonally active compounds can wreak all kinds of biological havoc, particularly in those exposed in the womb." Furthermore, according to these authors, many studies on the hazards of industrial chemicals have focused on cancer, while research on other kinds of damage due to exposure has only begun.

On another front, new research on particulates—microscopic particles released during incineration and combustion processes, such as those in power plants and automobiles—show that they can lodge in and damage the lungs. A 1995 Harvard study found that as many as 100,000 people die annually in the United States as a result of these tiny particles. Although regulations for controlling their release are in place, implementation does not have to begin until 2005 (and if legislation only reduces their amounts, small quantities of these particulates will still be a problem).

Another waste reduction strategy is incineration, which is often perceived as healthier than landfilling and is praised by energy efficiency proponents as "waste to energy." But waste in incinerators burns only because valuable materials, like paper and plastic, are flammable. Since these materials were never designed to be safely burned, they can release dioxins and other toxins when incinerated. In Hamburg, Germany, some trees' leaves contain such high concentrations of heavy metals from incinerator fallout that the leaves themselves must be burned, effecting a vicious cycle with a dual effect: valuable materials, such as these metals, bioaccumulate in nature to possible harmful effect and are lost to industries forever.

Air, water, and soil do not safely absorb our wastes unless the wastes themselves are completely healthy and biodegradable. Despite persistent misconceptions, even aquatic ecosystems are unable to purify and distill unsafe waste to safe levels. We have just too little knowledge about industrial pollutants and their effects on natural systems for "slowing down" to be a healthy strategy in the long term.

Finding markets to *reuse* wastes can also make industries and customers feel that something good is being done for the environment, because piles of waste appear to go "away." But in many cases these wastes—and any toxins and contaminants they contain—are simply being transferred to another place. In some developing countries, sewage sludge is recycled into animal food, but the current design and treatment of sewage by conventional sewage systems produces sludge containing

chemicals that are not healthy food for any animal. Sewage sludge is also used as fertilizer, which is a well-intended attempt to make use of nutrients, but as currently processed it can contain harmful substances (like dioxins, heavy metals, endocrine disrupters, and antibiotics) that are inappropriate for fertilizing crops. Even residential sewage sludge that contains toilet paper made from recycled paper may carry dioxins. Unless materials are specifically *designed* to ultimately become safe food for nature, composting can present problems as well. When so-called biodegradable municipal wastes, including packaging and paper, are composted, the chemicals and toxins in the materials can be released into the environment. Even if these toxins exist in minute amounts, the practice may not be safe. In some cases it would actually be less dangerous to seal the materials in a landfill.

What about *recycling*? As we have noted, most recycling is actually *downcycling*; it reduces the quality of a material over time. When plastics other than those found in soda and water bottles are recycled, they are mixed with different plastics to produce a hybrid of lower quality, which is then molded into something amorphous and cheap, such as a park bench or a speed bump. Metals are often downcycled. For example, the high-quality steel used in automobiles—high-carbon, high-tensile steel—is "recycled" by melting it down with other car parts, including copper from the cables in the car, and the paint and plastic coatings. These materials lower the recycled steel's quality. More high-quality steel may be added to make the hybrid strong enough for its next use, but it will not have the material properties to make new cars again. Meanwhile the rare

metals, such as copper, manganese, and chromium, and the paints, plastics, and other components that had value for industry in an unmixed, high-quality state are lost. Currently, there is no technology to separate the polymer and paint coatings from automotive metal before it is processed; therefore, even if a car were designed for disassembly, it is not technically feasible to "close the loop" for its high-quality steel. The production of one ton of copper results in the production of hundreds of tons of waste, but the copper content in some steel alloy is actually higher than it is in mined ore. Also, the presence of copper weakens steel. Imagine how useful it would be if industries had a way to recover that copper instead of constantly losing it.

Aluminum is another valuable but constantly downcycled material. The typical soda can consists of two kinds of aluminum: the walls are composed of aluminum, manganese alloy with some magnesium, plus coatings and paint, while the harder top is aluminum magnesium alloy. In conventional recycling these materials are melted together, resulting in a weaker—and less useful—product.

Lost value and lost materials are not the only concerns. Downcycling can actually increase contamination of the biosphere. The paints and plastics that are melted into recycled steel, for example, contain harmful chemicals. Electric-arc furnaces that recycle secondary steel for building materials are now a large source of dioxin emissions, an odd side effect for a supposedly environmental process. Since downcycled materials of all kinds are materially less rigorous than their predecessors, more chemicals are often added to make the materials useful

again. For example, when some plastics are melted and combined, the polymers in the plastic—the chains that make it strong and flexible—shorten. Since the material properties of this recycled plastic are altered (its elasticity, clarity, and tensile strength are diminished), chemical or mineral additives may be added to attain the desired performance quality. As a result, downcycled plastic may have more additives than "virgin" plastic.

Because it was not designed with recycling in mind, paper requires extensive bleaching and other chemical processes to make it blank again for reuse. The result is a mixture of chemicals, pulp, and in some cases toxic inks that are not really appropriate for handling and use. The fibers are shorter and the paper less smooth than virgin paper, allowing an even higher proportion of particles to abrade into the air, where they can be inhaled and can irritate the nasal passages and lungs. Some people have developed allergies to newspapers, which are often made from recycled paper.

The creative use of downcycled materials for new products can be misguided, despite good intentions. For example, people may feel they are making an ecologically sound choice by buying and wearing clothing made of fibers from recycled plastic bottles. But the fibers from plastic bottles contain toxins such as antimony, catalytic residues, ultraviolet stabilizers, plasticizers, and antioxidants, which were never designed to lie next to human skin. Using downcycled paper as insulation is another current trend. But additional chemicals (such as fungicides to prevent mildew) must be added to make downcycled paper suitable for insulation, intensifying the problems already caused by

toxic inks and other contaminants. The insulation might then offgas formaldehyde and other chemicals into the home.

In all of these cases, the agenda to recycle has superseded other design considerations. Just because a material is recycled does not automatically make it ecologically benign, especially if it was not designed specifically for recycling. Blindly adopting superficial environmental approaches without fully understanding their effects can be no better—and perhaps even worse—than doing nothing.

Downcycling has one more disadvantage. It can be more expensive for businesses, partly because it tries to force materials into more lifetimes than they were originally designed for, a complicated and messy conversion and one that itself expends energy and resources. Legislation in Europe requires packaging materials that are made of aluminum and polypropylene to be recycled. But because these boxes are not designed to be recycled into new packaging (that is, to be reused by the industry to make its own product again), compliance results in additional operating costs. The components of the old packages are often downcycled into lower-quality products until they are eventually incinerated or landfilled anyway. In this instance as in many others, an ecological agenda becomes a burden for industry instead of a rewarding option.

In *Systems of Survival* the urbanist and economic thinker Jane Jacobs describes two fundamental syndromes of human civilizations: what she calls the *guardian* and *commerce*. The guardian is the government, the agency whose primary purpose is to preserve and protect the public. This syndrome is slow and serious. It reserves the right to kill—that is, it will go to war. It

represents the public interest, and it is meant to shun commerce (witness conflicts over capital campaign contributions from vested interests).

Commerce, on the other hand, is the day-to-day, instant exchange of value. The name of its primary tool, currency, denotes its urgency. Commerce is quick, highly creative, inventive, constantly seeking short- and long-term advantage, and inherently honest: you can't do business with people if they aren't trustworthy. Any hybrid of these two syndromes Jacobs characterizes as so riddled with problems as to be "monstrous." Money, the tool of commerce, will corrupt the guardian. Regulation, the tool of the guardian, will slow down commerce. An example: a manufacturer might spend more money to provide an improved product under regulations, but its commercial customers, who want products quickly and cheaply, may be unwilling to absorb the extra costs. They may then find what they need elsewhere, perhaps offshore, where regulations are less stringent. In an unfortunate turnaround, the unregulated and potentially dangerous product is given a competitive edge.

For regulators who are attempting to safeguard whole industries, the readiest solutions are often those that can be applied on a very large scale, such as so-called end-of-pipe solutions, in which regulations are applied to the waste and polluting streams of a process or system. Or regulators may try to dilute or distill emissions to a more acceptable level, requiring businesses to increase ventilation or to pump more fresh air into a building because of poor indoor air quality due to offgassing materials or processes. But this "solution" to pollution—dilution—is an outdated and ineffective response that

does not examine the design that caused the pollution in the first place. The essential flaw remains: badly designed materials and systems that are unsuitable for indoor use.

Jacobs sees other problems with "monstrous hybrids." Regulations force companies to comply under threat of punishment, but they seldom *reward* commerce for taking initiatives. Since regulations often require one-size-fits-all end-of-pipe solutions rather than a deeper design response, they do not directly encourage creative problem-solving. And regulation can pit environmentalists and industries against each other. Because regulations seem like a chastisement, industrialists find them annoying and burdensome. Since environmental goals are typically forced upon business by the guardian—or are simply perceived as an added dimension outside crucial operating methods and goals—industrialists see environmental initiatives as inherently uneconomic.

We do not mean to lambaste those who are working with good intentions to create and enforce laws meant to protect the public good. In a world where designs are unintelligent and destructive, regulations can reduce immediate deleterious effects. But ultimately a regulation is a signal of design failure. In fact, it is what we call a *license to harm*: a permit issued by a government to an industry so that it may dispense sickness, destruction, and death at an "acceptable" rate. But as we shall see, good design can require no regulation at all.

Eco-efficiency is an outwardly admirable, even noble, concept, but it is not a strategy for success over the long term, because it

does not reach deep enough. It works within the same system that caused the problem in the first place, merely slowing it down with moral proscriptions and punitive measures. It presents little more than an illusion of change. Relying on eco-efficiency to save the environment will in fact achieve the opposite; it will let industry finish off everything, quietly, persistently, and completely.

Remember the retroactive design assignment that we applied to the Industrial Revolution in Chapter One? If we were to take a similar look at industry under the influence of the eco-efficiency movement, the results might look like this:

Design a system of industry that will:

- release *fewer* pounds of toxic wastes into the air, soil, and water every year
- measure prosperity by *less* activity
- *meet* the stipulations of thousands of complex regulations to keep people and natural systems from being poisoned too quickly
- produce *fewer* materials that are so dangerous that they will require future generations to maintain constant vigilance while living in terror
- result in *smaller* amounts of useless waste
- put *smaller* amounts of valuable materials in holes all over the planet, where they can never be retrieved.

Plainly put, eco-efficiency only works to make the old, destructive system a bit less so. In some cases, it can be more pernicious, because its workings are more subtle and long-term. An

ecosystem might actually have more of a chance to become healthy and whole again after a quick collapse that leaves some niches intact than with a slow, deliberate, and efficient destruction of the whole.

Efficient—at What?

As we have seen, even before the term eco-efficiency was coined, industry generally viewed efficiency as a virtue. We would like to question the general goal of efficiency for a system that is largely destructive.

Consider energy-efficient buildings. Twenty years ago in Germany, the standard rate of oil use for heating and cooling the average house was 30 liters per square meter per year. Today, with high-efficiency housing, that number has plummeted to 1.5 liters of oil per square meter. Increased efficiency is often achieved through better insulation (such as plastic coatings in potential air-exchange areas so that less air comes into the building from outside) and smaller, leak-proof windows. These strategies are meant to optimize the system and reduce wasted energy. But by reducing air-exchange rates, efficient homeowners are actually strengthening the concentration of indoor air pollution from poorly designed materials and products in the home. If indoor air quality is poor because of crude products and building materials, then people require more fresh air to circulate throughout the building, not less.

Overly efficient buildings can also be dangerous. Several decades ago the Turkish government created inexpensive hous-

ing by designing and constructing apartments and houses which were built "efficiently," with a minimum of steel and concrete. During the 1999 earthquakes, however, this housing easily collapsed, while older, "inefficient" buildings held up better. In the short term, people saved money on housing, but in the long term, the efficiency strategy turned out to be dangerous. What social benefit does cheap, efficient housing provide if it also exposes people to more dangers than traditional housing?

Efficient agriculture can perniciously deplete local landscapes and wildlife. The contrast between the former East Germany and West Germany is a good example. Traditionally, the average amount of wheat produced in eastern Germany per acre has been only half that of western Germany, because the agricultural industry in the west is more modern and efficient. The eastern region's "inefficient," more old-fashioned agriculture is actually better for environmental health: it has larger wetland areas that have not been drained and overtaken by monocultural crops, and they contain more rare species—for example, three thousand nesting pairs of storks, compared with 240 pairs in the more developed western lands. These wild marshes and wetland areas provide vital centers for breeding, nutrient cycling, and water absorption and purification. Today agriculture all over Germany is becoming more efficient, destroying wetlands and other habitats, resulting in rising extinction rates.

Eco-efficient factories are held up as models of modern manufacturing. But in truth many of them are only distributing their pollution in less obvious ways. Less efficient factories, instead of sending emissions through high smokestacks into other areas far from the site (or importing them), tend to contaminate

local areas. At least local destruction tends to be more visible and comprehensible: if you know what you are dealing with, you may be horrified enough to do something about it. Efficient destruction is harder to detect and thus harder to stop.

In a philosophical sense, efficiency has no independent value: it depends on the value of the larger system of which it is a part. An efficient Nazi, for example, is a terrifying thing. If the aims are questionable, efficiency may even make destruction more insidious.

Last but not least, efficiency isn't much fun. In a world dominated by efficiency, each development would serve only narrow and practical purposes. Beauty, creativity, fantasy, enjoyment, inspiration, and poetry would fall by the wayside, creating an unappealing world indeed. Imagine a fully efficient world: an Italian dinner would be a red pill and a glass of water with an artificial aroma. Mozart would hit the piano with a two-by-four. Van Gogh would use one color. Whitman's sprawling "Song of Myself" would fit on a single page. And what about efficient sex? An efficient world is not one we envision as delightful. In contrast to nature, it is downright parsimonious.

This is not to condemn *all* efficiency. When implemented as a tool within a larger, effective system that intends overall positive effects on a wide range of issues—not simply economic ones—efficiency can actually be valuable. It is valuable too when conceived as a transitional strategy to help current systems slow down and turn around. But as long as modern industry is so destructive, attempting only to make it less bad is a fatally limited goal.

The "be less bad" environmental approaches to industry

have been crucial in sending important messages of environmental concern—messages that continue to catch the public's attention and to spur important research. At the same time, they forward conclusions that are less useful. Instead of presenting an inspiring and exciting vision of change, conventional environmental approaches focus on what *not* to do. Such proscriptions can be seen as a kind of guilt management for our collective sins, a familiar placebo in Western culture.

In very early societies, repentance, atonement, and sacrifice were typical reactions to complex systems, like nature, over which people felt they had little control. Societies around the world developed belief systems based on myth in which bad weather, famine, or disease meant one had displeased the gods, and sacrifices were a way to appease them. In some cultures, even today, one must sacrifice something of value in order to regain the blessing of the gods (or god) and reestablish stability and harmony.

Environmental destruction is a complex system in its own right—widespread, with deeper causes that are difficult to see and understand. Like our ancestors, we may react automatically, with terror and guilt, and we may look for ways to purge ourselves—which the "eco-efficiency" movement provides in abundance, with its exhortations to consume and produce less by minimizing, avoiding, reducing, and sacrificing. Humans are condemned as the one species on the planet guilty of burdening it beyond what it can withstand; as such, we must shrink our presence, our systems, our activities, and even our population so as to become almost invisible. (Those who believe population is the root of our ills think people should mostly stop

having children.) The goal is zero: zero waste, zero emissions, zero "ecological footprint."

As long as human beings are regarded as "bad," zero is a good goal. But to be less bad is to accept things as they are, to believe that poorly designed, dishonorable, destructive systems are the *best* humans can do. This is the ultimate failure of the "be less bad" approach: a failure of the imagination. From our perspective, this is a depressing vision of our species' role in the world.

What about an entirely different model? What would it mean to be 100 percent good?