

NATURAL CAPITALISM: PATH TO SUSTAINABILITY?

L. Hunter Lovins, President, Natural Capitalism, Inc.

We live in interesting times.

Environmental lawyers frequently define their job as advising their clients on laws and the sorts of issues taught in law school. The challenges now facing the world, however, will require lawyers, and indeed all professionals to redefine not only their jobs but also the whole of business. There is no longer any serious scientific doubt that all major ecosystems on the planet are in decline. Challenges like climate change will force us to change most aspects of how business is done. At the same time, such challenges give each one of us the opportunity to make our jobs much more interesting, our expertise more in demand and our relationship with our home, this fragile planet on which we all live, more satisfying. In these times, environmental lawyers would do well to familiarize themselves not just with conventional legal issues, but with the evidence now emerging from the earth, and with the opportunities that a commitment to doing business in more sustainable ways can confer on companies, communities and citizens.

What you believe about these challenges and opportunities will determine whether you can prosper from them. Is your job is one of evading compliance, in effect enabling your clients to remain as unsustainable as possible as long as possible? It may not be long before such an attitude is recognized as malpractice. Or are you in the business of ensuring compliance? You may miss the real opportunities that making a commitment to become more sustainable can confer. But if you see your job as enabling your clients to get ahead of the curve, to ride this next wave of innovation and capture the enhanced brand equity, reduced costs and improved profitability inherent in the new way of doing business known as Natural Capitalism, you are one of the new breed of lawyers who will come to be seen as critical to their clients success.

Industrial capitalism, as it is now practiced, is unnatural—an aberration. It is defying the logic of capitalism, because it does not value, but rather is liquidating, the most important forms of capital, especially *natural* capital—the biological world whose resources and ecosystem services make possible all life. According to the June 2000 pioneering analysis of the world's ecosystems prepared by the United Nations, the World Bank, and the World Resources Institute, "There are considerable signs that the capacity of ecosystems, the biological engines of the planet, to produce many of the goods and services we depend on is rapidly declining."

Ecosystem services include such natural processes as the cycling of nutrients and water, regulation of atmosphere and climate, pollination and the maintenance of biodiversity, control of pests and diseases, and the assimilation and detoxification of society's wastes. These free and automatic services provide tens of trillions of dollars of worth each year—at least as much as the global economy that is counted. Arguably, their value is nearly infinite, since without them life and thus economic activity is not possible. But none of their value is reflected on anyone's balance sheets.

The economists say that if essential services are not being properly counted, then place a price tag on them and add them to the economic equation. But deficient logic of the sort now practiced by industrial capitalism can't be corrected simply by monetizing natural, or indeed human, capital. Many key ecosystem services have no known substitutes at any price. The folks at Biosphere II, the engineering marvel in the Arizona desert spent \$200 million and couldn't keep eight people in clean air for two years.

Biosphere I, our planet, performs this task daily for now over six billion of us for free. What's the worth of clean air? Whatever it is, we're all a bit sentimental about it.

Sometimes the cost of destroying ecosystem services becomes apparent only when the services start to break down. In China's Yangtze basin in 1998, for example, upstream deforestation triggered flooding that killed 3,700 people, dislocated 223 million and inundated 60 million acres of cropland. That \$30 billion disaster forced a logging moratorium and a \$12 billion crash program of reforestation. Such disasters are becoming more common. Economic losses due to extreme weather have been rising since the 1950s, when there were 20 "great catastrophes" and steeply since the 1970s, when there were 47 disasters, to now \$608 billion in 1990s, which suffered 87 weather related disasters. These costs arise because our industrial economy, (for example) harvests wood fiber in ways that prevent forests from properly regulating watersheds to prevent flooding, or provides energy in ways that increase the CO₂ in the atmosphere and damages the self-stabilization of the earth's climate.

What is a stable climate worth? Whatever it is, we'd better decide quickly if we care, because we're losing it. In February 2004, Fortune Magazine profiled a study commissioned by the Pentagon on the national security risks that might be posed by a rapid shift in the climate. The report stated, "Growing evidence suggests the ocean-atmosphere system that controls the world's climate can lurch from one state to another in less than a decade—like a canoe that's gradually tilted until suddenly it flips over. Scientists don't know how close the system is to a critical threshold. But abrupt climate change may well occur in the not-too-distant future. If it does, the need to rapidly adapt may overwhelm many societies—thereby upsetting the geopolitical balance of power."

The "ocean-atmosphere system" referred to is called the North Atlantic thermo-halocline conveyor. It is the flow of warm water up past North Europe that keeps North Europe different from Siberia. The shutdown of this service of warming North Europe, the Pentagon report concluded, would be of serious concern to American national security.

No doubt. And the security of the rest of the world, as this flow of warm and cold water is linked throughout all the oceans of the world.

Such information is adding to the growing consensus that there is a strong business case for behaving in more sustainable ways. Reuters reported (June 2003) that Swiss Re, the world's second largest reinsurer stated "that the costs of natural disasters, aggravated by global warming, threatened to spiral out of control, forcing the human race into a catastrophe of its own making."

Swiss Re said that "climate change is rising on the corporate agenda, as the economic costs of such disasters threatened to double to \$150 billion (82 billion pounds) a year in 10 years, hitting insurers with \$30-40 billion in claims, or the equivalent of one World Trade Centre attack annually."

"Today, climate change as a financial issue is very much underestimated from the point of view of the insurance and reinsurance industry's potentially rising costs and risks."

In an 18 Aug 2002 New York Times article Swiss Re stated that it will closely watch Executive and Director liability. "Our concern is: will there be a shareholder action 5-10 years from now? Emissions reduction is shaping up as a 'clear liability issue' for corporate managements and boards. So Swiss Re is looking at its insured to determine if they are doing enough, and is considering excluding from coverage companies that are not addressing it; directors too."

Joel Levin, Vice President of the new California Climate Action Registry echoed this concern in an April 2004 article in Energy Pulse. He stated that within a few years companies that have not proactively dealt with their carbon emissions could find themselves facing financial disaster. As states begin to regulate greenhouse gas emissions, companies that choose not to implement emissions reductions programs may face rising costs, plummeting share prices, desertion by senior executives, shareholder suits for violation of fiduciary responsibility, investigation by the SEC for failure to disclose carbon liability, cancelled insurance policies, and suits by attorneys general in coastal states facing flooding from climate change.

So what is the job of an environmental lawyer in the face of such problems? Inventor Edwin Land once observed that, "People who seem to have had a new idea have often just stopped having an old idea." Land also said, "Invention is just a sudden cessation of stupidity." Perhaps it is time for such a shift in the legal profession.

How on earth did companies (and the lawyers who serve them) come to face such challenges?

Industrial capitalism was born a quarter-millennium ago in the first Industrial Revolution. Before that time, it was inconceivable that people could work more productively. If you needed two horsepower, you needed two horses, and if you wanted more cloth, you had to hire more skilled weavers—if you could find them. So it made sense to enable the relatively scarce people to do more work by substituting machines and abundant nature. The textile mills introduced in the late 1700s soon enabled one Lancashire spinner to produce the cloth that had previously required 200 weavers. These were only one of many technologies that increased the productivity of workers, and increased prosperity. As these technical and organizational innovations spread through sector after sector of the economy, affordable mass goods, purchasing power, a middle class, and everything we now call the Industrial Revolution emerged.

Profit-maximizing capitalists economized on their scarcest factor of production, skilled people. They substituted the use of the seemingly abundant resources and ability of the planet to absorb their pollution to enable people to do more work.

The logic of economizing on the scarcest resource, because that is what limits human progress, remains perennially true. What has changed—indeed, reversed—is the pattern of scarcity. *Today we have abundant people and scarce nature*, not the other way around. Now, as the economic gurus call for even greater efforts to increase labor productivity, as if people were still scarce and nature still abundant, a completely different approach is needed.

Today's patterns of relative scarcity and abundance dictate using more people and more brains to wring four, ten or even 100 times as much benefit from each unit of energy, water, materials, or anything else borrowed from the planet.

Radically increased resource efficiency is the first principle of Natural Capitalism. It offers not only increased profits, but also the solution to most of the environmental dilemmas facing the world today. It greatly slows depletion of resources at one end of the economic process, and the discharge of pollution—resources out of place—at the other end. It creates profits from not having to pay for either. And it also buys time, forestalling the threatened collapse of natural systems.

That time should then be used to implement the other principles of Natural Capitalism. These are:

- **Biomimicry.** This is the approach of asking how nature would solve this problem? Nature makes a wide array of products and services very differently than we do. It means eliminating the concept of waste by redesigning the economy on biological lines that close the loops of materials flows;
- **Restoration.** Any good capitalist reinvests in the productive capital that is in short supply. The challenge facing business today is to reverse the planetary destruction now underway with programs of restoration that invest in natural capital.

Together the three principles of Natural Capitalism enable businesses to behave as if ecosystem services were properly valued. This enables companies to begin to reverse the loss of natural capital and its valuable services, while increasing profits. It makes it possible to profitably achieve a more sustainable economy, in which there is not net loss of human or natural capital.

INCREASING RESOURCE PRODUCTIVITY

It is relatively easy to undertake this course of action because at present resources are used incredibly wastefully now. The stuff that drives the metabolism of industry currently amounts to more than 20 times your body weight every day for every American, or more than a million pounds per citizen per year.

Globally, the economy mobilizes a flow of half a trillion tons per year. But of all that stuff, only about 1% of ever gets embodied in a product and is still there six months after sale. The other 99% is waste. You might call this un-saleable production: business pays to make it, you buy it, but you do not derive continuing value from it. Cutting such waste represents a vast business opportunity.

Nowhere are the opportunities for savings easier to see than in energy. The U.S. has already cut its annual energy bill by \$300 billion since the first oil shock in 1973, but still wastes another \$300 billion worth of energy each year. Just the energy thrown away as waste heat by U.S. power stations equals the total energy used by Japan for everything.

But many companies have shown how to reduce such waste and increase profits.

Southwire Corporation, an energy intensive maker of cable, rod and wire, halved its energy per pound of product in six years. The savings roughly equaled the company's profits during that period when many competitors were going bankrupt. The energy efficiency effort probably saved 4,000 jobs at ten plants in six states. The company then went on to save even more energy, all with two-year paybacks.

Dow Chemical's Louisiana Division implemented more than 900 worker-suggested energy-saving projects during 1981—93, with average annual returns on investment in excess of 200%. Both returns and savings tended to *rise* in the latter years, even after the annual savings had passed \$100 million, because the engineers were learning new ways to save faster than they were using up the old ones.

Combining energy efficiency and renewable sources of energy makes even more sense. Over a decade ago the people of Sacramento California voted to shut down the then operating (but not very well) nuclear plant Rancho Seco. The utility lost half of its generating capacity at once. But rather than follow the conventional wisdom and construct any sort of centralized power plant, the utility invested first in helping its clients get more efficient. In effect it helped people use less of its product, because doing this was the cheapest way that it could meet its customer's needs for energy services. None of us want raw energy. We wouldn't know what to do with a kilowatt of electricity if one walked up and bit us. What we want are hot showers and cold beer, industrial shaft power and mobility – the services that energy gives us. The utility realized that its real business was to supply those services in the cheapest way. And energy efficiency is

that. Next the utility invested in a diversity of distributed supply, renewable sources like solar photovoltaic electricity, solar heating, wind, biomass, as well as fuel cells and co-generation and tri-generation. Any technology that met the customers' needs at the location of those needs was chosen over conventional supply options. This not only gave the utility the cheaper option, but gave them experience with a diversity of supply options.

Now, ten years later, the econometric studies of those choices are complete. The entire region is financially healthier than had they just kept running the nuclear plant, by \$180 million. The utility was able to keep rates level for a decade. This retained 2,000 jobs in factories that would have relocated had the rates increased. The choice of distributed generation generated 880 new jobs. And the utility was able to pay off its debt significantly earlier than scheduled.

Such examples are indicative of the sorts of profitable ways to meet our needs more profitably while using far fewer resources. But they are only a beginning.

The Energy Intelligent Europe Initiative, signed by Parliamentarians from all 15 members, calls for integrating energy efficiency and renewable energy as the basis for European competitiveness and high quality of life. The EU seeks to get 22% of its electricity and 10% of its energy from such clean sources as wind within 10 years

State-of-the-shelf technologies can make old buildings three- to four-fold more energy-efficient, new ones nearer 10-fold—and cheaper to build. Examples include large and small buildings in climates ranging from well below freezing to sweltering.

Industries can achieve similarly surprising savings:

1. Thirty-five improvements can save about half the energy in typical existing industrial motor systems (which use three-fourths of industrial electricity) with returns on investment approaching 200% per year. The improvements are so profitable because only seven of the improvements must be paid for; the other 28 are free byproducts.
2. Radical changes in process technology can, for example, often condense a big chemical plant into the size of a watermelon, via the practice of microfluidics.
3. Revolutions in product lifetime, design and manufacturing with a minimum of materials, and elimination of waste can enable far less manufacturing to produce the same desired flow of products and services.

Combining new technologies with the new design thinking can yield unexpected breakthroughs. It is now possible to produce a large sport-utility vehicle that gets 100 miles per gallon-equivalent, powering its electric propulsion motors with an onboard fuel cell using compressed gaseous hydrogen. Five sedan versions of such cars are now running around in Los Angeles, courtesy of Honda and Toyota. The fuel cells that power them are ultra-reliable and emit no pollution, producing only hot drinking water. What do you do with hot water in a car? Install an espresso maker in the dashboard? Hold that thought.

Now consider Four Times Square, the new Durst office building in New York City. It uses half the energy of a normal building. Half of what appears to be glass (the spandrels) are actually photovoltaic cells, which along with the fuel cell in the building's basement enable the building to continue to operate even in the 2003 Northeast blackout. Because the building has ultra-reliable power 24/7, it can lease space at premium rents.

Now suppose that you drive one of these new hydrogen powered cars and live and work in such a building. Your car, when parked there, can be plugged into the building's hydrogen supply and back into the electric grid, becoming a mini-power-plant on wheels and selling electricity back to the grid at the real-time price.

This combination of technologies— now in or entering commercial service to which roughly \$10 billion has already been committed by automakers and potential new market entrants—will ultimately save about as much oil as OPEC now sells. Indeed, it probably spells the end of the car, oil, steel, aluminum, nuclear, coal, and electricity industries as we know them, and the beginning of successor industries that are cleaner and more profitable. Ford Motor Company Chairman William Clay Ford, Jr., has predicted that hybrid-electric cars and trucks could account for 20% of vehicle sales by 2010.

The opportunities to use energy more efficiently and to use renewable energy mean that global climate change can be prevented at a profit. Leading companies are starting to capture this potential. British Petroleum recently announced a commitment to reduce its carbon emissions 10% below its 1990 levels by 2010, in effect adhering to the reductions called for in the Kyoto protocol. It achieved this two years later in 2002. Doing it is now saving them \$650 million. Even if it cost them money to achieve this, company spokespeople say, it would be worthwhile, because it makes them the sort of company that the best talent wants to work for. The results it is achieving, and the thinking that drove the commitment in the first place also lead BP to announce a rebranding to “Beyond Petroleum”. Virtually all of its regular corporate advertising states that it is working to become a more sustainable company.

DuPont recently announced that by 2010, it will reduce its CO2 emissions by 65% from 1990 levels, raise its revenues 6% a year with no increase in energy use, and get a tenth of its energy and a quarter of its raw materials from renewables—all in the name of increasing shareholder value. STMicroelectronics has set a goal of zero net carbon emissions by 2010 despite a 40-fold increase in production from 1990. The company reckons that by the time it is carbon neutral, it will have saved almost a billion dollars. Making such a bold commitment has driven the company's innovation, taking them from the number twelve chipmaker in the world's to the sixth largest.

This is why the European Union has already adopted at least a fourfold ("Factor Four") gain in resource productivity as the new basis for sustainable development policy and practice. . Some countries, like Holland and Austria, have declared this a national goal. The OECD Environment Ministers, the government of Sweden, and distinguished industrial and academic leaders in Europe, Japan, and elsewhere have gone even further, adopting Factor Ten improvements as their goal. The World Business Council for Sustainable Development and the United Nations Environment Programme have called for Factor Twenty. There is growing evidence that even such ambitious goals are feasible and achievable in the marketplace. They may, in fact, offer even *greater* profits.

And this is only the beginning.

ELIMINATING THE CONCEPT OF WASTE

Resource efficiency is Natural Capitalism's cornerstone, but is only its beginning.

Natural Capitalism doesn't mean merely reducing waste; it means eliminating the entire *concept* of waste by adopting biological patterns, processes and often materials. This implies eliminating any industrial output that represents a disposal cost rather than a saleable product.

The second principle of Natural Capitalism is Biomimicry. The science writer Janine Benyus, author of *Biomimicry*, points out that nature uses low energy flows, and ambient temperature manufacturing. It makes almost everything it produces near something alive. Nature also solves its problems in ways that don't produce persistent toxins or waste. The output from any process in nature is the input for some other process. The industry of the future will derive its designs, processes, and often materials from such biological wisdom. This implies eliminating any industrial output that represents an emission or a disposal cost rather than a saleable product.

Some of the most exciting developments rival anything manmade. Janine points out that spiders make silk, strong as Kevlar but much tougher, from digested crickets and flies, without needing boiling sulfuric acid and high-pressure extruders. How do those little guys do that?

The humble abalone routinely performs a marvelous feat of chemical engineering, long been the envy of materials scientists. Using nothing but calcium carbonate (chalk) and a natural polymer, abalones produce a shell that is 1,000 times stronger than those two materials would be if randomly mixed together. It self-assembles at the molecular level an inner lining twice as tough as our best ceramics. And it does it in seawater without needing furnaces.

Researchers at Sandia National Labs finally said that they had to be at least as smart as an abalone. They developed an electrically charged silicon wafer that they dipped in alternating baths of calcium carbonate and a polymer. As the excess solution evaporated, it left behind a transparent, seashell-like coating that had self-assembled at the molecular level, just as it does for the abalone. The resulting resilient material could soon lead to scratchproof lenses, nearly unbreakable windshields or the nosecone of the Space Shuttle.

Dr. John Todd's biological "Living Machines" make sewage treatment plants that look like a garden—because they are. They turn sewage into exceptionally clean water, plus valuable flowers, an attractive tourist venue, and other byproducts, with no toxicity, no hazard, no odor, and lower capital costs. The plant can easily be small enough to serve an urban neighborhood or even a single building, avoiding the diseconomies of excessively centralized collection and treatment systems. Such "Bioneers" are also using living organisms to "bioremediate" toxic pollutants into forms that are harmless or salable or both.

Nature runs on sunlight, and creates conditions conducive to life. In contrast, consider the list of dozens of synthetic compounds that are now found in mother's milk: ketones, aldehydes, phenols, butanols, pentanols.... It is not too soon to ask just what it is that we are doing to ourselves. Nature runs a rigorous testing laboratory in which products that do not work are recalled by the manufacturer. This ought to be a cautionary tale for a young species like ours.

Biomimicry is an archetype for the emerging world where environmental regulation will be an anachronism. Often such a world emerges just from the cybernetics of not inflicting on others any emission to which you wouldn't expose yourself: how clean a car would you buy if its exhaust pipe, instead of being aimed at pedestrians, fed directly into the passenger compartment? How clean would a city or factory make the water it discharges if its intake pipes were downstream of its outlets?

Closing the loops in the flow of toxic materials can also be a good way to encourage better design that eliminates toxicity altogether. For example, how clean would you design a car to be if the exhaust pipe were plumbed into the passenger compartment instead of being aimed at people on the streets? How clean would you make the discharge from your factory if the water intake were upstream of the water intake? (The first Environmental Minister of Australia made many factories do exactly that.) How safe would you

make your explosives factory if you built your house next to it? (That's what Mr. DuPont did; his company has been the world leader in industrial safety ever since.)

Ultimately, companies that need environmental regulation will not be around, because they will not be profitable. They will have wasted money to make things that nobody wants. In such a biological world, the design lessons of nature will drive industrial innovation and will improve business—as well as health, housing, mobility, community, and national security. In this coming world, companies will take their values from their customers, their designs from nature and their discipline from the marketplace. Companies that ignore this will do so at their peril.

REINVESTING IN NATURAL CAPITAL

The third principle of Natural Capitalism is to reinvest to reverse the planet-wide destruction of ecosystems by reinvesting profits, achieved by eliminating waste, in the most productive way. Typically this means restoring natural capital, to produce more abundantly the biotic resources and ecosystems services that are scarce.

If natural capital is the most important, valuable, and indispensable form of capital, then a wise society will reinvest in restoring it where degraded, sustaining it where healthy, and expanding it wherever possible—the better to create wealth and sustain life. This is tending to occur first in the industries of forestry, farming, and fishing, whose success depends directly on the health of the natural systems around them. But it is starting to spread to other industries as the primary inputs to manufacturing come to be grown, not mined.

Such transitions, however, will place a premium on learning to understand biological models, and on using nature as model and mentor rather than as a nuisance to be evaded.

Restoring ecosystem services might sound expensive. But whole-system solutions can be restorative in low-cost and often even profitable ways. They enable life to flourish, creating more life and hence more value. Production is carried out automatically by nature; people need only create hospitable conditions and do no harm. In this exciting sphere of innovation lie such opportunities as these:

- Allan Savory, a wildlife biologist from Africa, has redesigned ranching to mimic the migration of large herds of native grazers that co-evolved with grasslands. This can greatly improve the carrying capacity even of arid and degraded rangelands, which turn out to have been not overgrazed but undergrazed, out of ignorance of how brittle ecosystems co-evolved with grazers;
- The California Rice Industry Association partnered with environmental groups to switch from burning rice straw to flooding the rice fields after harvest. They now flood 30% of California's rice acreage, harvesting a far more profitable mix of wildfowl, free cultivation and fertilization by millions of wild ducks and geese, lucrative hunting licenses, high-silica straw, groundwater recharge, and other benefits, with rice as a byproduct;

Like biomimicry, these practices adopt the design experience of nearly four billion years of evolutionary testing. Though many details of such nature-mimicking practices are still evolving, the broad contours of the lessons they teach are already clear.

BEYOND PROFITS: WHAT'S IN IT FOR US

Worldwide, the leaders in eliminating waste will be companies, advised, I hope, by lawyers who understand that taking this approach can enable them to minimize risk and maximize competitive advantage. But there remains a vital role for governments, and for civil society. It is important to remember markets' purposes and limitations. Markets make a splendid servant, a bad master and a worse religion. Markets produce value, but only communities and families produce values. A society that substitutes markets for politics, ethics, or faith is dangerously adrift. Commerce must be in the vanguard of creating a durable system of production and consumption by applying sound market principles. Yet not all that matters is monetized; not every priceless thing can be priced. Nor is accumulating money the same thing as creating wealth or improving people. Many of the best things in life are not the business of business. And as the Russians and Somalis are finding under "gangster capitalism", unless there are democratic ways to establish and maintain a level playing field, only the most ruthless can conduct business.

Governments have many powerful tools to help clear the barriers to the market working more efficiently. People need information if they are to capture the sorts of opportunities I have presented. If anything in this article surprised you, you do not have perfect information, but in theory a true market cannot operate in its absence. Most of our economic infrastructure was created under very different conditions than now obtain. Such taxes as FICA and other penalties on employment that grew out of the First Industrial Revolution encourage companies to use more resources and fewer people. Groups like Redefining Progress have shown how gradual and fair tax shifting and desubsidization can provide more of what we want, jobs and income, and less of what we don't want, environmental and social damage.

But governments, though vitally important, cannot solve all our problems. Today over half the world's 100 largest economic entities are not countries, they're companies. Corporations may well be the only institution in the world today with the size, skills, resources, agility, organization and motivation to solve the toughest problems. At the same time, many corporate leaders are finding a far more satisfying calling working not just for the interest of shareholders in the next quarter, but becoming leaders in a growing movement to solve many of the world's problems in ways that enhance profitability. Such business leaders as Ray Anderson of Interface, Mark Moody-Stuart of Royal/Dutch Shell, and Pasquale Pistorio of STMicroelectronics are redefining what corporate responsibility means. As we cross the threshold into the next industrial revolution, many changes will beset us: technological and institutional. E-commerce alone will revolutionize business. In this turbulent time, companies seeking stability and profit, and the professional who advise them are turning to Natural Capitalism.

Companies—and communities—that conscientiously pursue the three principles of Natural Capitalism, profiting from advanced resource productivity, closing materials loops and eliminating waste, and reinvesting in natural capital, will gain a commanding competitive advantage. They'll be behaving *as if* natural and human capital were properly valued. But they'll also be making a profit today, when these values are set at zero. And as Ed Woollard remarked, companies that take these opportunities seriously will do very well. Those that don't ... won't be a problem, because they won't be around.

Perhaps the only problem with capitalism—a system of wealth creation built on the productive flow and expansion of all forms of capital—is that it is only now beginning to be tried.

For more information on these ideas, please see, *Natural Capitalism, Creating the Next Industrial Revolution*, published in 1999 by Little, Brown, written with the business author, Paul Hawken.

Or contact: Natural Capitalism, Inc., www.natcapinc.com