Environmental Entrepreneurship: What Does the Future Hold?
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Over the past decade, academics and industry alike have scrutinized the "greening of the economy" and its potential to advance environmental progress. Two questions loom before us: "Where is environmental entrepreneurship going?" and "What barriers stand in its way?" But before we can address those questions, we need first to establish a context. What, in fact, do we mean by environmental entrepreneurship? My colleagues today have plucked out of the general economy a subset that they have labeled "environmental entrepreneurship" activities. This subset includes recycling, hazardous waste remediation, energy efficiency, renewable energy, and other economic activities often associated with environmental investment.

I want to offer a different perspective—one that advances two key points. First, environmental entrepreneurship resides "anywhere" and "everywhere," rather than amid some predefined set of activities dubbed "green businesses." Second, we should think of environmental entrepreneurship as a discovery process—a process that starts with an idea, followed by investment in that idea, implementation of the innovation, and, finally, ongoing adaptation to improve the innovation. As a discovery process, all entrepreneurship involves a constant search for ways to add value by reducing costs, improving the bundle of attributes of good and services, or assembling and conveying attributes of goods and services in new ways. In the case of environmental entrepreneurship, this discovery process centers on adding value by improving the environmental performance of a good or service.

The discovery process of environmental entrepreneurship unfolds along two dimensions—technological innovations and institutional innovations. The role technological innovation plays in adding value in the marketplace is both recognized and well understood. Indeed, economic history often describes a sequence of innovations that propel economic growth. But, even with technologies, better opportunities lie anywhere and everywhere rather than in a few arbitrary "green" categories. Consider a few examples that fall outside of the traditional recycling, remediation, and renewable energy boxes.

A few years ago, at its El Dorado Refinery, Texaco embraced "Nature's Capital" by creating wetlands to treat its wastewater rather than continuing to rely on the prescribed mechanical treatment system. The wetlands purification system required one-third the installation costs of traditional mechanical treatment systems. IT cost $30,000 to $50,000 per year for maintenance in contrast to ten times that amount for maintenance of traditional mechanical treatment systems. The wetland purification system produced better water quality—and created habitat that became home to some 200 species.

Or consider a Dutch flower grower who shifted from traditional soil medium to grow flowers and, instead, began growing flowers in a rock wool medium with water circulating through the medium. Through this system, the nursery could substantially

reduce water use through recirculation; chemical use decreased dramatically through the highly refined and controlled application in the circulating water; plant quality improved because variability in growing conditions was reduced; and labor costs declined because harvesting flowers from rock wool containers on platforms was easier than harvesting from ground-level flower beds.

Take another example: Hitachi six-screw washing machines. The machine enhances ease of disassembly and remanufacturing. It takes 33 percent less time to produce because it has fewer parts; it requires less servicing for the customer because of the reduced number of moving parts.

These industries—oil refining, flower growing, and washing machine manufacturing—fall outside traditional "green" categories. Yet these are all examples of environmental entrepreneurship. Similar opportunities lie among the many goods and services in the marketplace and among all activities and processes undertaken by governments.

Let us move from technological innovation to institutional discovery—an oft-neglected dimension of entrepreneurship. For environmental entrepreneurship, new institutional arrangements that improve environmental performance fall into several categories.

First are new relationships between manufacturers and suppliers through "green performance contracts." For example, Saturn used to buy paint by volume. Under this arrangement, paint suppliers had little incentive to make more efficient paint—paint that would adequately color cars but use less "stuff." Saturn introduced a green performance contract through which its paint suppliers get paid on the basis of number of cars painted rather than volume of paint purchased. Under this arrangement, the paint suppliers now have an incentive to develop more efficient paint. They also have an incentive to work with Saturn to reduce overspray, which wastes paint.

Next are new relationships between producers and customers. For example, moving from purchase agreements to lease agreements can reduce waste. Interface Flooring introduced "carpet tiles" and carpet tile leasing, whereby companies lease floor covering rather than buy it. When individual carpet tiles wear out, they can be replaced without taking up the entire carpet and discarding it.

Green building management contracts offer another type of performance contract. Through threes contracts, building managers get paid through, for example, energy savings and, therefore, have incentives to invest in energy-saving practices and technologies.

A third institutional innovation centers on new relationships between a company and a host community. Many companies have developed "Good Neighbor Compacts" through which they work with their communities to develop agreed upon performance goals—goals that often go beyond basic compliance with state and federal regulations. These compacts help enable companies to continue or expand production and to overcome NIMBY—not-in-my-backyard—predispositions.

Finally, we are seeing the emergence of new relationships among producers through waste exchanges or development of byproduct synergy contracts. Through these relationships, one company's waste becomes another's feedstock.

How does all this apply to the sorts of activities that the Department of the Interior engages in? At Interior, the Department operates within a context of cooperative conservation, a framework that builds upon emerging conservation entrepreneurship now dotting our landscapes.

We are seeing new institutional relationships emerge. For example, in the boot heel of Arizona and New Mexico, ranchers have joined together to create a grassland bank that conserves land while also creating a "bank" of forage accessible during periods of drought or other special needs.

In Colorado, the Colorado Cattlemen's Association has created a special land trust. Through the trust, ranchers have created some 116,000 acres protected through conservation easements. Sale of easements provides needed revenues, maintains open space, and allows ranchers to continue working the land. In Montana, ranchers are taking advantage of a "purchase of development rights" program. The "Good Neighbor Compact" has spread from factories to mining operations at the Stillwater Mine in Montana.

Several financial entrepreneurs in the Northwest are trying to develop new sustainability financing tools. Specifically, they are seeking legal changes that would allow public activity bonds to be spent on conservation easements to create sustainable forestry investments. The selective logging under sustainable practices would create revenues to pay off the bonds. The concept would require a change in the tax code. But the idea, nonetheless, exemplifies a sort of environmental entrepreneurship.

What, then, are the challenges to this entrepreneurship? First is the marketplace itself. While opportunities for greening are infinite, attempts that assume buyers are willing to pay a premium for environmental improvements in their goods and services will find expectations unfulfilled. Just a small percentage of the buying public is willing to pay a premium for environmental attributes. Goods or services with environmental attributes, to be widely embraced, must be cost competitive with alternatives to flourish.

Second are rules constraints. For example, the punitive dimensions of the Endangered Species Act present a deterrent to landowners who might otherwise wish to engage in improving habitat to attract endangered species. And Resource Conservation and Recovery Act hazardous waste definitions stand in the way of more waste exchanges.

Third are information constraints. Performance contracts, for example, require good baseline information and good metrics that specify what constitutes good practices and good results. Ironically, the "old environmentalism" of the past four decades produced a

lot of rules and procedures, but relatively little effort was expended on developing good environmental performance measures.

Tax law, too, can be a constraint. The current code does not permit the sort of environmental activity bond envisioned by some foresters engaged in sustainability practices. And tax code treatment of leasing versus capital asset purchases can make "green performance leasing" appear more expensive than direct asset purchasing.

But let me end on a note of optimism. Opportunities for environmental entrepreneurship abound. The limits lie only in our imaginations. Five areas hold especially strong near-term possibilities.

First is in the realm of performance contracts. Such performance contracts include energy efficiency building management contracts. But think big—and with creativity. Such contracts also lie, for example, in land management performance contracts in which, for example, environmental experts provide performance measures for farmers with confined animal feeding operations, audit the farmers' performance against those measures, and propose improvements. Already, such contracts are being used with potential cost savings for farmers if, and this is a big if, the Environmental Protection Agency and other agencies agree to substitute performance contracts for prescriptive rules.

A second area of opportunity is in conservation land transactions. Demand is growing for the services of those skilled in arranging conservation easements, purchase-of-development rights transactions, mitigation banks, grass banks, and so on.

A third area of opportunity lies in development and application of metrics and monitoring. The growing emphasis on environmental indicators requires more monitoring and more measurement information and technologies.

Fourth, I see a growing demand for alternative dispute resolution, mediation, and arbitration of environmental conflicts. The evolving shift to cooperative conservation will generate more demand for mediation skills. Demand already outstrips supply of skilled mediators.

Finally, though my colleagues here suggested remediation is a declining arena for environmental entrepreneurship, I disagree. Remediation of hazardous wastes is likely a non-growth field. But we can expect to see demand for remediation and restoration in new arenas—especially in riparian restoration. We will also see a growing demand for biotechnology applied to remediation challenges. And we will see a growing demand for "natural engineering," such as wildlife friendly culverts, or permeable infrastructure in building complexes to permit natural drainage and percolation of water into the ground. The 20th century was a time of paving over our cities. The 21st century will be a time of re-creating natural landscapes, natural urban streams, and other permeable landscapes.

Yogi Berra once quipped that "the future ain't what it used to be." Environmental entrepreneurship is a search for new ways to add value through environmental

improvements. These improvements take the form of cost reductions through waste exchanges or energy and water efficiencies. They take the form of providing new bundles of customer value such as through hazards reductions or conservation enhancements. The opportunities lie anywhere and everywhere as we enter an era of the viridian verge—the coming together of environmental and economic values.