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Big Green: IBM and the ROI of Environmental Leadership

by John Davies

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The Bottom Line

Saving more than $100M since 1998 by conserving energy, IBM continues to set environmental goals while openly reporting its performance, proving good practices generate good money.

Executive Summary

"Can we leverage our experience as a responsible company to make money?" Over the past several years, AMR Research has seen a rise in inquiries like this from senior executives regarding the social and environmental questions that face global corporations and their roles as leaders in addressing some of the world's most difficult problems.

Industry leaders understand the need for building a sustainable business. Few, if any, question the impact of global warming. They all have concerns about energy security, and the role of globally responsible citizenship is taken seriously. Progressive business leaders also see unique opportunities for new products and services for the emerging green economy. For many executives, it is not what they can do individually, but how they can affect change within their organizations as well as the world at large. They are looking for lessons from the front lines that demonstrate a broader set of leadership principles.

IBM's approach to the environment offers one such set of lessons. As a result of our research into Big Blue's approach, we have identified three fundamental cultural traits that have informed IBM's environmental initiatives of the past, present, and future:

- **Leadership responsibility**—While its internal environmental stewardship initiatives have been broad, IBM has also participated as a founding member of numerous industry and governmental organizations and helped develop global standards for environmental excellence.
- **Open communication**—Since the publication of its first environmental progress report, IBM has not only reported on its impact and progress in a clear and transparent manner, but has consistently communicated performance against its internal targets, which typically exceed government laws and regulations.
- **Values-driven organization**—Throughout the organization, a concern for IBM's impact on the environment is apparent, from product design to the establishment of business practices. Beyond merely "doing the right thing," a concern for the environment is embedded at all levels of the organization.

For the purposes of this Report, we reviewed documents from the past 35 years and conducted numerous interviews to understand how IBM achieved its leadership position in environmental stewardship and what this might mean for the future.

Global challenges for global leaders—an IBM case study

In 1970, economist Milton Friedman argued in *The New York Times* that "the social responsibility of business is to increase its profits," elaborating that "only people can have responsibilities…business as a whole cannot be said to have responsibilities." He goes on to question whether it is the role of the corporate executive "to make expenditures on reducing pollution beyond the amount that is in the best interests of the corporation or that is required by law in order to contribute to the social objective of improving the environment."

Since that time, public perception has shifted. Many now believe that businesses do have social responsibilities beyond increasing profits. But at the time when Friedman wrote his opinion, the people of IBM—executives and employees alike—already saw environmental stewardship as integral to their business. Their view was not only to meet regulatory requirements, but to set the standard for business while saving money and, eventually, discover new sources of revenue.

Creating the foundation for a higher standard

In 1990, IBM was one of the first companies to publicly issue an environment, health, and safety report, a forerunner of what we now refer to as a sustainability or corporate citizenship report. This initial document described its progress in addressing environmental issues, which coincided with the establishment of a corporate staff dedicated to environmental affairs. But this action and the 1990 report didn't represent the beginning of IBM's formal efforts to communicate the importance of environmental responsibility. A corporate policy issued by then chairman and CEO Thomas J. Watson, Jr. on May 26, 1971, instructed that "line management in IBM must be continuously on guard against adversely affecting the environment. This effort must include constant attention not only to the waste incident to producing a product, but also to the consequences of the processes established during product development."

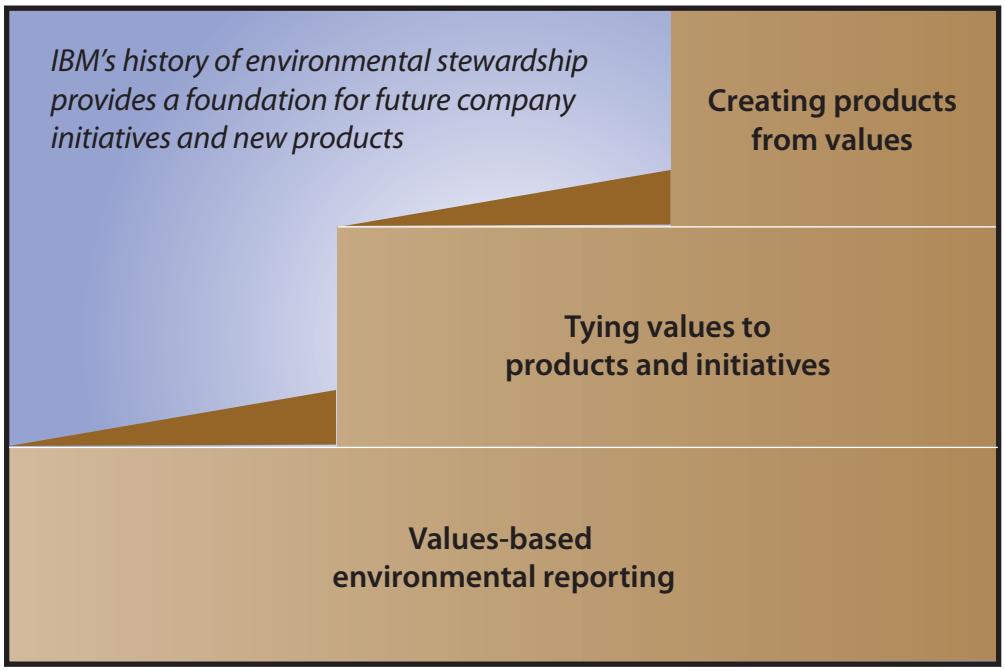
> "Perhaps the first of IBM's environmental efforts was industrial wastewater treatment at our plants, back in the 1940s, years before treatment was required by law."
>
> *—John Serino, director of corporate environmental programs, 1989*

While this may be the first documented evidence of IBM's perspective on the environment, executives who began their careers with the company at that time or earlier state that a concern for the environment was already a value embedded in the company's culture. Several of the executives we interviewed reaffirmed that environmental policy at IBM was not a CEO mandate, but a part of the fabric of the culture. According to one source, IBM was communicating information about chemicals used in the workplace to employees and chemicals used in products to customers since the 1960s, 20 years before it was required by law.

From environmental reporting to Big Green Innovations

In order to understand IBM's position as a business with a strong sense of environmental stewardship, the evolution of the company's role in this regard can be viewed in three overlapping phases. The values (and value) associated with environmental stewardship are central to all three phases (see Figure 1).

Figure 1: IBM builds on its experience



Source: AMR Research, 2007

As IBM's approach to environmental stewardship continues to evolve, the company has moved from sharing its experiences with external organizations and clients to identifying new business opportunities. The past few years have placed IBM at a turning point: the company's initiatives are no longer focused solely on cost-cutting, but on providing a foundation for generating new sources of revenue.

Here are the overlapping phases that describe this journey:

- **Values-based environmental reporting**—Critical to IBM's environmental stewardship has been its long history of operational transparency. The firm is one of the first to publish aggressive goals in terms of lowering its impact on the environment as well as its performance against those goals. As a leader in reducing its environmental footprint, IBM has helped governments and other businesses by sharing its approaches through participation in a number of programs and organizations. This has resulted in the company winning the U.S. Environmental Protection Agency's (EPA) Climate Leaders Award twice, among many other awards.

- **Tying values to products and initiatives**—As IBM pursued projects associated with environmental stewardship, the company began to integrate its design efforts more closely to reflect a concern for its products' environmental impact. This led to designing products based on their entire lifecycles, beyond end of use to reuse and recycling. As a result of incorporating environmental criteria in its product stewardship efforts, IBM incorporated increasing amounts of recycled materials into its products, designing them for disassembly and reuse, and making them even more energy efficient.
- **Creating products from values**—More recently, IBM has embarked on programs that leverage its longstanding experience in environmental stewardship and applies its knowledge and experience to some of the biggest problems facing the world. These initiatives involve overhauling the technology used in utility networks, decreasing pollution resulting from transportation, and, perhaps most importantly, averting a looming international water crisis.

During the early 1990s, IBM underwent a difficult period as markets shifted and the company needed to reinvent itself to compete across a new landscape. However, in 1994, while this transition was underway, then CEO Lou Gerstner asserted, "In the past two years, we in IBM have had to rethink much about the way we do business. In the process, it has become clear that there are certain things that should not change. One of them is our responsibility to run a business mindful of the world in which that business operates. When it comes to the environmental well being of that world, this responsibility takes on added weight for a company such as ours: a multinational organization whose technology represents a powerful engine of change."

The foundation of environmental stewardship IBM established several decades ago continues to bear fruit. Although the savings have been dramatic, the results are not only from cutting costs. IBM has benefited from employee innovations, in both technology and advanced processes, that have not only improved the company's revenue and profitability, but also contributed to a less polluted and greener world.

Values-based environmental reporting

Many global business issues, ranging from global climate change to tracking greenhouse gas emissions, which are beginning to be recognized for their broader public and investor interest, have a legacy of being addressed proactively within IBM's internal operations. However, issues associated with business impacts on the environment are often difficult to navigate. While environmental issues can often be deeply technical, they can also be a lightning rod for public policy as well as public perception. For that reason, IBM has long sought to be ahead of the curve when it comes to environmental issues.

In interviews with Wayne Balta, vice president of corporate environmental affairs and product safety, he noted that "IBM's outlook in terms of environmental leadership encompasses all business units within the company. This includes how the environment is considered in relation to research, product design, manufacturing, procurement, distribution, and logistics as well as other areas such as health, medical, marketing, and branding."

The core internal initiative for dealing with environmental issues within IBM is its global environmental management system (EMS). As stated by the International Standards Organization (ISO), a properly implemented environmental management approach can provide assurance that good performance is not an accident. A company's EMS can identify environmental risks, helping to manage any required resolution.

While most companies certify their EMS on a per-plant basis, IBM was the first company in the world to achieve a single global registration to the ISO 14001 standard when it earned the certification in 1997. IBM's environmental management system is defined by a set of documents that includes policy directives, instructions, internal regulations, and governmental regulations around the world. The system, maintained on a corporate intranet site, allows access for all IBM employees.

Corporate Policy 139 (summary of current revision)

The primary policy directive issued by IBM is Corporate Policy 139, which establishes the following policy objectives (presented here in an abbreviated format):

- Provide a safe and healthful workplace.
- Be an environmentally responsible neighbor.
- Maintain respect for natural resources.
- Develop, manufacture, and market products that are safe for their intended use, efficient in their use of energy, protective of the environment, and can be recycled or disposed of safely.
- Use development and manufacturing processes that do not adversely affect the environment.
- Ensure the responsible use of energy.
- Assist in the development of technological solutions to global environmental problems.
- Meet or exceed all applicable government requirements.
- Conduct rigorous audits and self-assessments.

Setting targets and promoting transparency

While IBM's certification of a global EMS is certainly a significant accomplishment, its approach to managing environmental issues goes far beyond a reporting system. Since its first corporate environmental report, the company has not only recorded its performance, but set targets for future achievements. Each site submits an environmental master plan that is then aggregated with plans from other sites for IBM's consolidated evaluation and reporting.

An example of IBM setting corporate targets associated with the environment is its approach to the topics of ozone depletion and global warming. In a 1990 article in IBM's *Think* magazine, Mason Southworth wrote that "even more serious has been the growing recognition of two potential threats to the whole Earth: global warming caused by gases that build up in the atmosphere and damage to the ozone layer by other gases that accumulate higher up in the stratosphere."

When the environmental report was issued, IBM was trying to determine how to deal with its use of chlorofluorocarbons (CFCs), which were later shown to cause depletion of the ozone layer in the atmosphere. The company set a target to eliminate the use of CFCs by 1993, six years ahead of the deadline set by the U.S. Clean Air Act. In a number of other instances, the company set a high bar and exceeded it. As Mr. Balta noted, "Continuing to raise the bar after our past accomplishments becomes incrementally more difficult, but it's a challenge we embrace."

Most recently in the public arena is the issue of global climate change. As a founding member of the EPA's Climate Leaders program, IBM has long identified addressing climate change issues as an important initiative for the company. "While some assume that cutting carbon dioxide (CO2) emissions costs businesses money, we have found just the opposite. Addressing climate change makes business sense," said Mr. Balta.

He goes on to state that IBM has "saved more than $100M since 1998 by conserving energy. When you consider the significant environmental benefits also achieved, cutting emissions is a win-win proposition. Climate Leaders presents an opportunity for IBM to continue its voluntary efforts to further conserve energy and reduce its greenhouse gas emissions, share best practices, promote cooperation between industry and government, and gain recognized leadership."

As far back as 1990, the company was reporting its energy savings, particularly of electricity, in terms of CO2 emissions eliminated. It then translated this to the equivalent number of cars taken off the road.

In terms of performance since that time, IBM has reduced or avoided CO2 emissions by an amount equal to 39.88% versus a baseline of 1990. That accounts for avoiding more than 8.98 million metric tons of CO2 emissions. The company expects to extend this achievement by further reducing CO2 emissions associated with its total energy use 12% by 2012 (against a base year of 2005).

IBM was also a founding member of the Chicago Climate Exchange (CCX), the world's first voluntary, legally binding, rules-based greenhouse gas emission reduction and trading system. As a result of its longstanding environmental stewardship efforts, IBM is currently a creditor based on its aggressive stance on reducing CO2 emissions.

Pollution prevention with community involvement

Reducing greenhouse gases and CFCs is only one example of IBM's approach to pollution and emissions. Since 1971 the company had formally established a pollution prevention program focused on reducing hazardous wastes and other pollutants at their sources. Then CEO Thomas Watson noted that, above and beyond vigilant corrective measures, the best way to fight pollution is to stop it before it starts.

IBM has saved more than $100 million since 1998 by conserving energy.

Stopping pollution before it starts can also mean holding yourself to a higher standard of measurement. Many years ago, IBM noted that its standards for safe water quality should not only be measured in parts per million (although it would significantly beat these requirements when established by internal and external regulations). The company's internal rule is to ask sites to base their quality criteria on how the discharge would affect the ecology of the body of water they are using. By framing the discussion in this way, IBM engages more directly with the community involved and considers a broader range of contingencies and local impacts.

Tying values to products and initiatives

IBM was clearly an early leader in implementing environmental initiatives for managing its worldwide business operations. The values that drove environmental stewardship as a foundation for corporate-wide initiatives are also deeply embedded in the way that IBM views product stewardship. A corporate policy from then president Frank T. Cary on September 9, 1974, instructed the following: "I expect each operating unit to cooperate fully in national energy conservation programs, give high priority to conservation of energy, raw materials, and commodities in the design and manufacture of our products and—wherever practicable—develop substitutes for materials in short supply."

Mr. Cary's policy directive amplified Mr. Watson's 1971 memo, where he called for an assessment of the environmental impact of every IBM product and process. By 1991, IBM had established a formalized product stewardship program to address the company's environmental management of the product development process and the products and services it offers. As a result of implementing this program, product design focused on the following features:

- Avoiding toxic substances
- Enabling easy disassembly and reuse
- Incorporating recyclable plastics or materials with recycled content
- Improving energy efficiency

There are a number of effects that can be seen from IBM's integration of environmental concerns with product stewardship, such as improved production methods, manufacturing processes, and equipment. Among the most significant efforts are IBM's design for environment and design for recycling programs.

Design for environment

Design for environment is a strategy historically employed by companies to probe for potential product hazards during the design phase. According to early work by the EPA, by following this philosophy it was possible for companies to substitute less toxic materials to make a product safer to build as well as use.

In 1984, IBM initiated a program that specifically focused on the environmental impact assessment of all its products. By 1991, IBM developed an online environmental impact assessment system to provide an early review of any proposed product or process. According to then director of integrated safety technology, Diana Bendz, "This effort has focused the attention of IBM design engineers on all aspects of a product's lifecycle, including packaging, material selection, energy efficiency, and recyclability."

Early impacts of this program were on the company's packaging. IBM made the move to standard corrugated boxes and required greater recycled content. In 2000, it established a database to capture the cost savings of its various packaging initiatives. In the last five years, the company has realized over $80M in savings while reducing the environmental impact of its packaging. More recently these design for environment processes and IT tools have enabled IBM to report the compliance status of assemblies or full systems against regulations such as the European Reduction of Hazardous Substances (RoHS) requirements.

Design for recycling

In its global operations, IBM was an early leader in solid waste recycling. In 1988, IBM set a goal of recycling 50% of all wood, metal, paper, glass, and plastic from its manufacturing sites by 1992 (by 1990 the worldwide figure was 52%). IBM has since updated its nonhazardous waste recycling goal. Currently, the company's goal is to recycle 67% of the nonhazardous waste generated by locations owned or operated by IBM. In 2005, the last year the data was compiled, IBM recycled 77% of its nonhazardous waste.

> "Maintain respect for natural resources by practicing conservation and striving to recycle materials, purchase recycled materials, and use recyclable packaging and other materials."
>
> *—Corporate Policy 139*

Its experience with recycling programs throughout the organization made it easier for design engineers to think about how to embed those same principles into the product development process. In 1991, IBM established the Engineering Center for Environmentally Conscious Products (ECECP) in North Carolina.

As far back as the PS/2 Model 40 in 1991, IBM designed products based on a "design for disassembly" strategy that made manufacturing as well as disassembly much easier through the use of snap technology. At the same time, with the PS/2 E, the company was able to recover plastic covers from end-of-life computers and blend the recaptured plastic to make PS/2 covers with 25% recycled content. By 2006, 28% of all plastic resins procured by IBM contain recycled plastic content.

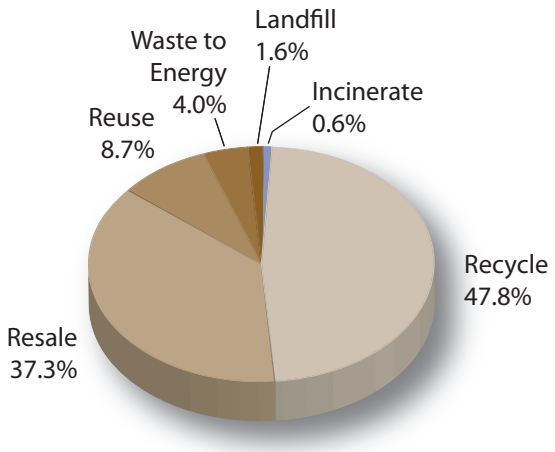
Managing product end of life

In response to customer requests, IBM began offering product take-back programs in Europe in 1989. These programs, referred to as the Global Asset Recovery Service (GARS), have grown rapidly, and asset recovery and recycling is now offered to IBM's commercial customers in 21 countries.

IBM began to publicly report the volumes of product waste it collected and recovered 12 years ago. As of year-end 2005, the amount exceeded 1.3 billion pounds, making IBM the first IT company to exceed the 1 billion pound threshold. When it comes to managing the product waste it collects, IBM places top priority on reuse and recycling. In that regard, IBM has had a goal in place for many years to send no more than 3% of what it processes to landfills. For 2005, IBM sent less than 2% of what it collected to landfills (see Figure 2).

On a global basis, the GARS program receives almost 40,000 machines each week weighing nearly 1.8 million pounds. In 2006, Global Financing sold more than $1.6B in preowned equipment. While IBM is providing an important service that prevents pollution and excess landfill use, the GARS business unit also acts as a profit center. As Mr. Balta noted, "IBM's GARS operation demonstrates the value of integrating environmental considerations into the fabric of our business. It also provides an example of how good environmental management makes good business sense."

Figure 2: Product end-of-life management operations



2005—percentage by weight

Source: IBM 2006 Corporate Responsibility Report

Creating products from values

One of the issues many companies are working to address is how to leverage the strengths of their research labs, brand equity, and organizational core competencies to develop more environmentally targeted products. As the awareness of consumers and businesses increases about topics such as global climate change and environmental stewardship, businesses realize these criteria could set the stage for the firms that will dominate in the 21st century.

"Energy prices will be an issue, as will security concerns and concerns about climate change," said Mr. Balta. "With our experience, we can help companies understand how good environmental practices make good business sense." What he and others at IBM also see is their knowledge and experience in environmental stewardship can help the company develop new businesses.

Already IBM has collaborated with its customers on a number of innovative projects. These span all areas of its business, from hardware to industry-specific solutions for various sectors. Consider the following examples:

- **Intelligent oil fields**—In an initiative headed by Steve Edwards, Global Lead Chemical and Petroleum, IBM helps companies extract oil efficiently and responsibly by applying advanced analytics and modeling. Once a site is in operation, RFID-enabled networks can provide real-time monitoring of production, supporting the remote management of facilities, plants, and equipment. As an extension of this real-time network, RFID tags are embedded in workers' identification badges, which can expedite search-and-rescue efforts in emergency situations.
- **Data center energy savings**—While IBM has invested in energy efficiency for a wide range of equipment used in data centers, from blade servers to storage systems and virtualization technology, the company has also innovated in other areas that affect the data center. By using robotic thermal mapping, managers can pinpoint hot spots and redesign around them. With a software tool called PowerExecutive, data center managers can begin to take control of their power usage, measuring real-time usage on each piece of PowerExecutive-enabled equipment. They can set power caps to control power usage during peak loads by slowing down fans and blowers, as well as by selecting the best power/performance operating mode to meet the blade or rack power budget.

While these are examples of initiatives that could be expected from a large global company, IBM has reached out over the past year to collaborate with a much broader range of partners, including industry leaders, IBM employees, government officials, and nongovernmental organizations. This outreach has helped IBM define the most important initiatives to address in the future. The foundation for this effort was laid with the publication of the second Global Innovation Outlook. A more detailed plan was established through a mechanism called the Innovation Jam.

The Innovation Jam

Under CEO Sam Palmisano, IBM has held a number of discussions via the Internet dubbed "Jams." These conversations employ the company's strategy of extended collaboration. An earlier Jam helped update the focus of the company's core values. A more recent one uncovered new business opportunities and helped IBM prioritize future efforts.

The Jams are viewed within the company as critical to IBM's future success, as 50% of its workforce has five or fewer years of tenure with the company. For a globally integrated enterprise to maintain its history as a values-driven company, these Jams represent the way forward for what IBM calls "innovation that matters."

In fall 2006, the Innovation Jam brought clients, employees, and their families together to collaborate in a worldwide brainstorming session. In two collaborative phases, more than 150,000 people in 104 countries suggested more than 46,000 ideas. After a second phase of interaction, 10 diverse business opportunities were approved for further development.

In November 2006, as a result of the Innovation Jam, Mr. Palmisano announced the top 10 ideas at a town hall event in Beijing. Before a live audience of nearly 2,600 IBM employees, partners, and distinguished guests, he announced that IBM would fund $100M to develop these ideas. 3 of the 10 initiatives have a direct relationship to IBM's work in terms of environmental stewardship:

- **Intelligent utility networks**—Headed by Guido Bartels, IBM's general manager for the global energy and utilities industry, these efforts are focused on increasing the reliability and manageability of the world's power grids. The efforts to create a smarter power grid that utilizes real-time monitoring and control as well as load simulation will help increase power availability and reliability. It should also help reduce wasteful energy consumption, which will help reduce pollution.
- **Integrated mass transit information systems**—Both real-time transportation data management and advanced simulation modeling will be used to develop these systems. IBM has the benefit of leveraging past experiences such as its work with the city of Stockholm in implementing a real-time monitoring system to support a dynamic pricing system for commuter tolls.
- **Big Green Innovations**—One of the most exciting programs for IBM is referred to as Big Green Innovations. The group behind this is led by Dr. Sharon Nunes, who has taken on the role of green innovations champion. The broad focus of this group is to apply IBM's expertise in technology, advanced modeling, materials science, physics, and other areas within the company to emerging environmental opportunities.

Big Green tackles "Big Blue"

While over three quarters of the earth's surface is covered by water, only 1% of it is fresh and accessible. According to a recent United Nations study, water scarcity is a fact of life for over 700 million people around the world. The study goes on to project that this figure could rise to impact three billion people by 2025. Agriculture and industry are equally thirsty for this scarce resource. The world's biggest problem for the 21st century may not be energy related, but rather the availability of water.

According to Dr. Nunes, one of the major initiatives under the Big Green Innovations program will be advanced water management. This encompasses a broad agenda, from availability to distribution and consumption. IBM's wide-ranging experience in modeling will be brought to bear in terms of weather prediction, as well as discovering underground aquifers and designing efficient distribution strategies. IBM will also work with other organizations to develop nanotechnology-based water filtration systems and other products to address this challenge.

"This is a world-changing opportunity," said Dr. Nunes. "We are collaborating with customers that have a global presence to address water-related problems. Together we feel we bring an innovative perspective that reaches across ecosystems to solve problems none of us could have solved individually."

A real difference for the environment

The results of IBM's ongoing programs for environmental stewardship are providing quantifiable returns economically as well as environmentally. While employee comments captured by the Innovation Jam recorded the personal passion of IBM employees, it was not a surprise to Wayne Balta. "In the past couple of years, there has been a marked increase in unsolicited calls and e-mails from people wanting to get a job in this organization. I think our employees see that a company like IBM can make a real difference for the environment."

Perhaps the most encouraging news from IBM is the economic benefit it realizes from its leadership in environmental management. "IBM estimates that, over the past eight years, annual savings from its focus on pollution prevention and design for the environment have exceeded environmental expenses by an average of two to one." As IBM has done since 1990, the dollar amounts to back up those statements are clearly presented in its most recent sustainability report.

Acronyms and Initialisms

CCX	Chicago Climate Exchange
CFC	Chlorofluorocarbons
CO2	Carbon dioxide
ECECP	Engineering Center for Environmentally Conscious Products
EMS	Environmental management system
EPA	Environmental Protection Agency
GARS	Global Asset Recovery Service
ISO	International Standards Organization
RFID	Radio frequency identification
RoHS	Reduction of Hazardous Substances
ROI	Return on investment

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