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Environmental Management at IBM (A): Making Sustainability Sustainable through Passion and Process

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We acknowledge our obligation as a business institution to help improve the quality of the society we are part of. We want to be in the forefront of those companies which are working to make our world a better place.

— Thomas J. Watson, Jr., IBM Chairman, 1969[1]

It's obvious, when you consider the trajectories of development driving the planet today, that we're going to have to run a lot smarter and more efficiently—especially as we seek the next areas of investment to drive economic growth and to move large parts of the global economy out of recession... Isn't it true that the hardest part of driving any kind of change is whether the individual—the employee, the citizen—feels the need to change at a deeply personal level? And in hindsight, when the circumstances that cry out for change are gone, when things have returned to 'normal'—don't we always wish we had been bolder, more ambitious, gone faster, gone further?

— Sam Palmisano, IBM Chairman & CEO, 2008[2]

"We pursue innovation that matters, for our company and for the world. It is one of our core values. And it means more than just creating and building great products. It involves how our work can help people and societies to thrive. So when it comes to the environment, our interest is in strategic innovation that fundamentally improves the way business and the world work -- and benefits its people. "

— Wayne Balta, Vice President,
Corporate Environmental Affairs & Product Safety,
IBM, 2008

[1] IBM Beliefs & Principles, 1969.

[2] Sam Palmisano, "A Smarter Planet: The Next Leadership Agenda," Remarks (as prepared) by Sam Palmisano to the Council on Foreign Relations, November 6, 2008. *Ideas from IBM.* November 6, 2008. http://www.ibm.com/ibm/ideasfromibm/us/smartplanet/20081106/sjp_speech.shtml (accessed November 15, 2008).

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Wayne Balta, VP of Environmental Affairs and Product Safety at IBM, sighed as he read yet another article about corporate sustainability. It seemed to him that external audiences were becoming more enamoured with splashy endeavours oriented towards quick public relations value than they were with meaningful, long-term changes that might make businesses significantly more sustainable. Recent suggestions that companies put "carbon labels" on their products, listing the amount of carbon dioxide (CO_2) emissions generated during the product life cycle, was a case in point.

A recent "specification for the assessment of the life cycle greenhouse gas (GHG) emissions of goods and services" issued by BSI British Standards,[3] for example, claimed to be designed to "benefit organizations, businesses and other stakeholders by providing a clear and consistent method for the assessment of the life cycle GHG emissions associated with goods and services." These specifications would "allow for a comparison of goods or services using a common, recognized and standardized approach to life cycle GHG emissions assessment and support reporting on corporate responsibility."[4]

However, according to Balta's team, it was not at all clear that the specification would achieve these latter goals. In particular, careful analysis of the specification suggested that it permitted the extensive use of "secondary data" – data obtained from sources other than direct measurement of the processes included in the life cycle of the product. While the specification required that primary activity data be collected for "those processes owned, operated or controlled by the organization implementing the publicly available specification (PAS)," this requirement did not apply to downstream emission sources, except where the organization implementing the PAS did not contribute more than 10% to the upstream GHG emissions of the product or input prior to its provision to another organization or the end-user.[5]

As such, manufacturers that outsourced much of their production and fulfilment activities could label their products with life-cycle GHG emissions estimates using virtually no primary data. Moreover in the case of products that used electricity, studies suggested that the vast majority of the related greenhouse gas emissions were associated with their use, not with their manufacture. But some consumers were pushing hard for carbon labels. What would happen if IBM's competitors were to adopt them? Was it time for IBM to modify its approach?

Company Background

IBM was founded in 1911, and by 1964 it had become the leader of the world's computing industry. The introduction of the System/360 – the first family of fully compatible computers and peripherals – proved to be one of the most successful product launches in history, and IBM remained a leader of

[3] BSI British Standards is "the National Standards Body of the UK, with a globally recognized reputation for independence, integrity and innovation in the production of standards that promote best practice" (British Standards Institution. *About BSI Group.* 2008. http://www.bsi-global.com/en/About-BSI/ (accessed December 5, 2008)).

[4] "Specification for the Assessment of the Life Cycle Greenhouse Gas Emissions of Goods and Services," The British Standards Institute, 2008. p. 17.

[5] Ibid.

the information technology (IT) industry for the next 30 years.[6] However in 1991, for the first time in 45 years, the company stopped growing, and by 1993 its net losses reached a record $8 billion.[7] Lou Gerstner was hired from outside IBM to turn the company around, and he transformed IBM from a vertically integrated computer hardware manufacturer to a company with a diverse business portfolio that includes software, hardware and services. For its hardware business, IBM currently procured most of the components that went into its finished products. In 2003, Gerstner was succeeded by current CEO Sam Palmisano, and by 2008, the company had nearly 400,000 employees and generated over $103 billion in revenue: 21% in software, 21% in hardware and financing, 57% in services, and 1% other (**Exhibit 1** gives IBM's financial highlights). On November 2008 Palmisano launched IBM's "Smarter Planet" agenda, a call for the world to rethink the way it works, and a vision of how IBM could contribute to making the necessary and substantive changes a reality – by enabling smarter and more efficient systems.[8]

The Origins of Environmental Management at IBM

IBM began instituting worldwide policies for safety, conservation and the environment in the late 1960s,[9] and the company's first Corporate Policy on Environmental Responsibility was established in 1971, just a couple of months after the creation of the United States Environmental Protection Agency (EPA).[10] Written by then-CEO Thomas J. Watson, Jr., the policy stated: "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."[11]

Watson's policy placed the responsibility for protecting the environment firmly in the hands of line management, rather than in IBM's staff. It also emphasized pollution prevention instead of pollution control – a shift that did not occur at the EPA until the 1980s.[12] As Tim Mann, Manager of Environmental Product & Process Stewardship of IBM's Corporate Environmental Affairs opined, "It is easier and more efficient to establish higher standards voluntarily, on your own schedule, than to wait for the regulation and be told you need to do it within six months."

IBM's environmental impact in the 1970s and 1980s largely flowed from its facilities construction activities and ongoing operations. The team responsible for the development of IBM's environmental

[6] Chandler, Jr., Alfred D, *Inventing the Electronic Century: The Epic Story of the Consumer Electronics and Computer Industries*, (New York, NY: The Free Press, 2001), p. 85-93; Gerstner, Jr., Louis V., *Who Says Elephants Can't Dance?* (New York, NY: HarperCollins Publishers Inc., 2002), p. 116-117.

[7] David A. Gavrin and Lynne C. Levesque. "Emerging Business Opportunities at IBM (A)," *HBS Case* (Harvard Business School), February 2005; IBM Archives, "History of IBM: 1990s." *IBM*. 2008. http://www-03.ibm.com/ibm/history/history/decade_1990.html (accessed October 17, 2008).

[8] Palmisano, 2008.

[9] Ed Grimm, "Update on Safety, Energy and the Environment," *Think*, 1992, Special Report Ed.

[10] The EPA was formed in 1970, under the administration of President Nixon. (Jack Lewis, *US EPA History: The Birth of EPA,* September 21, 2007. http://www.epa.gov/history/topics/epa/15c.htm (accessed August 12, 2008)).

[11] Watson, Jr., T.J. "IBM Corporate Policy on Environmental Responsibility," May 26, 1971.

[12] The EPA's Pollution Prevention Act was established in 1990 (Browner, Carol, *US EPA History: Pollution Prevention Takes Center Stage*, September 21, 2007. http://www.epa.gov/history/topics/ppa/01.htm (accessed August 12, 2008)).

goals and directives, the Environmental Engineering Team (EET), was housed under the Real Estate and Construction Division (RECD). The EET focused on defining and maintaining what years later would become the company's Environmental Management System (EMS). The company established the Process Environmental Impact Assessment (EIA) program in 1973 and the Product EIA in 1977. The Process EIA evaluated the resource and material (e.g., energy, water, chemicals) requirements as well as discharges to the environment from all manufacturing and facilities processes. It also assessed requirements for waste management, and for the control of air emissions and water discharges. The Product EIA included an evaluation of what every product was made of, its energy use, the chemicals used for its maintenance, and whether there was a need for special disposal. An environmental evaluation program for suppliers was established in 1972 and a corporate policy on energy conservation in 1974 (**Exhibit 2** gives a sequence of timelines for some of IBM's most significant environmental initiatives.)

Several highly publicized events gave IBM's environmental efforts added momentum in the early years. In 1984 a chemical release at Union Carbide's plant in Bhopal, India, killed over 3,000 people and injured more than 300,000,[13] and in the same year the U.S. EPA proposed adding IBM's manufacturing plants in Manassas, Virginia and San Jose, California to the EPA's "National Priorities List" of hazardous waste sites for Superfund cleanup (neither sites were ultimately listed), despite the fact that IBM had already taken actions to clean up the sites. Six years earlier, in 1978, the company had established a Groundwater Protection Plan to prevent groundwater contamination, to monitor facilities "to assure the integrity of all plant system against release of chemicals into groundwater," and in case of contamination, to undertake appropriate remedial measures "to limit the spread and eventually remove the contaminate."[14] IBM's requirements remained ahead of laws and regulations because, as Diana Lyon, Program Director of External Relations for IBM's Corporate Environmental Affairs, explained, "IBM is driven by science, in addition to regulatory measures." She explained that the company "continuously monitors environmental issues, seeks to increase its understanding, and, when dealing with an emerging issue, looks at the situation and makes decisions based on science."

IBM's environmental efforts were further energized when in 1987, two years after the discovery of the Ozone Hole, routine and permitted emissions by the company placed three of its manufacturing facilities as the first, second and third largest emitters of CFC-113 in the United States.[15] According to Mann, this discovery which made the front page of a major newspaper was "a big slap on the face [and] not something IBM wanted to be associated with."

In 1990 IBM pulled together environmental, energy and legal experts from across the company to form a corporate staff function called Corporate Environmental Affairs (CEA).[16][17] When the

[13] Andrew Hoffman, "Institutional Evolution and Change: Environmentalism and the U.S. Chemical Industry," *Academy of Management Journal* 42, no. 4, 1999: p. 363.

[14] Morris, Jr., Robert B., "Memorandum on Site Groundwater Protection Plan," June 21, 1978.

[15] IBM CEA, *IBM and the Environment: A Progress Report*, (Corporate Environmental Report, Somers, NY: IBM Publication, 1992), p. 7.

[16] Claudia H. Deutsch, "Managing; Giving the Environment Teeth," *The New York Times*, March 3, 1991.

announcement was made, IBM's senior vice-president at the time, C. Michael Armstrong, said, "IBM has long been committed to conducting business in the safest way possible for our employees, the communities where we operate and for the world at large. Bringing environment, energy and safety programs together under this new position will enable us to further coordinate our work in these interrelated areas."[18]

CEA was founded at a difficult time for IBM. Nonetheless, despite the fact that the company was about to lay employees off for the first time in its history, CEA was one of the few groups that Gerstner left untouched amid his long list of changes. In his 1994 environmental report letter, he stated,

> 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.[19]

The staff of the newly formed group focused on three tasks: continuing the work of the Environmental Engineering Team, raising the stature of the Environmental Management System across IBM, and strengthening IBM's environmental strategy.[20] To do this, Balta recalled, the group asked itself, "what do we aspire to be?" and "what stands the test of time?" The group identified six major challenges:

- "Consumerism." IBM recognized that consumers were increasingly aware of the environmental, energy, and safety attributes of products.[21] This underscored the importance of designing products with this growing consumer interest in mind, and communicating their environmental attributes in a manner that was credible, transparent and easy-to-understand.
- "Credibility." This was about earning people's trust, given that industry was generally cast by the public "in the role of wrongdoer and as the major contributor to environmental problems." IBM felt there was "a lack of sufficient trust between environmental organizations, business and

[17] Environmental affairs is one of seven functional areas that IBM includes in its Corporate Social Responsibility efforts. The others are governance and financial accountability, corporate community relations, employee well-being, human resources, supply chain, and governmental programs. Each function has a representative on the Executive Steering Committee or Working Group, which meets monthly to manage IBM's CSR reporting, stakeholder engagement, and to address cross-company citizenship issues.

[18] "A.J. Hedge Jr. Appointed to IBM Environmental Post," *PR Newswire*, May 22, 1990.

[19] IBM CEA, *Environmental Report*, (Corporate Environmental Report, Somers, NY: IBM Publication), 1994.

[20] IBM's Corporate Policy 139 on Environmental Affairs, the company's corporate policy on environmental protection that was adopted in 1990, begins with the words: "IBM is committed to environmental affairs leadership in all of its business activities." This sentence also opens the two follow-on policy updates – 139A (set in 1995) and policy - 139B (1997), IBM's current environmental corporate policy. IBM's environmental affairs policy can be found at http://www.ibm.com/ibm/environment/policy/.

[21] IBM CEA, "Key Worldwide Challenges and Issues," Internal IBM Document, 1990, p. 32.

regulators." The company knew it would no longer suffice for IBM to simply say that it had existing policies and practices, that those policies met the law, and that IBM was in compliance and, therefore, performed well. IBM would instead have to prove these things.[22]

- "Communications." Events such as the Union Carbide chemical accident in Bhopal, India, and Exxon Mobil's oil spill in Prince William Sound, Alaska, had a significant negative impact on the public's perception of companies. As a result, there was growing demand for corporate disclosure. The challenge was for IBM to communicate its environmental policy, programs, objectives, and stewardship activities' results, in addition to its environmental impact, in a way that anticipated and satisfied such demand.[23]

- "Issue Coordination." The complexity of the world's environmental issues and the increasing demand that business become involved presented yet another challenge. Some of the issues were related to IBM's activities and some weren't. The company believed it faced an important challenge in having a "coordinated, worldwide posture on the issues – from actions and communications to support and contributions."[24]

- "Public Policy and Regulation." Environmental policy and regulations were constantly evolving and changing. CEA's challenge was to continuously provide intelligence on these requirements and changes across IBM; to make sure that all were well communicated and understood across the board. In addition, as a global company, IBM faced the challenge of dealing with regulations that varied geographically. It also sought to speak with one voice globally on policy matters.[25]

- "The Need to Build Upon a Record of Success." By 1990, IBM already had a series of environmental accomplishments under its belt, which the firm believed placed it ahead of industry. CEA staff felt they had already made the most obvious and easy to implement changes such as reducing energy consumption in real estate operations. The challenge was to continue to build on that record of success, and to demonstrate environmental leadership. As an internal document from 1990 explained,

  > Given increasing attention and worldwide concern over environmental affairs issues, it is clear that companies today must not rest on their past success. People concerned with environmental affairs issues will not accept past achievements as an indicator of present or future performance. Companies must make demonstrated progress today and tomorrow, regardless of whether they have already come 99% of the way toward tackling environmental

[22] Ibid, p. 33.
[23] Ibid, p. 34.
[24] Ibid, p. 34-35.
[25] Ibid, p. 35-36.

> affairs problems... Without a continued record of success, IBM will not be able to speak with the same credibility it has had in the past on its programs and public policy positions.[26]

Corporate Environmental Affairs in 2009

According to Balta, IBM's challenges in 2009 were not very different from those confronting the company at the beginning of the 1990s. However, in concert with changes to IBM's business, there were new challenges, including the need to focus on improving supply chain environmental performance, ensuring that the Environmental Management System (EMS) remained effective and helping IBM colleagues develop innovative solutions for IBM's clients.

CEA was a staff function of approximately 35 people located across the globe complemented by 400 full-time equivalent employees within the business units. CEA's responsibilities were twofold. First and foremost, it focused on setting IBM's strategy for environmental affairs, overseeing internal execution and driving operational results. In addition, it communicated IBM's efforts and their results to the public.[27] Second, CEA provided support and advice, using its experience and expertise, to client-facing IBM teams that were working with companies on improving their environmental performance.

The ability of such a small group to effectively keep track of all of the environmental issues in a company with close to 400,000 employees was possible due to Watson's 1971 Corporate Policy on Environmental Responsibility, which placed the responsibility with IBM's line management rather than with its staff. While CEA staff provided advice and counsel regarding which environmental issues mattered and why, employees within the business organizations, anchored in the company's global environmental management system, were responsible for meeting corporate requirements.

Improving Internal Operations: The Environmental Management System

The global EMS is IBM's foundation to what IBM has or has not done [in the environmental arena] – it is like a building's concrete blocks, they may not be exciting but are absolutely necessary for everything else.

–Wayne Balta, VP of Environmental Affairs & Product Safety

No results come easy… many $10,000 projects are needed to achieve a goal for a $100 billion company... Hard work is the bottom line – there is no magic.

—Edan Dionne, Director, CEA

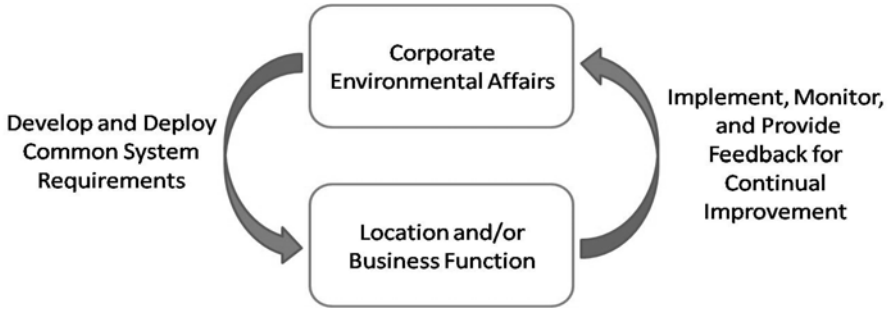
The Environmental Management System – the "EMS" – was a two-tiered approach that placed responsibility both at the corporate and at the local or business function level. CEA was responsible

[26] Ibid, p. 36-37.

[27] IBM has published an environmental report every year since 1990.

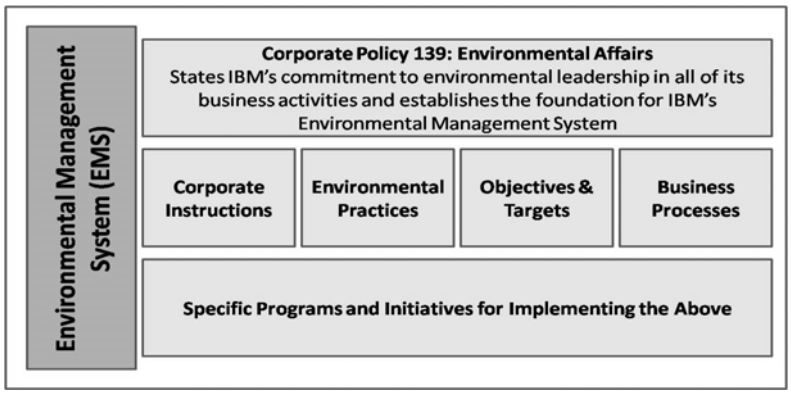
for developing IBM's worldwide EMS, including its environmental policy, environmental corporate instructions, and corporate-wide environmental practices and standards. CEA was also responsible for establishing IBM's environmental strategy and goals, and monitoring the company's progress towards them. At the execution level, IBM's locations and/or operating units were responsible for implementing the company's policy by managing environmental programs and meeting the established requirements and goals (**Figures 1** and **2**).[28]

Figure 1 EMS Approach



Source: IBM CEA.

Figure 2 Environmental Management System Structure



Source: IBM CEA.

[28] IBM CEA, "International Business Machines Corporation Worldwide Environmental Management System Manual," IBM Internal Document, August 1, 2008.

Within the EMS, "Corporate Instructions" and "Environmental Practices" identified the elements critical to the successful implementation of IBM's environmental policy, including energy management programs, environmental incident prevention and reporting, environmental due diligence for acquisitions and divestures, chemical management programs, product stewardship, and documentation of the environmental profiles of products, as well as management practices that were considered important. Corporate Instruction number ENV119 on Product Stewardship and Design for Environment, for example, stated that:

> Those IBM Organizations with responsibility for design, development, and/or release of IBM Logo hardware and chemical products shall:
> - Develop and maintain an EMS in line with IBM's worldwide EMS.
> - Establish Product Stewardship programs [which] must be integrated into the Organization's EMS and at a minimum include [elements detailed in ENV119].
> - Designate an individual to be its Product Stewardship Executive Leader.
> - Conduct annual reviews of the Organization's EMS and Product Stewardship programs with the Product Stewardship Executive Leader to ensure the EMS' appropriateness, adequacy, and effectiveness in implementing IBM's environmental policy and objectives, and consistency with the Organization missions.
> - Report performance against Corporate Product Stewardship objectives and targets and other EMS information as requested by CEA in the Corporate Environmental Performance Database, consistent with report content and timing requirements.

The EMS not only defined programs and requirements, set standards and goals and allocated responsibility for meeting these, but also monitored progress through an online system that was easily updated and could be accessed by any authorized employee within IBM. The EMS was compliant with ISO 14001, the internationally-accepted standard requirements for any environmental management system.[29] Patrick Aurrichio, the EMS Program Manager, actively participated in the development of the standard and IBM was the first company in the world to attain ISO 14001 certification at a global level – something that was achieved within a year of the standard's publication.

Monitoring activity and measuring results were key components of the EMS. These included annual site and organization self assessment programs, reporting on IBM's Environmental Performance Database (EPD), and internal and external EMS (for ISO 14001) audits. Nicolette Visalli, Real Estate and Site Operations' Environmental Manager in IBM's Thomas J. Watson Research Centre, talked about self-assessments as an opportunity to identify "if any deviation from [policy] happens, [and if so] to self-correct." In the case of internal audits, she explained that "they are a great way to learn about what others are doing" since different groups got to visit and evaluate each other.

[29] The International Organization for Standardization (ISO) is a non-governmental organization (NGO) that helps the public and private sectors across 157 countries reach consensus on what international standards should exist to meet the needs of both business and society (ISO 2008).

The Environmental Performance Database (EPD) collected environmental performance data on a quarterly or annual basis. It was extremely detailed and enabled anyone within CEA to access information on a particular site's environmental expenses and savings, as well as on its performance against all of IBM's environmental goals, across time. (See **Exhibit 3** for a "screen shot" from the EPD and **Exhibit 4** for some examples of the data that is monitored.) In addition, CEA performed environmental due diligence involving all business and real estate transactions, and tracked and/or monitored the integration of IBM's EMS requirements across acquired businesses.

One important aspect of the EMS was that it set baseline requirements and drove consistent execution across all IBM facilities and business functions, including those that were located in areas of the world where environmental regulations were less strict. For example, IBM's Environmental Practice 4 (EP4) required the installation of secondary containment to prevent spills from reaching the environment, in the event they occurred for all liquid storage and handling systems located at facilities owned, or operated and/or managed by IBM.[30] EP4 specified that "in case where this practice conflicts with legal requirements, the more stringent requirements shall apply."[31] As an example, in 2004, IBM acquired Daksh, an India-based business process and transformation outsourcing service provider, as a wholly-owned subsidiary. Like many facilities in India, Daksh was equipped with 100% backup power in the form of diesel generators. During IBM's environmental due diligence process, three Daksh locations were identified by IBM RESO Real Estate Site Operations (RESO) India as non-compliant with EP4 requirements and following the acquisition, a program was outlined and initiated to ensure these sites met all of IBM's environmental requirements, including the installation of secondary containment.

Establishing Goals

IBM is committed to environmental leadership in all of its business activities – from its operations, research and technology to its products and services. IBM will help its clients and the world develop new approaches and innovative solutions to critical environmental problems.

—IBM Goals Statement[32]

In order to fulfil its commitment to environmental leadership, IBM set goals for its environmental management system, for conservation, climate protection, pollution prevention, and product stewardship. Each of IBM's goals targeted a particular "intersection" between IBM and the

[30] This covers all liquids except: Steam and high temperature water, de-mineralized/de-ionized water, air conditioning (cooling coil) condensate, chiller condenser water, cooling tower blow-down, sanitary sewage, storm water, treated groundwater and industrial wastewater, fire suppression system water, drinking and potable water, other liquids similar in nature or hazard as those listed above and approved by CEA.

[31] IBM CEA "Corporate Facilities Practice 1410 - Underground Liquid Storage Systems," January 1979, p. 1.

[32] IBM CEA, "Environmental Goals - Internal Document," June 2007.

environment (see **Exhibits 5** and **6**), and reflected IBM's confidence in its ability to have a positive impact on that particular issue.

Corporate Environmental Affairs led the company's goal setting, which involved discussions with relevant line managers. As Mann explained, "IBM doesn't establish goals without knowing them to be technically feasible... goals may be stretch but should be achievable." Brad Brech, Distinguished Engineer of the Systems & Technology Group, agreed. His role in the goal-development process was to "provide realism to stretch goals." In his mind, he was accountable for meeting goals because "it is my job to help the corporation to do the right thing and because the tools I develop should help meet the goals." Jay Dietrich, CEA's Program Manager for Energy and Climate Stewardship, suggested that any tension during goal-setting discussions was "in good spirit" and that engineers involved in product development, for example, understood that the goals being discussed would be what they would be measured on in the future.

The buy-in process was essential because as CEA's Director Edan Dionne suggested, "people don't like to fail." It was important to give everyone responsible for meeting the goals an opportunity to participate in their development. But once the process was complete, "the time for debate is over." In the case of energy, for example, Greg Peterson, Global Energy Manager, explained that discussions surrounding goals usually focused on what the particular target should be – a 3%, 4%, or 5% conservation in the case of energy use, for example – and how IBM could measure progress. He described the conversation as "an open dialogue regarding the investment – in assets, expense monies for lights and new technologies, for example – needed to achieve a particular goal." Peterson felt that while there was little tension (i.e. whether there should be an energy conservation goal) since "nobody forces things, and CEA is very good at asking questions," there was some tension regarding where the money would come from: "Energy conservation is competing with everything else IBM spends money on, including research and other projects." This goal-setting conversation was very important – as Peterson explained, any manager "need[s] to understand very well [what the goal] is because he or she will be the one seeking to achieve it." IBM's energy conservation goal was to achieve annual energy conservation savings equal to 3.5% of IBM's total energy use. This goal applied to spaces owned, operated or leased by IBM in support of IBM's operations.[33]

Another example of the way in which IBM established environmental goals was the firm's experience in determining goals for paper procurement. The initial suggestion was to require the use of recycled paper across IBM. However, Global Procurement expressed concern that some IBM facilities were located in places where purchasing recycled paper was not an option. After some consideration, CEA and Global Procurement together decided that the goal would be to use paper originating from sustainable sourcing. In addition to addressing the underlying issue, CEA felt the impact of meeting a sustainable sourcing goal would be far greater. The goal was for IBM to procure paper/wood based

[33] Ibid.

packaging from suppliers who sourced from sustainably managed forests, when such suppliers could be found.[34]

In some cases setting goals was relatively straightforward since the "right thing to do" was evident, as when in 1987, in response to the discovery of the ozone hole, IBM chose to voluntarily eliminate the use of chlorofluorocarbons (CFCs) by the end of 1993. But knowing what the right thing to do was versus knowing how to do it were two very different things. In the case of CFCs, for example, nobody knew how to completely eradicate their use. IBM invested $100 million during the late 1980s and early 1990s to find solutions that would eliminate the use of CFCs. Everyone, from the company's president to engineers in research and manufacturing organizations, understood the gravity of the issue. As Dionne noted, "the science was indisputable." There were other situations, however, in which the approach was less obvious. At times, the company had little control over the solution. In the case of global warming, for example, CO2 could not be eliminated in the same way CFCs were. "One of the major contributors is our whole energy infrastructure," said Lyon. While IBM could and continued to pursue energy conservation and emissions reductions, the company had little control over the system as a whole.

In addition, there were other times when setting appropriate goals was much harder, since the science was more complex and evolving. Such was the case with the use of brominated fire retardants, for example.[35] Since 1990, IBM had prohibited the use of polybrominated biphenyls (PBBs) and polybrominated diphenyl ethers (PBDEs) for use in packaging, and then extended the prohibition of these compounds to its products in 1993, 14 years before their use was legally banned. Beginning in 2006, IBM prohibited the use of "unreacted" tetrabromobisphenol-A (TBBP-A) from use in IT systems enclosures for newly released products. However, IBM permitted the use of "reacted" TBBP-A in its products. TBBP-A was the most commonly used flame retardant in printed wiring boards (PWBs), where it was "reacted into" the polymer backbone of epoxy resins used in the manufacturing of PWBs. As a consequence of the chemical reaction, TBBP-A in its unreacted form was effectively lost, and the finished product (i.e., flame retarded epoxy resin) no longer possessed the same chemical and physical properties as unreacted TBBPA. [36]

Nevertheless, IBM was collaborating with industry consortia to identify and qualify non-brominated flame retardants for use in PWBs. The pivotal issue in this endeavor was not whether halogen-free flame retardants existed and were available on the market, but whether such halogen-free flame retardants could suitably replace TBBP-A in PWBs, especially in PWBs used in high-end electronic products such as servers and mainframes. Such non-halogenated flame retardants had to satisfy three essential criteria when incorporated into PWBs: 1) provide effective flame retardancy under normal

[34] Ibid.

[35] There are some health concerns related to these compounds, including their potential to be carcinogenous.

[36]. TBBP-A is the most commonly used flame retardant in printed wiring boards (PWBs), where it is reacted into the polymer backbone of epoxy resins used in the manufacturing of PWBs. There are no current regulatory restrictions on the use of TBBP-A in IT products and no human health risks have been identified in the EU risk assessment of TBBP-A.

PWB use and product failure conditions; 2) maintain the electrical and mechanical properties of TBBPA-based PWBs; and 3) be preferable from an environmental and human health standpoint.

It was not known if the proposed non-halogen replacement materials would provide the functional properties required for use in PWBs in high-end electronic products. In addition, there was little environmental, health and safety data available for the proposed non-halogen replacement materials, and there was no available data demonstrating that these replacement materials were environmentally preferable to TBBP-A. IBM, therefore, decided not to ban all brominated flame retardants, though it continued to actively participate in industry and government efforts to identify alternatives for halogenated flame retardants in PWBs that met the above required criteria. Should practical, reliable and more environmentally sound alternatives to this use of TBBP-A be identified, IBM would move to use them.

IBM's environmental goals evolved continuously. For example, the company's recycling goal for non-hazardous waste (NHW) was in its 8th generation (see **Exhibit 7**). In 1988, IBM set out to achieve 50% recycling of all wood, metal, paper, glass, and plastic from manufacturing and research operations by 1992. The company achieved this target earlier than planned, and in 1992 it added non-hazardous chemicals, end-of-life IT and manufacturing equipment, and industrial trash to the recycling goal. In 1994 CEA expanded the goal to include office locations, and in 1996 CEA updated recycling goals according to locations' individual performance. Those locations that had already achieved the 50% recycling goal were expected to achieve a 67% recycling rate beginning in 1996, while those that hadn't yet reached 50% had to continue striving for that target. In 1999 CEA divided NHW into two categories: solid waste and industrial waste, with specific recycling goals of 67% and 35% respectively. The latter had changed to 67% for all types of non-hazardous waste by 2004. In 2007, IBM raised the target to a 75% recycling rate applicable to all manufacturing, research and administrative sites. Starting in 2008, the goal also became applicable to leased locations identified by IBM.

IBM's spending on environmental efforts had remained fairly flat since 1992, hovering between $100 million and $150 million (see **Exhibit 8**), and since 1997 IBM's environmental expenses[37] had on average yielded savings[38] of more than double the expense – an estimate that CEA considered to be conservative since it did not include factors such as the intangible effects that IBM's environmental efforts had had on the value of IBM's brand.

[37] Environmental expenses include: Personnel, consultant fees, laboratory fees, permit fees, waste treatment & disposal, water and wastewater management, air emission control operations, groundwater protection operations, other environmental systems operations, waste & materials recycling, Superfund & former IBM site (i.e. environmental) remediation, and other miscellaneous expenses.

[38] Environmental savings include savings and cost avoidance related to: Site pollution prevention and operations, on-site recycling, corporate operations, packaging, recycled materials usage and savings, energy conservation & cost avoidance, Superfund & site remediation efficiencies, insurance savings, spill remediation cost avoidance, and compliance cost avoidance.

CEA staff understood that some sites would overachieve while others might underachieve against corporate goals. The EMS Program Manager, Patrick Aurrichio, explained, however, that when a business unit claimed to be unable to meet a goal, it was required to provide a thorough evaluation and explanation of the reasons why it could not do so. Lyon stressed that CEA's objective was "to have a constructive and collaborative environment, not a police state."

How did IBM decide what was "enough", or, in other words, what was the breaking point? How far did IBM choose to stretch its goals? At the most basic level, IBM would always comply with the law. Dionne explained that when there were requirements to meet certain standards, whether these were internal or regulatory in nature, "there are no questions asked" across IBM. Balta believed that this behavior "is part of the IBM culture of compliance."

At the other end of the spectrum, the question was whether a goal, in Dionne's words, "is of leadership nature." For Balta, the necessary question was "why something matters, and if it was something that would matter in the long-run." Lyon explained that "most IBMers like to have a challenge," that there was a reason why they worked for an innovation company, and that therefore, they embraced IBM's commitment to environmental leadership regardless of the difficulties inherent in the goals set by CEA.

Several people stressed that IBM employees were often personally committed to improving the company's environmental performance. For example Sharon Nunes, VP of Big Green Innovations in the Systems & Technology Group (STG), said that there was "no lack of ideas" and that "we have people knocking on our door to see how they can get involved." A "Green Community" had formed within IBM made up of 1,000 volunteers who communicated on a regular basis regarding projects they were involved in. This group had become an essential resource within IBM. Dionne explained in greater detail:

> Many IBM employees, though their day-to-day job responsibilities in IBM do not involve environmental management, have a strong personal interest in environmental protection. We have a number of avenues through which employees are made aware of IBM's long history of environmental commitment and results — something all employees can be and are very proud of. We also educate our employees about IBM's global environmental management system which defines our programs, and drives actions that are consistent with the company's policy and positions. Having equipped employees with this information, we are able to harness their enthusiasm and channel it toward helping IBM achieve its environmental goals and objectives such as materials and energy conservation and waste recycling. Examples of how our employees contribute to IBM's environmental programs and goals in their work include materials use reduction and reuse; waste reduction and recycling; and work station power management.

The Environmental Management System in Action

Product development and manufacturing and global procurement provided two good insights into how IBM's EMS worked.

Product Development and Manufacturing

IBM's efforts to detail the environmental attributes of its products could be traced back to the early 1970s, when the company began requiring that all products go through an environmental assessment. In 1991, the firm established the Engineering Centre of Environmentally Conscious Products (ECECP) in Research Triangle Park, North Carolina to provide greater focus to its Design for Environment (DFE) efforts. The first task of the ECECP was to define what an environmentally conscious product was – an effort that led IBM to focus, for example, on whether recycled material could be used for products, and how best to eliminate hazardous materials. As a result IBM began working with suppliers to create sources of recycled materials.

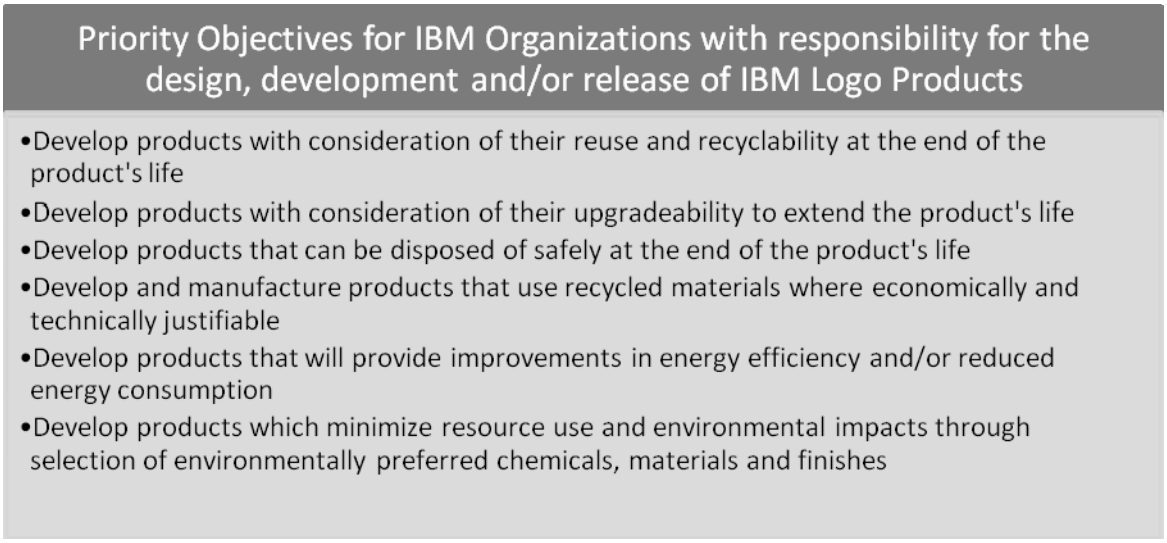
In 1992, the ECECP established standards for coding of plastic parts to facilitate sorting and recycling. In 1994 these standards were expanded to include the design of plastic parts to facilitate recycling. In 1997 IBM published its first general environmental standard documenting and/or establishing baseline requirements for design of IBM products, including an extensive list of potentially hazardous materials that were prohibited or restricted.

As soon as product DFE standards were established, they were integrated into the company's product design process – known as the Integrated Product Development process — so that a product was evaluated on its environmental objectives throughout the design process. As part of this process, environmental experts reviewed each product release to ensure that it not only met all legal and regulatory requirements, but that it also complied with IBM's more stringent internal design requirements. Some of the metrics included the environmental characteristics of products (e.g., materials content, energy efficiency, reportable substances), evaluation of IBM products' compliance with applicable environmental, material and chemical management requirements (both those that were legally required and those that were voluntarily established by IBM), and identification of components, parts, and assemblies which might require special handling or disposal at product end-of-life.

In 1996, IBM established its first corporate instruction detailing requirements for the development of "product stewardship programs" within development organizations. In addition to establishing product stewardship leaders within each IBM brand, this instruction established design objectives for all IBM products, and required that each IBM brand not only support IBM's corporate-wide product stewardship objectives (**Figure 3**), but also establish their own product stewardship design goals and complete an annual report to document their performance. One of the priorities established in the very first Product Stewardship Corporate Instruction was the development of products with improved energy efficiency and / or reduced energy consumption. IBM's Systems & Technology Group (STG)

was responsible for developing an annual strategy that outlined how this objective would be met and it was then up to the design engineers to make it happen. As Dionne explained, this was "specific but not so decentralized that it will drive designers crazy."

Figure 3 IBM'S Corporate-wide Product Stewardship Objectives



Source: IBM.

IBM did not use flagship "green" products to drive innovation, Mann explained, because it believed that if something "is good for one product, it is good for all." He recalled that in 1998 IBM tried to establish an internal environmental rating system for products in order to drive additional improvements in design. However, after some use, the system proved to be ineffective and "too subjective." It was difficult to come up with a definitive methodology for rating products when the company had such a wide range of products and a correspondingly wide range of opportunities to potentially improve their environmental performance. "The purpose of the rating system was really to demonstrate improvements as the design process progressed, not to compare different products against one another," said Mann. Every product received a score, but designers soon began focusing much more on the numerical score as opposed to the environmental improvement achieved from their own initial design. Dionne explained that because of this, IBM eliminated this internal environmental rating system for products. "Scores can be good," she said, "but they need to be meaningful. You need to make sure you are comparing apples to apples."

Global Procurement

Global Procurement's mission was to "deliver competitive advantage in the form of cost, quality, delivery and technology, to [its] clients and [shareholders]."[39] This involved being accountable for IBM's environmental and social impact across its supply chain, and integrating both compliance and voluntary activities globally.

The Centre of Excellence for Environmental Compliance (CoE) had worldwide responsibility for meeting environmental compliance regulations affecting the Global Procurement organization. This included understanding new and future environmental regulation, designing compliance strategies and processes, educating both IBM Global Procurement employees and its suppliers about the requirements, and evaluating suppliers' environmental performance. IBM had long had worldwide environmental requirements for suppliers providing hazardous waste management services to the company (1972), production-related suppliers (1980), and for those suppliers who supported product recycling and disposal (1991).

To assess whether suppliers had a strong focus on environmental management and the capability to meet IBM's environmental requirements, Corporate Instruction Number ENV 109 established requirements that "prevent the transfer of responsibility for environmentally sensitive operations to any company lacking the commitment or capability to manage them properly, reduce environmental risk, [and] protect IBM's brand." Implementing these requirements entailed collaboration between the Global Procurement organisation and Corporate Environmental Affairs. CEA was responsible for evaluating and approving suppliers providing hazardous waste management and product end-of-life management (PELM) services for the company globally, while Global Procurement ensured that IBM only contracted with CEA approved suppliers. Global Procurement was also responsible for communicating the firm's environmental requirements and specifications to suppliers, and for ensuring that suppliers complied with them.

Global Procurement representatives participated in a number of industry consortia, including the IPC (Association Connecting Electronics Industries), JEDEC, which helped establish standards for environmental compliance and provided a forum to discuss alternative technologies with other companies in the electronics and solid state industries, and the EICC (the Electronic Industry Citizenship Coalition), which was a group of companies working together to create a comprehensive set of tools and methods that supported "credible implementation of the Code of Conduct throughout the Electronics and Information and Communications Technology (ICT) supply chain."[40] John Gabriel, Technical Lead for Global Procurement's Corporate Social Responsibility and Environmental Initiatives and EICC's Chair, explained that the EICC started as a way for companies in the industry to address social responsibility issues as a team.

[39] Lou Ferreti's Presentation: Integrated Supply Chain (August 2008)

[40] http://www.eicc.info/ (accessed November 13, 2008).

IBM's and EICC's work in corporate citizenship had evolved simultaneously, and thus IBM's requirements had been coordinated with those of the EICC. IBM had raised awareness about supply chain issues across sourcing teams and executives by conducting audits of its suppliers (at least 500 were conducted between 2004 and 2008), engaging with suppliers in major growth markets, and introducing considerations of corporate social responsibility into pre-sourcing activities that evaluated potential future suppliers, regardless of their country of operations. Gabriel believed that audits helped educate buyers about the corporate citizenship commitment of IBM and that social responsibility needed to evolve to the stage where it influenced the company's decision making.

"Green" Businesses for a "Smarter Planet"

Our world is becoming smarter... [it] is becoming instrumented, interconnected, [and] all things are becoming intelligent... Computational power is being put into things we wouldn't recognize as computers. Indeed, almost anything – any person, any object, any process or any service, for any organization, large or small – can become digitally aware and networked.

With so much technology and networking abundantly available at such low cost, what wouldn't you enhance? What service wouldn't you provide a customer, citizen, student or patient? What wouldn't you connect? What information wouldn't you mine for insight? The answer is, you or your competitor, will do all of that. You will do it because you can – the technology is available and affordable. But there is another reason we will make our companies, institutions and industries smarter. Because we must. Not just at moments of widespread shock, but integrated into our day-to-day operations. These mundane processes of business, government and life – which are ultimately the source of those 'surprising' crises – are not smart enough to be sustainable.

—Sam Palmisano, IBM Chairman & CEO[41]

We're not in this [only] for its direct social benefit. We're in this to help our clients respond to [environmental and energy concerns] and innovate in response to government actions... We focus on innovation that matters.

—Martin Fleming, VP Corporate Strategy, IBM

One of CEA's roles was to share IBM's internal experience and know-how with potential clients, and to participate in strategic discussions as IBM's environmental experts. IBM's opportunities in this space had grown dramatically as governments had begun to take action in response to the threat of climate change. By surveying ongoing activities within IBM, the Emerging Business Opportunities (EBO) group identified more than 280 projects that could be grouped into four distinct "green" initiatives:

[41] Palmisano, 2008.

- Energy Efficient or Green Data Centres: to reduce energy consumption in data centres.
- Intelligent Utility Networks: to improve grid network planning and electricity management, and to provide a platform for managing renewable sources of energy.
- Intelligent Transportation Systems: to reduce congestion and transportation emissions in cities, and to encourage greater use of public transportation.
- Strategic Water Information Management: to improve water management and foster better conservation practices.

Each of these initiatives was considered to be large and immediate enough for IBM to have an impact. A statistic commonly-cited across IBM was that 2% of the world's total energy use originated from IT use – hence the focus on energy efficient data centres.[42] IBM's vision, however, was that the company should work not only to minimize that 2%, but also to ensure full use of IT capabilities to help make the remaining 98% of energy consumption in the society more efficient. For Martin Fleming, VP of Corporate Strategy, the key was that these cases were all network management issues, thus directly building on IBM's ability to manage an IT network and systems. IBM's Energy & Environment Framework (**Figure 4**) captured the variety of IBM's offerings in these areas.

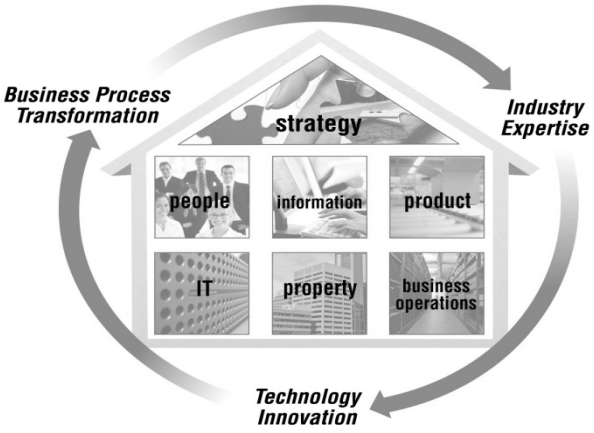
In addition, IBM had deployed its Big Green Innovations team described as "a seed organization that figures out if projects are viable as businesses" to apply "advanced materials science, physics, modeling tools, and integrating expertise to address emerging environmental management opportunities."[43] This organization moved IBM into photovoltaics by capitalizing on the company's semiconductor know-how, and was now focusing on water modeling and management.

For the long term, Fleming envisioned IBM becoming involved in energy and climate change issues as a developer and manager of the selected networks and business processes, rather than being only an IT supplier. For example, a utility company could be looking to invest billions of dollars over a three-to-five year period to build a smart grid with tens of millions of dollars of that total to be spent on traditional IT. Fleming believed that due to the complexity involved in grid issues over time, this would be a long-term and profitable opportunity for IBM. Equally, he anticipated there would be significant business opportunities springing up from future emissions cap and trade schemes, from the need to address how to manage the charging and fueling of plug-in hybrids, and even from carbon capture and sequestration. "Clients will be faced with new needs and requirements," he said, "and IBM can help address them. These are all spaces where IBM could participate in the future."

[42] Eurosif, the European Social Investment Forum, published an ICT Hardware Sector Report. It states that, "The ICT sector causes around 2% of global CO2 emissions – as much as air transport. This estimate includes the in-use phase of PCs, servers, cooling, fixed and mobile phones, local area networks (LANs), office telecommunications and printers. The US EPA found that data centers consumed about 61 billion kWh in 2006 (1.5% of total US electricity consumption) for a total electricity cost of about $4.5 billion. Consumption is expected to double by 2011." (Eurosif, WestLB. "ICT Hardware Sector Report," Sector Report, 2008.)

[43] Semiconductor Solutions IBM, Big Green Innovations. 2008. http://www-03.ibm.com/technology/greeninnovations/ (accessed November 23, 2008).

Figure 4 IBM Energy & Environment Framework



The Framework is IBM's holistic view of the challenges that organizations face in responding to energy, climate change, and environmental challenges.

Source: IBM.

Beyond the breadth of IBM's capabilities in research, hardware, data centre management and services, consulting services, and industry solutions, Martin Fleming identified three differentiators for IBM in the "green" businesses area:

1. The ability to help clients address matters in a systemic fashion. The management of large network infrastructure-related projects needs a long-term systemic view, something that IBM can offer.
2. IBM's software infrastructure and platform, which creates significant value for clients by bringing together and coordinating diverse elements of operation.
3. IBM's internal experience and expertise. This is a significant differentiator for IBM, since the list of organizations that can bring a background comparable to IBM's in environmental management to the table is very short one.

Fleming believed that CEA had given IBM enormous credibility. IBM's leadership and participation in voluntary programs such as the Chicago Climate Exchange had certainly contributed to this, but perhaps even more important was IBM's own experience. Clients trying to solve an environmental problem asked constantly "what does IBM do?" and asked to speak to individuals from CEA. IBM could often show that what the firm was recommending to clients had already been implemented inside the company.

Think Blue: Be Green?

As Wayne Balta observed the many environmental awards displayed in his office (See **Exhibit 9** for a sampling) he wondered again how IBM should respond to fashionable initiatives like "carbon neutrality" and "carbon labelling." Should IBM develop and put "carbon labels" on its products? If not, how should he recommend the firm proceed?

Should he recommend that IBM pursue initiatives that offered significant PR value, regardless of their real impact on IBM's environmental performance? Or should he push IBM towards being even clearer on what it believed environmental sustainability entailed? What would be best, Balta pondered, both for IBM and for the environment?

Exhibit 1 IBM Financial Highlights for 2005-2008

($ in millions except per share amounts)

FOR THE YEAR	**2008**	**2007**	**2006**	**2005**
Revenue:				
Services	58,892	54,057	48,328	47,509
Sales	41,376	42,202	40,716	41,218
Financing	2,559	2,526	2,379	2,407
Total Revenue	**103,630**	**98,786**	**91,424**	**91,134**
Cost:				
Services	40,937	39,160	35,065	35,151
Sales	15,776	16,552	16,882	18,360
Financing	1,256	1,345	1,182	1,091
Total Cost	**57,969**	**57,057**	**53,129**	**54,602**
Gross Profit	**45,661**	**41,729**	**38,295**	**36,532**
Expense and Other Income:				
Selling, general and administrative	23,386	22,060	20,259	21,314
Research, development and engineering	6,337	6,153	6,107	5,842
Intellectual property and custom development income	(1,153)	(958)	(900)	(948)
Other (income) and expense	(298)	(626)	(766)	(2,122)
Interest expense	673	611	278	220
Total Expense and Other Income	**28,945**	**27,240**	**24,978**	**24,306**
Net Income	**12,334**	**10,418**	**9,492**	**7,934**
Total Assets	**109,524**	**120,431**	**103,234**	**105,748**
Net investment in plant, rental machines and other property	14,305	15,081	14,440	13,756
Working capital	6,568	8,867	4,569	10,509
Total debt	33,926	35,274	22,682	22,641
Stockholders' Equity	13,465	28,470	28,506	33,098
Market capitalization	**$112,689**	**$149,744**	**$146,355**	**$129,381**
Stock price per common share	**$84.16**	**$108.10**	**$97.15**	**$82.20**
Number of employees in IBM/wholly owned subsidiaries	**398,455**	**386,558**	**355,766**	**329,373**

Source: IBM Annual Reports

Exhibit 2 Time line of "Highlights" in IBM's environmental activity

The following information was provided by IBM CEA.

Energy Conservation & Climate Protection

Year	Highlight
1974	Corporate Policy on Energy Conservation
1976	Think, the company magazine, devoted an entire issue to IBM's energy conservation and environmental programs.
1990	Pioneered employee commute program. By 2007, nearly 1/3 of IBM's global workforce participated in this program. IBM estimates that it has conserved approximate 7.75M gallons of fuel, and avoided 64,000 tons of CO2 emissions in the U.S.
1995	Began to voluntarily report its greenhouse gas emissions.
1996	Established energy conservation goal. In 2007, conservation projects saved energy equivalent to 3.8% of IBM's actual global energy use.
1998	1st semiconductor company to set a specific numeral perfluorocompounds (PFCs) emissions reduction target.
2000-2001	Contributed to the publication of the World Resources Institute GHG Protocol, a corporate accounting and reporting standard
2005	Met goals under USEPA Climate Leaders Program
2006	Set 2nd generation CO2 reduction goal: To reduce CO2 emissions associated with IBM's energy use by 12% between 2005 and 2012 through energy conservation and the use of renewable energy or procurement of Renewable Energy Credits or comparable instruments
2007	Using a baseline of 2000, IBM achieved a 51% reduction in PFC Emissions between 2000 and 2007
2007	Using a baseline of 2001, IBM increased its use of renewable energy from less than 50MWh in 2001, to more than 400MWH in 2007
2007	Using a baseline of 1990, IBM's global energy conservation actions had, by 2007, saved 4.6B kWh, avoided 3.1M tons of CO2 emissions (equal to 45% of its 1990 emissions), and saved $310M.

Product and Process Stewardship (Design for Environment)

Year	Highlight
1973	Established Process Environmental Impact Assessment Program
1978	Eliminated polychlorinated biphenyls (PCBs) in products
1990	Prohibited the use of the following in packaging: Ozone Depleting Compounds as expansion agents, polybrominated pibhenyls (PBBs) and polybrominated diphenyl ethers (PBDEs), and heavy metals (including lead, hexavalent chromium, and mercury).
1991	Formalized IBM's Product Stewardship Program. It included considerations for: reuse and recyclability, upgradablity, energy efficiency, use of recycled materials, use of environmentally preferred materials, and safe disposition.
1992	Became a Charter member of the Energy Star program.
1993	Eliminated Class I Ozone Depleting Compounds from products and processes
1993	Prohibited PBBs and PBDEs in products
1993	Prohibited Asbestos from use in products
1993	Prohibited lead from use in plastic housing and paints. Prohibited use of hexavalent chromium in inks, dyes, pigments and paints used for IBM products. Prohibited mercury from use in IBM parts of assemblies (exceptions, i.e., in lamps, were added in 1999)
1995	Eliminated Class II Ozone Depleting Compounds from products and processes
1995	Established a goal for recycled plastic resins use in products. In 2007, 36% by weight of resins procured through IBM's corporate contracts contained recycled resin
2004	Contributed to EXMA-341, the international standard on Design for Environment
2005	Project partner with the USEPA's Design for Environment Program on Life-Cycle Analysis of lead-free solders
2006	Prohibited nonreacted tetrabromobisphenol-A (TBBP-A) and polyvinyl chloride (PVC) from use in IBM-designed IT system enclosures.
2007	Prohibited certain perfluorinated compounds from research, development and manufacturing processes. Prohibited nonreacted TBBP-A and PVC from use in IT system enclosures.

Resource Conservation & Pollution Prevention

Year	Highlight
1988	Established nonhazardous waste recycling goal, which has been met annually
1989	Offered IBM's first product take back program
1994	Established Global Materials Recovery Centre network for product re-use and recycling
1995	Achieved a reduction of 95% in hazardous waste generation since 1987
1995	Established goal to achieve year-to-year reduction in hazardous waste generation from IBM's manufacturing processes indexed to output, which has been met annually
1997	Established goal for use of powder coating for product decorative finishes. By 2007, IBM had avoided 4.4 million pounds of volatile organic compounds since establishing this goal
2000	Established a water conservation goal for semiconductor manufacturing operations. By 2007, IBM had achieved an average of annual water savings of 7%
2003	IBM documented its recycling of over 1 billion pounds of end-of-life product waste. It was the first company to reach the 1-billion-pound threshold in the IT industry
2007	IBM sent less than 1% of end-of-life product waste to landfill or incineration

Supply Chain Management and Collaboration

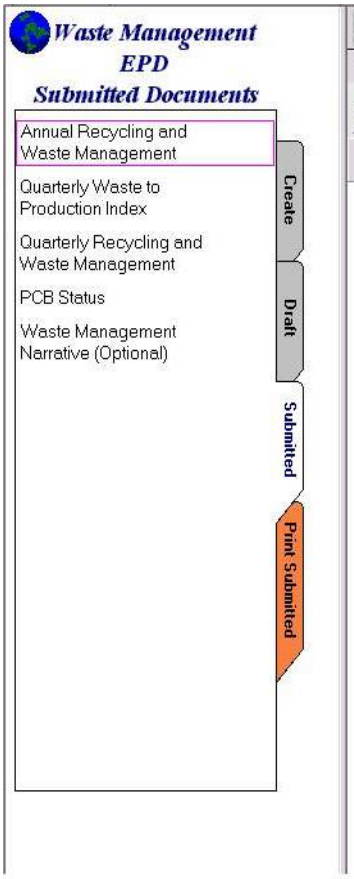
Year	Highlight
1972	Established Supplier Environmental Evaluation Program
1979	Introduced 1st reusable ARBO crate for servers throughout logistics supply chain
1980	Expanded Supplier Evaluation Program to cover certain production-related suppliers
1990	Published Corporate Packaging guide and shared with suppliers
1991	Further expanded Supplier Evaluation Program to include product recycling and disposal suppliers
1997	Published Engineering Specification on Baseline Environmental Requirements for supplier deliverables
2004-2005	Initiated and led the Joint Industry Group on the development of uniform product content reporting requirements
2004	Established IBM Supplier Conduct Principles and supporting audits. IBM is one of the leading companies that supported the Electronic Industry Citizenship Coalition
2006	Joined USEPA's SmartWay™ Transport Partnership. Within a year, by 2007, over 80% of US-based transport spending by IBM was with SmartWay™ carriers. The company is voluntarily expanding its SmartWay™ commitments outside of the US
2008	Participating in the Carbon Disclosure Project's Supply Chain Leadership Collaboration
2008	IBM commits to ship 100% of products from System Z and Supercomputer families to customers in North America exclusively using a SmartWay™ carrier

Source: IBM CEA

Exhibit 3 Environmental Performance Database

Snapshot of IBM's Environmental Performance Database

Note: the "zero" value in the field "Beginning Inventory" indicates a location had shipped out all waste volume generated in the prior year by the end of that year, resulting in none on hand at the beginning of the reporting year. The "zero" value in the field "Ending Inventory" indicates a location had shipped out all waste volume generated in the reporting year.



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Search in View 'Submitted Annual Recycling and Waste Management'

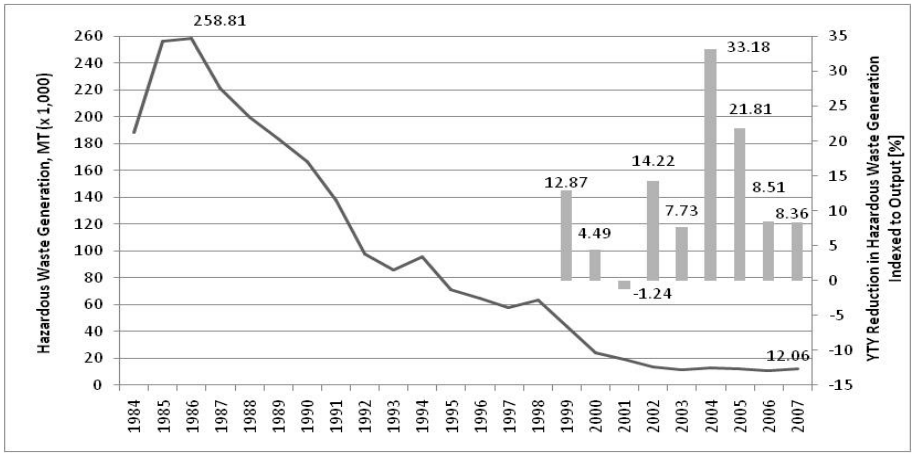
Search for Search

Region	Country	Site	Waste Type	Waste Category	Waste Description	Treatment/Disposal Method	Mass Shipped (Klbs)	Mass Shipped (MT)	Beginning Inventory(Klbs)	Ending Inventory(Klbs)
2007							215,986.312	97,970.748	933.843	2,355.833
AP							14,120.869	6,405.184	286.686	522.272
EUROPE - IOT Northeast							23,747.939	10,771.994	3.164	1.462
EUROPE - IOT Southwest							8,735.998	3,962.623	47.730	1,131.630
LA							8,978.462	4,072.604	60.038	112.304
NA							160,403.044	72,758.343	536.225	588.166
CANADA							13,649.367	6,191.312	298.668	265.338
UNITED STATES							146,753.677	66,567.031	237.557	322.828
UNITED STATES							146,753.677	66,567.031	237.557	322.828
ALMADEN RESEARCH CTR							844.182	382.918	0.000	0.000
Hazardous Waste							32.360	14.678	0.000	0.000
Nonhazardous Waste							809.075	366.994	0.000	0.000
Cafeteria Waste							30.230	13.712	0.000	0.000
					Cooking Oil/Grease Interceptor	Recycle	7.730	3.506		
					Food Scraps	Recycle	22.500	10.206	0.000	0.000
Cardboard							37.720	17.110	0.000	0.000
					Corrugated Cardboard	Recycle	37.720	17.110	0.000	0.000
Construction Debris							341.540	154.922	0.000	0.000
					Misc. Construction Debris	Recycle	341.540	154.922	0.000	0.000
Furniture							37.290	16.915	0.000	0.000
					Furniture, Tools and Equipment	Recycle	37.290	16.915	0.000	0.000
General Trash							105.120	47.682	0.000	0.000
					General Trash	Land Filling	105.120	47.682	0.000	0.000
Landscape Debris (Yard Waste)							20.180	9.154	0.000	0.000
					Green waste including tree limbs, grass cuttings	Recycle	20.180	9.154	0.000	0.000
Metals (Non-Precious)							143.410	65.050	0.000	0.000
					Non-PCB Ballasts	Recycle	2.540	1.152	0.000	0.000
					Scrap Metals, Construction Duct/Wire/Cable/P	Recycle	140.870	63.898	0.000	0.000
Mixed Waste							35.580	16.139	0.000	0.000
					Mixed Recyclables (plastic, bottles, glass, alumi	Recycle	35.580	16.139	0.000	0.000
Office waste							0.075	0.034	0.000	0.000
					Surplus Office Supplies	Recycle	0.075	0.034	0.000	0.000
Paper							20.570	9.330	0.000	0.000
					Confidential Materials (Shredded)	Recycle	20.570	9.330	0.000	0.000
Plastics							2.030	0.921	0.000	0.000
					Packing peanuts, bubblewrap and vermiculite	Recycle	2.030	0.921	0.000	0.000
Toner, Cartridges, Inks							0.490	0.222	0.000	0.000
					Toner and Inkjet Cartridges	Recycle	0.490	0.222	0.000	0.000
Wood							34.840	15.803	0.000	0.000
					Pallets/Crates and Scrap Wood	Recycle	34.840	15.803	0.000	0.000
Special Waste							2.747	1.246	0.000	0.000

Source: IBM CEA

Exhibit 4 Select Data Monitored by IBM's Environmental Performance Database

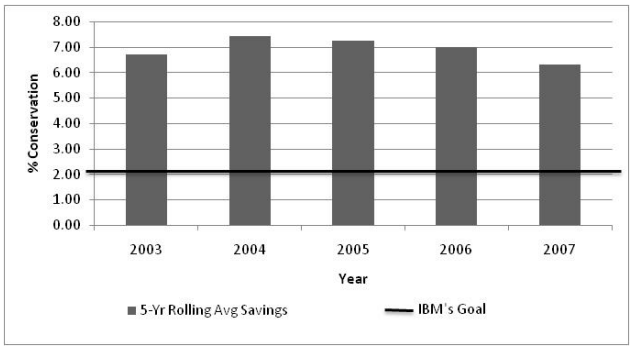
Hazardous Waste Generation 1984-2007 & Hazardous Waste Indexed to Output (1999-2007) IBM has the goal to achieve year-to-year reduction in hazardous waste generation from IBM's manufacturing processes indexed to output[44]. The bar chart depicts IBM's performance against this goal, which covers approximately 90% of IBM's manufacturing- and hardware development-related hazardous waste. IBM's total hazardous waste has decreased by 94.7% since 1987. The responsible organization for meeting this goal is STG.



IBM Hazardous Waste Generation (1984-2007) & HW Indexed to Output (1999-2007)

Water Conservation (2003-2007)

IBM's goal is to achieve average annual conservation savings equal to 2% of IBM's annual water use at microelectronics manufacturing facilities over a rolling 5 year period. The organization responsible for meeting this goal is STG.[45]



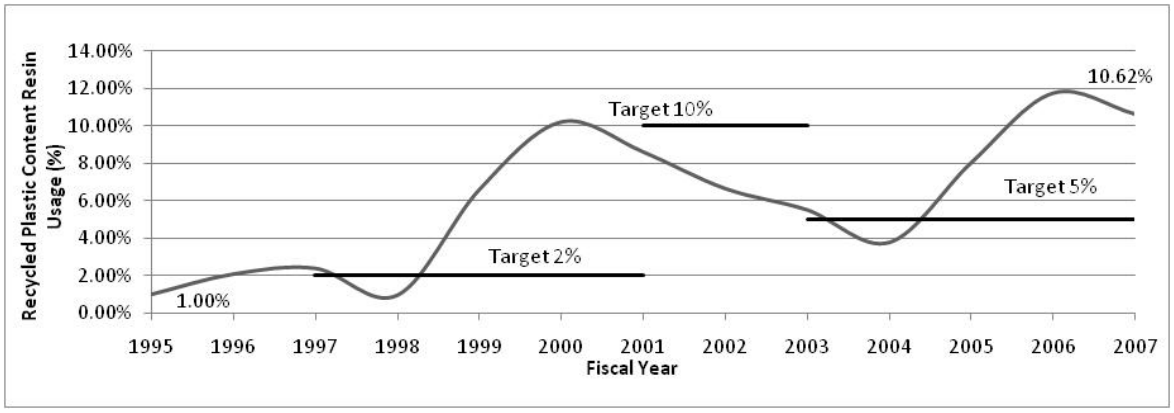
Annual Data for IBM's Water Conservation Goal (2003-2007)

[44] IBM CEA "Environmental Goals – Internal Document," June 2007

[45] Ibid.

Use of Recycled Plastics in IBM Hardware Products

Metrics tracked are recycled resin usage, type of resin, and total amount of plastics procured by IBM for application in hardware products. The responsible organizations are STG and Global ProcurementIBM increased its recycled content plastics goal from 2% in 1997 to 10% in 2001. After significant early progress, the ability to meet this 10% goal was impacted largely by the decrease in applications for recycled plastics with the company's products went through a major change in material use, from using plastic enclosures to metal enclosures. Availability for source material was also a factor in the early 2000s. As a consequence, IBM adjusted this goal in 2003 to 5% or greater.[46] Since then, the increased involvement of the Retail Store Solutions division has had a positive contribution to recycled resin use. Retail Store Solutions products provide greater opportunities for recycled resin applications, as reflected in the current numbers.

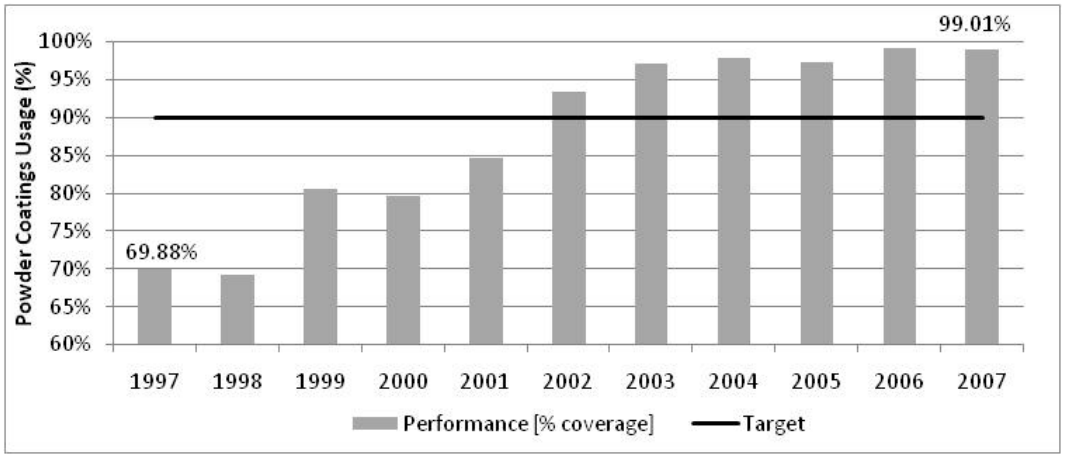


IBM Recycled Plastic Content Resin Usage Metric Performance (1995-2008)

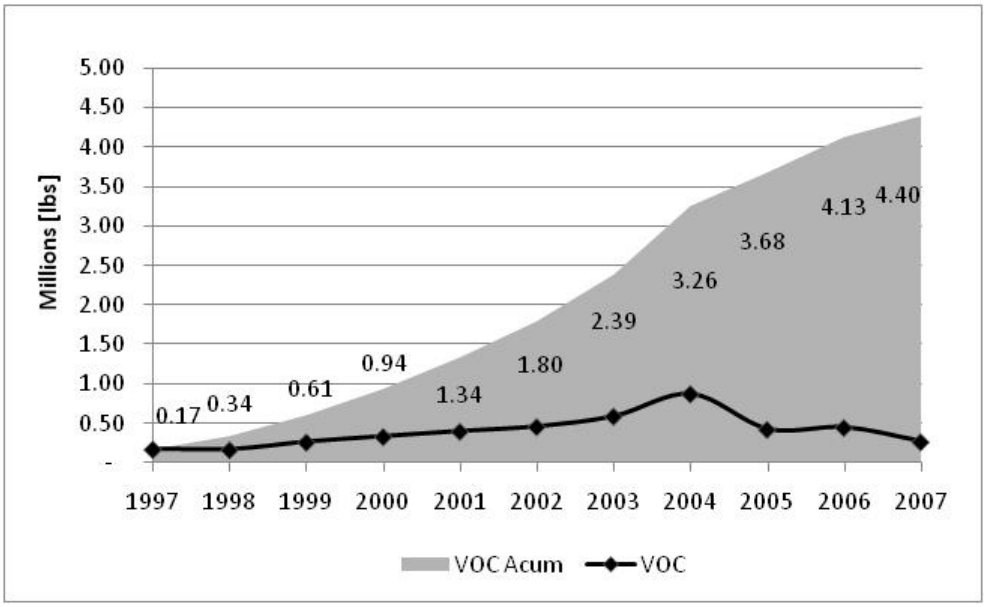
[46] IBM CEA "Environmental Goals – Internal Document," June 2007

Use of Powder Coatings & Resulting Volatile Organic Compounds Avoidance

IBM's goal is to "use powder coatings in lieu of liquid paints for at least 90% of the decorative finishing on IBM products".[47] The responsible organizations are STG and Global Procurement.



IBM Powder Coatings Usage Metric Performance (1997-2007)

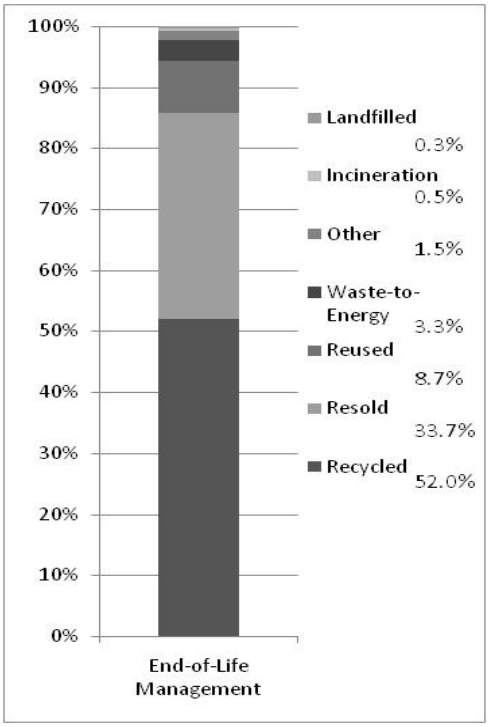


Annual and Cumulative Avoidance in VOC Emissions from the Use of Powder Coating for Product Decorative Finishing (1997-2007

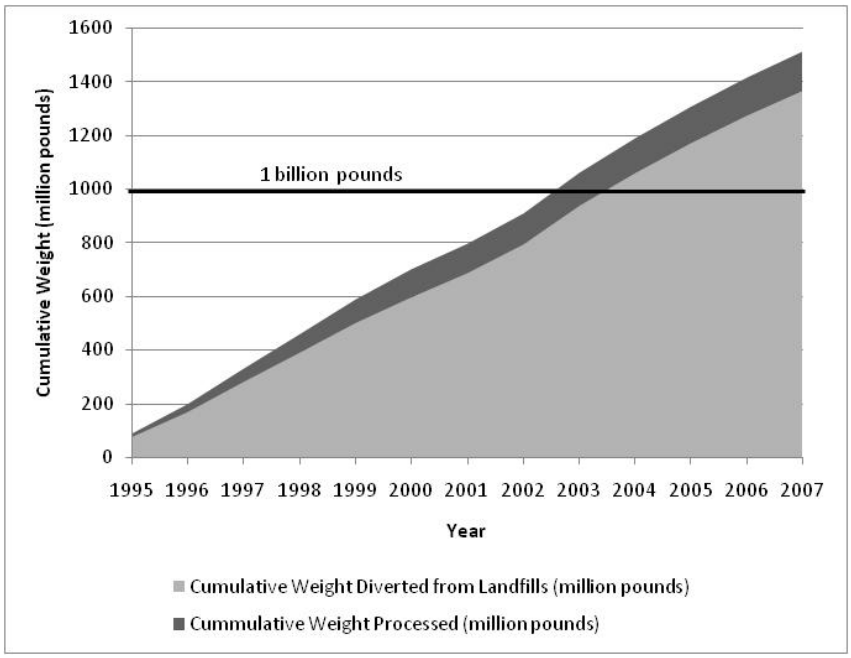
[47] IBM CEA, "Environmental Goals – Internal Document," June 2007

Minimize the environmental impact of end-of-life (EOL) IT products and IT product waste

Metrics currently tracked include, first, the total amount of IT EOL products and IT product waste processed by IBM globally and, second, avoidance by IBM of the use of landfills and incineration for disposition of IT EOL products and IT product waste. IBM began offering EOL IT product take-back programs in Europe in 1989 and has extended and enhanced them over the years. Today, IBM's Global Asset Recovery Services organization offers asset recovery solutions to commercial customers in 57 countries. Since 1995, when IBM first began disclosing the volumes of EOL IT products and IT product waste collected and recovered in the company's annual corporate environmental report, IBM has documented the collection and recovery of more than 1.5 billion pounds (686,877 metric tons) of EOL IT products and IT product waste worldwide through year-end 2007. In 2003, IBM became the first IT company to reach the 1 billion pounds threshold of EOL IT products and IT product waste processed for reuse and recycling. In 2000, IBM established a goal to avoid sending more than 3 percent of the total amount of EOL IT products and IT product waste it processed to landfills. In 2007, this goal was modified to include incineration as a treatment method along with landfilling within the not-to-exceed 3% limit. The responsible organization is Global Asset Recovery Services.



IBM Product EOL Management Results for 2007
% by Weight, Total Weight Processed: 44, 332 metric tons



IBM Product End-of-Life Management Results 1995-2007

Weight processed and weight diverted from landfills.

Fines and Penalties Worldwide

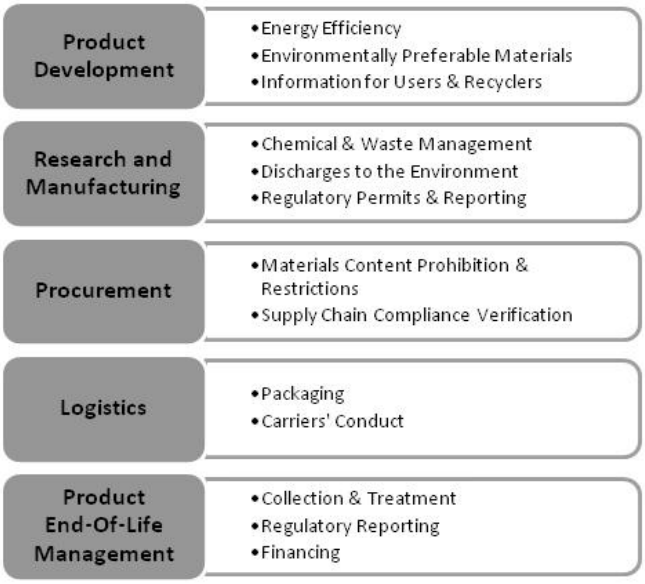
IBM received 111 agency visits worldwide in 2007, and during the year was assessed one Administrative Enforcement Order, which included a $1,000 fine. The Order was issued in response to IBM's failure to provide copies of a completed Hazardous Materials Business Plan at one of its office locations. As can be seen in the table, this is the only fine IBM has paid over the past five years.

Year	2003	2004	2005	2006	2007
Number	0	0	0	0	1
Fines ($K)	$0.0	$0.0	$0.0	$0.0	$1.0

Fines and Penalties Worldwide

Source: IBM CEA.

Exhibit 5 Examples of IBM's Environmental "Intersections", 2008



Source: IBM CEA

Exhibit 6 IBM Goal Statements and the Responsible Organizations (CEA, IBM 2007) [48]

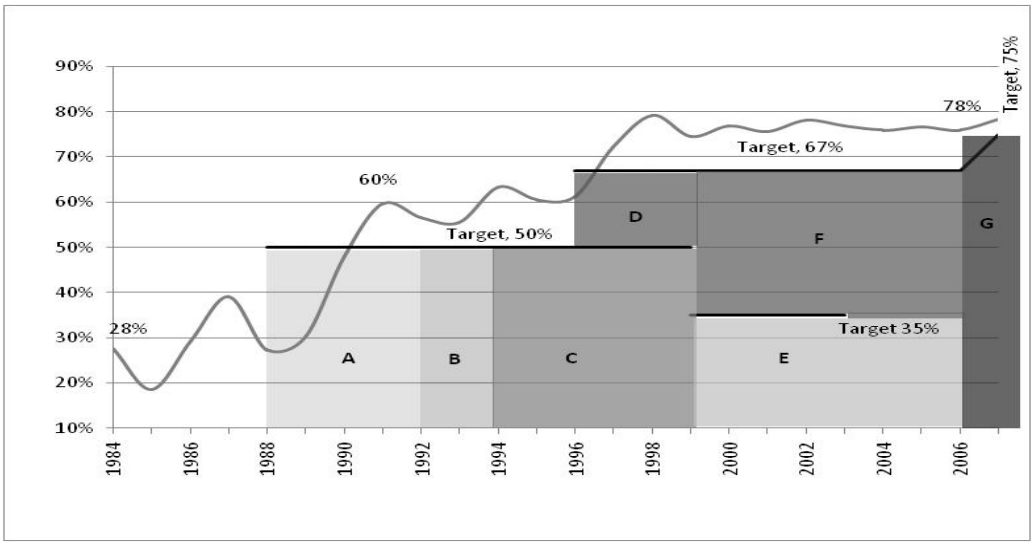
EMS	•IBM's global environmental management system will cover all aspects of its business activities, including its operations, products, services and supply chain. •Responsible IBM Organizations: CEA, ISC Procurement
Conservation	•IBM will maximize its opportunities to conserve materials and natural resources and to use recycled materials when feasible in its operations •Responsible IBM Organizations: RESO, STG, ITD, ISC Procurement
Climate Protection	•IBM will be a leader in climate protection across its operations and in the energy efficiency of its products •Responsible IBM Organizations: CEA. ISC Procurement, ISC Logistics, STG, SWG, GTS, RESO, ITD, HR, Operating Units
Pollution Prevention	•IBM will prevent pollution and minize the environmetnal footprint of its manufacturing operations •Responsible IBM Organizations: STG, ISC Manufacturing, ISC Logistics
Product Stewardship	•IBM will be a leader in product design for the environment and product recovery, reuse and recycling •Responsible IBM Organizations: STG, ISC Procurement, Research, GARS, ISC Logistics

Source: IBM CEA

[48] The acronyms in this table refer to the following IBM organisations: CEA, Corporate Environmental Affairs; ISC, Integrated Supply Chain; RESO, Real Estate & Site Operations; STG, Systems & Technology Group; ITD, Integrated Technology Delivery; SWG, Software Group; GTS, Global Technology Services; HR, Human Resources; GARS, Global Assets Recovery Services.

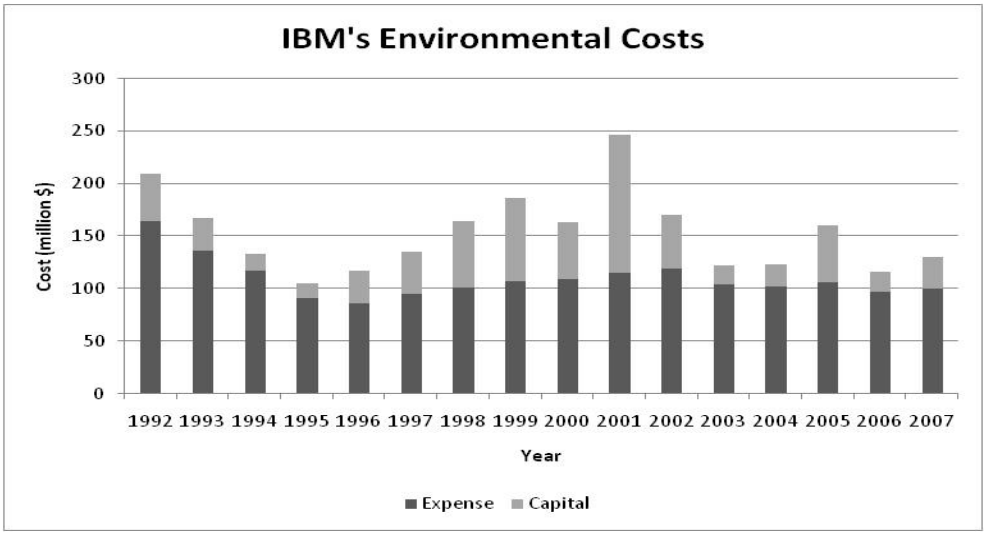
Exhibit 7 Evolution of Non-Hazardous Waste Recycling Goal

IBM's current recycling goal for non-hazardous waste (NHW) is an 8th generation goal. In 1988, IBM set out to achieve 50% recycling of all wood, metal, paper glass and plastic from manufacturing and research operations by 1992 (region A). The company achieved this target earlier than planned, and in 1992 it added non-hazardous chemicals, end-of-life IT and manufacturing equipment, and industrial trash to the recycling goal (region B). In 1994 CEA expanded the goal to include administrative sites (region C). By 1996 CEA began targeting sites according to their individual performance. Those sites that had already achieved the 50% recycling goal were expected to achieve a 67% recycling rate (region D), while those that hadn't yet reached 50% had to continue striving for that target (region C). In 1999 CEA divided NHW into two categories: solid waste and industrial waste, with specific recycling goals of 67% (region F) and 35% (region E) respectively. The latter had changed to 67% for all types of non-hazardous waste by 2004. In 2007, IBM raised the target to a 75% recycling rate applicable to all manufacturing, research and administrative sites (region G). Starting in 2008, the goal also became applicable to leased locations as identified by IBM.



Source IBM CEA

Exhibit 8 IBM's Environmental Costs and Savings over Time



IBM's Environmental Costs. Please note that this does not include research and product development expenses, among others. The cost of making products RoHS compliant, for example, are not included. (Source: IBM Environmental Reports)

YEAR	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
SAVINGS / EXPENSES	2.06	2.11	1.77	1.76	2.11	2.01	2.20	2.04	2.42	2.04	2.00

Annual Average Environmental Savings to Expense Ratio. Please note that this does not include research and product development expenses, among others. The cost of making products RoHS compliant, for example, are not included. (Source: IBM Environmental Reports).

Source: IBM CEA

Exhibit 9 Sample List of IBM's Environmental Awards & Recognition[49]

1992	• US President's Environmental and Conservation Challenge Award – the highest environmental honour in the United States. • One of four "green trophies" from the French Minister of the Environment.
1997	• First multinational to earn a single global registration of its EMS to ISO 14001, only one year after the standard was published. • US EPA Best-of-the-Best Stratospheric Ozone Protection Award given out on the 10th year anniversary of the Montreal Protocol.
1998	• US EPA Climate Protection Award. This was the first year this recognition was given.
1999	• US EPA ENERGY STAR Computer Partner of the year. (The second time in as many years.)
2000	• Recognized by environmental entities in Singapore, Canada, Mexico, and Australia, in addition to various states in the United States
2001	• Received top honours in the annual Nikkei environmental survey of manufacturers in Japan, one of the country's most prestigious awards for corporate environmental efforts. • Included in the Light Green Advisor's Eco*Index (TM) investment fund, the first environmental leadership index fund in the United States for financially conservative green investors. IBM was also selected as one of the 30 companies in their Environmental Leadership Trust (TM) portfolio.
2002	• Included in the Calvert Social Index, an index that screens companies for their record on responsible business practices. • Earned one of the highest ratings in the UK Business in the Environment (BiE) Index, which is the leading benchmark of corporate environmental engagement for companies on the London Stock Exchange, an honour it has enjoyed every year until 2005.
2003	• The company's climate change efforts, which had led to one of the greatest reported GHG emissions reductions (31% since 1990), were praised in the CERES report on "Corporate Governance and Climate Change: Making the Connection." • Ranked #1 in environmental issues and #2 in Intangible Value Analysis (which includes governance, human capital and emerging market issues) in "The Computer & Peripherals Industry" report issued by Innovest Strategic Value Advisors.
2004	• Recognized by the EPA as one of the "Top 20 Best Places to Work for Commuters"
2005	• Recognized by the World Wildlife Fund (WWF) Centre for Energy and Climate Solutions for attaining its Climate Savers goal. • Recognized by the World Resources Institute for its leadership in the purchase of Renewable Energy Credits (RECs), which was the fourth largest corporate purchase in the US. • Climate Group's Low Carbon Leader Award • Included in the Dow Jones Sustainability Index (DJSI) World Index, the world's first equity benchmark to track the financial performance of sustainability leaders.
2006	• US EPA Climate Protection Award. (The first time a company had received this recognition twice). • US DOE and US EPA Green Power Purchasing Award
2007	• US EPA SmartWay Excellence Award • Awarded the Green Initiative of the Year by CNET Networks UK for "Project Big Green" • Ranked among the top 10 holdings in the KLD Global Sustainability Index
2008	• Most climate-friendly electronics manufacturer according to Scorecards by Climate Counts. • Identified as "best positioned to sustain competitive advantage on a combination of cash returns, industry structural positioning and environmental, social, and governance (ESG) performance" in the Goldman Sachs' GS Sustain Report • Ranked by CERES as #1 in climate change governance practices among 63 of the world's largest consumer products and information technology companies in 11 industry sectors

[49] Source: IBM CEA