



IBM AND THE
ENVIRONMENT

2008 ANNUAL REPORT



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ENVIRONMENTAL PROTECTION

IBM has a long history of environmental leadership. The company's corporate policy on environmental protection, first established in 1971, is supported by a comprehensive global environmental management system that governs IBM's operations worldwide.

IBM's long-standing recognition of the importance of protecting the environment arises from two key aspects of its business. The first is the intersection of the company's operations and products with the environment. The second is the enabling aspects of IBM's innovation, technology and expertise.

IBM's operations can potentially have an effect on the environment in a number of ways. For example, chemicals needed for research, development and manufacturing must be properly managed from selection and purchase through storage, use and disposal. Data center operations are energy-intensive and some manufacturing processes are energy- and/or water-intensive. IBM continually looks for ways to reduce consumption of these and other resources.

In the product area, IBM designs its products to be energy efficient and utilizes environmentally preferable materials that are capable of being reused, recycled or disposed of safely at the end of their useful lives. Moreover, as IBM has outsourced more of its manufacturing, its supply chain has changed. Evaluation of suppliers' overall environmental responsibility and the environmental attributes of the parts and products suppliers provide to IBM has become increasingly important.

The enabling aspect of IBM's innovation and technology makes it a significant force in developing solutions that can help both IBM and its clients to be more efficient and protective of the environment. In addition, the massive computational power, software advancements and visualization capabilities of IBM's technology can bring increased understanding and swifter solutions to some of the world's most demanding scientific and environmental problems. This report describes IBM's programs and performance in both areas.

GLOBAL ENVIRONMENTAL MANAGEMENT SYSTEM

IBM's corporate environmental affairs policy calls for environmental affairs leadership in all of the company's business activities. The policy objectives range from workplace safety, pollution prevention and energy conservation to product design for the environment, continual improvement and the application of IBM's expertise to help address some of the world's most pressing environmental problems. The policy may be found on page 44 of this report or at www.ibm.com/ibm/environment/policy.

Every employee is expected to follow the policy and its directives and report any environmental, health or safety concern to IBM management. Managers are expected to take prompt action when faced with a potential violation of the policy or directives.

The policy is supported by corporate directives that govern IBM's operations worldwide. These directives cover areas such as pollution prevention, chemical and waste management, energy conservation and climate protection, environmental evaluation of suppliers, product stewardship, and incident prevention and reporting.

Environmental goals are also an important part of IBM's environmental management system (EMS). The company's key environmental performance indicators cover the following areas: climate protection, energy and water conservation, pollution prevention, waste management and product stewardship. These goals and IBM's performance against them are discussed in their respective sections of this report.



IBM became the world's first major multinational to earn a single global registration to ISO 14001 in 1997, over a decade ago—and the company achieved it within just one year of the finalization of the Standard.

The registration covered IBM's manufacturing, product design and hardware development operations across its business units worldwide. IBM has since expanded its global ISO 14001 registration to include its chemical-using research locations, several country organizations covering their nonmanufacturing locations and its Global Asset Recovery Services business function.

As its business model has evolved to include more services offerings, IBM continues to update its EMS to appropriately address environmental opportunities and challenges in the services area.

More information about IBM's EMS and programs supporting its environmental objectives may be found at www.ibm.com/ibm/environment.

ENVIRONMENTAL EVALUATION OF SUPPLIERS

IBM's EMS includes environmental requirements for its supply chain. IBM conducts substantive evaluations of the environmental responsibility of a relevant subset of its suppliers. The requirements for these evaluations were established by an IBM corporate directive in 1972 requiring environmental assessments of hazardous waste services suppliers. The directive was designed to prevent the transfer of responsibility for environmentally sensitive operations to any company lacking the commitment or capability to manage such operations properly.

The corporate directive was updated in 1980 to include environmental evaluations of certain production-related suppliers. In 1991, the requirement for environmental evaluations of product recycling and disposal suppliers was added. Suppliers providing hazardous and special waste services (including IBM's product end-of-life management suppliers), their facilities and methods are evaluated prior to IBM approving them for use.

To verify that their environmental operations remain satisfactory, these suppliers are reevaluated every three years. Any concern during the evaluation is addressed with the supplier and must be resolved to IBM's satisfaction. IBM's conformance with these supplier evaluation requirements is part of its comprehensive audit programs.

In 2002, to address general concerns about electronic waste being exported to some non-Organization for Economic Cooperation and Development (OECD) countries where it was then being improperly handled, IBM expanded its supplier evaluation requirements to include assessments of subcontractors the suppliers may use to handle recycling and/or disposal operations in non-OECD countries.

IBM also has criteria to avoid the sale of technologically obsolete or nonfunctional equipment to brokers for resale. Moreover, brokers who procure used products or parts from IBM for resale are required to sign an agreement not to resell into non-OECD countries if the broker knows or has reason to believe that the equipment and/or parts will not be used for their originally intended purpose, without the need for disassembly or disposal.

The evaluations mentioned above are in addition to the audits conducted in association with IBM's Supplier Conduct Principles.

IBM's Supplier Conduct Principles, formalized in 2004, outline the company's expectations and requirements of suppliers doing business with IBM in regard to forced or involuntary labor, child labor, wages and benefits, working hours, nondiscrimination, respect and dignity, freedom of association, health and safety, protection of the environment, laws (including regulations and other legal requirements), ethical dealings, communications and monitoring/record keeping.

The Principles are integrated into IBM's contracts and relationships with suppliers, and the company actively monitors suppliers' performance against them as a means to promote sound business practices across IBM's extended supply chain.

With the assistance of a third-party auditor, IBM has undertaken hundreds of on-location supplier audits against its Supplier Conduct Principles. The suppliers audited are selected on a risk-based priority, focusing on suppliers in markets where noncompliance may be likely to occur.

Since 2004, more than 550 audits have been conducted with suppliers in 15 growth markets by third-party auditors with local personnel who specialize in social responsibility and are well versed in local law, practices, culture and customs.

IBM's supplier audit program encompasses both manufacturing (production) and distribution (logistics) suppliers—which are historically where social audits are focused—as well as services and general procurement suppliers.

In 2004, IBM was among the companies that developed the Electronic Industry Citizenship Coalition's (EICC) Code of Conduct, an initiative that provides a single common code of standards and best practices for the electronics industry and their suppliers. By consolidating and standardizing compliance, audit and reporting efforts, suppliers can focus on achieving the high standards of performance set forth by the Code. IBM accepts the EICC Code of Conduct as equivalent and an alternative to its Supplier Conduct Principles. The company currently holds the EICC Chair of the Board position and it has participated in work groups such as Communications/Stakeholder Engagement, Extractives and the Validated Audit Process. As part of its environmental management leadership, IBM also encourages its suppliers to pursue ISO 14001 registration.

IBM is also focusing on the energy and climate programs of its suppliers. In early 2008, IBM joined the Carbon Disclosure Project's (CDP) Supply Chain Project. IBM is participating in this collaboration because it wants to work with its suppliers to understand where they are with regard to having energy conservation and greenhouse gas reduction programs and to encourage their action and leadership in climate protection. More about this program is provided in the Climate Protection section of this report.

STAKEHOLDER ENGAGEMENT

IBM has a variety of outreach programs through which it engages with various groups and individuals on the subject of the environment.

Though they may vary by location, the company's community outreach programs range from open houses and emergency preparedness drills with local organizations to the support of and participation in local environmental projects and environmental education efforts.

IBM also has ongoing dialogues with many stakeholders, including socially responsible investors and other shareholders, environmental nongovernmental organizations (eNGOs), governments, employees and others on a range of environmental issues. These dialogues are valuable, as they allow the company to share ideas and obtain feedback about its programs, activities and performance.

IBM's Global Innovation Outlook™ (GIO) is another example of stakeholder engagement, one in which IBM opens its technical and business forecasting processes to external thought leaders from a broad range of disciplines in a series of

“deep dive” brainstorming sessions. These GIO conversations, first launched in 2004, generate diverse insight into the readiness of emerging business, technical and societal trends, and on how IBM can apply its respective capabilities to fuel collaborative innovation.

One of the two focus areas of the GIO in 2008 was “Water.” Among the issues the GIO explored were the increasing pressures on water, including immigration, population growth and climate change, and what was needed to better manage the delicate and complex balance that food, energy and water share. The GIO report on Water may be found at www.ibm.com/ibm/gio/water.html.

To date, more than 55 GIO deep dives on 5 continents have brought together more than 750 influencers from several dozen countries. All of the results from the GIO are shared openly and may be found on IBM's Global Innovation Outlook Web site at www.ibm.com/ibm/gio.

VOLUNTARY PARTNERSHIPS AND INITIATIVES

IBM is strongly committed to participation in voluntary programs and has joined a number of voluntary initiatives and partnerships with governmental and nongovernmental organizations (NGOs).

Among the many, some governmental examples include the U.S. Environmental Protection Agency's (EPA) ENERGY STAR® and Climate Leaders programs, and the OECD Committee on Industry, Innovation and Entrepreneurship.

Partnerships with eNGOs include, among others: charter member of the World Resources Institute's (WRI) Green Power Market Development Group (U.S. and Europe); charter member of the World Wildlife Fund's Climate Savers program; and membership in the Pew Center on Global Climate Change and The °Climate Group. IBM also works with and supports organizations such as The Conservation Fund, the Environmental Law Institute, the World Environment Center and the WRI. In addition, IBM is a founding member of The Green GridSM and a member of the World Business Council for Sustainable Development.

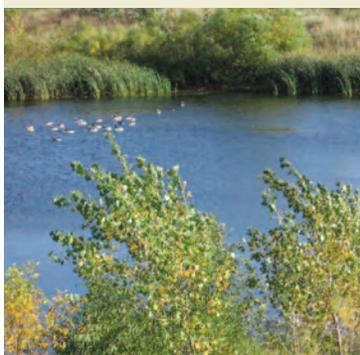
A more complete listing of IBM's voluntary partnerships and initiatives can be found at www.ibm.com/ibm/environment/initiatives/.

IBM partners with the Wildlife Habitat Council (WHC) to manage many of its properties in ways that enhance habitats. Seven IBM sites (Armonk, New York [Corporate Headquarters]; Boulder,

Colorado; Research Triangle Park, North Carolina; Rochester, Minnesota; San Jose, California [IBM's Almaden Research Center and Silicon Valley Laboratory]; and Toronto, Canada [IBM's Software Lab]) have had their land management and wildlife habitat programs certified by the WHC.

IBM also encourages its employees to support environmental efforts. For example, through its Matching Grants program, the company matches contributions made by U.S. employees to groups ranging from The Nature Conservancy and the World Wildlife Fund to smaller groups dedicated to preserving lands and habitats in local communities.

In addition, IBM employees can support environmental organizations in their local communities through IBM's On Demand Community (ODC) program. ODC is a first-of-its-kind global initiative to encourage and sustain corporate philanthropy through volunteerism. It provides IBM employees and retirees with a rich set of IBM



IBM ROCHESTER, MINNESOTA, FACILITY RECEIVES WILDLIFE HABITAT COUNCIL (WHC) CERTIFICATION

IBM's facility in Rochester, Minnesota, became certified by the WHC in 2008. Surrounded by nearly 200 acres of undeveloped land, the site's Wildlife at Work program has focused on enhancing these habitats for the benefit of wildlife. Wildlife habitat improvement projects have included managing a butterfly prairie plot, establishing and tending to 10 bluebird houses, native prairie restoration and education, controlling invasive buckthorn in wooded areas and converting a portion of an excess parking lot to an oak savanna prairie.

IBM employees have played a key part in the active management of these habitat improvements. Employees participating on the Wildlife at Work team have also developed a comprehensive species inventory of plants, trees, birds and wildlife native to the site.

technology tools they can use to help schools and the nonprofit community organizations in which they volunteer, including environmental organizations. The program combines the expertise, interests and skills of IBMers with the power of the company's innovative technologies and solutions to help nonprofit organizations be more effective in addressing community needs.

ENVIRONMENTAL INVESTMENT AND RETURN

ENVIRONMENTAL CAPITAL AND EXPENSE WORLDWIDE

(\$ in Millions)

	04	05	06	07	08
Capital	\$ 21	\$ 55	\$ 19	\$ 30	\$ 32
Expense	102	106	97	100	104
TOTAL	\$123	\$161	\$116	\$130	\$136

Note: The expense figures above do not total to the actual \$508 million due to rounding.

Over the past 5 years, IBM has spent \$157 million in capital and \$508 million in operating expense to build, maintain and upgrade the infrastructure for environmental protection at its plants and labs, and to manage its worldwide environmental programs.

IBM compares its environmental expenses to the estimated savings resulting from its policy of environmental leadership. Savings come from energy, material and water conservation, recycling, packaging improvement initiatives, reductions in chemical use and waste, and process improvements from pollution prevention. Ongoing savings from the previous years' initiatives are not carried over in this comparison, yielding very conservative estimates.

IBM also realizes savings through the avoidance of costs that likely would occur in the absence of its EMS. These savings are not measurable in the same way that expenses are, but avoiding these environmental costs does result in savings for IBM, and a reasonable attempt has been made to estimate them.

Consistent with the evolution of IBM's business model to one less focused on manufacturing and more on services, in 2008 the company changed its methodology for estimating compliance cost avoidance and established a more conservative process that includes compliance cost efficiency and potential fines, penalty and litigation avoidance.

The tables that follow provide the analysis of IBM's environmental expenses and estimated savings and cost avoidance for 2008.

IBM estimates that over the past 12 years, annual savings from its focus on pollution prevention and design for the environment have exceeded environmental expenses by an average of 2:1.

2008 ENVIRONMENTAL EXPENSES WORLDWIDE

(\$ in Millions)

Personnel	\$ 35.1
Consultant fees	3.4
Laboratory fees	2.2
Permit fees	0.7
Waste treatment and disposal	11.8
Water and wastewater management operations	3.3
Air emission control operations	1.2
Groundwater protection operations	1.4
Other environmental systems operations	2.5
Waste and materials recycling	1.8
Superfund and former IBM site remediation	33.8
Miscellaneous/other	6.6
TOTAL	\$103.8

2008 ESTIMATED ENVIRONMENTAL SAVINGS AND COST AVOIDANCE WORLDWIDE

(\$ in Millions)

Location pollution prevention operations	\$ 49.9
Corporate operations*	4.0
Packaging improvements	16.1
Environmentally preferable materials usage	1.7
Energy conservation and cost avoidance	32.3
Superfund and site remediation efficiencies	13.1
Financial assurance savings**	1.0
Spill remediation cost avoidance***	2.2
Compliance cost efficiency****	20.8
Potential fines, penalty and litigation avoidance*****	33.6
TOTAL	\$174.7

* Savings or costs avoided by having internal professional staff and tools versus using external consultants and tools.

** Savings achieved through use of RCRA financial assurance in lieu of obtaining letters of credit.

*** These savings are estimates based upon certain assumptions. The figure for spill remediation cost avoidance is estimated from IBM's actual experience with remediation costs.

**** Compliance cost efficiency considers the cost avoided through proactive compliance.

***** The estimation for the avoidance of potential fines, penalties and litigation does not include the environmental expenses attributed to product development, procurement and customer fulfillment for complying with product environmental laws and regulations. It also does not include the cost avoidance of potential business interruption or fines related to noncompliance with product environmental laws and regulations (e.g., E.U. REACH or RoHS requirements).

PROCESS AND MATERIALS LEADERSHIP

ENVIRONMENTALLY PREFERABLE SUBSTANCES AND MATERIALS

Among its objectives, IBM's environmental policy calls for the company to use development and manufacturing processes and provide products that are protective of the environment. As an integral part of its EMS supporting this objective, IBM routinely and consistently monitors and manages the substances it uses in its manufacturing and development processes and in its products.

The company's precautionary approach includes the careful scientific review and assessment of certain substances prior to their use in IBM's processes and products. In specific instances, IBM has chosen to proactively prohibit, restrict or substitute substances used in IBM processes and products when the weight of scientific evidence determines an adverse effect upon human health or the environment, even when law permits their use.

In addition, IBM conducts scientific assessments of existing approved substances when new processes or major modifications to existing processes are being developed. The objective of these scientific assessments is to identify potential substitutes that may be environmentally preferable. IBM believes that the same scientific rigor is required when investigating the human health and environmental effects of potential substitutes as was given to the substance currently in use.

The following provides a sampling of IBM's early leadership in prohibiting or restricting many substances of concern from its processes and products before regulatory requirements were imposed:

- **Chlorofluorocarbons (CFCs):** In 1989, IBM became the first major Information Technology (IT) manufacturer to announce a phase-out of CFCs, a Class I ozone-depleting substance, from its manufacturing and development processes.
- **Class I and II ozone-depleting substances:** IBM completed the phase-out of Class I ozone-depleting substances in 1993. Subsequently, IBM eliminated Class II ozone-depleting chemicals from its manufacturing processes in 1995.
- **Trichloroethene (TCE), ethylene-based glycol ethers and dichloromethane:** Examples of other chemicals that IBM voluntarily prohibited from its manufacturing processes include TCE in the late 1980s, ethylene-based glycol ethers in the mid-1990s and dichloromethane in 2003.
- **Polybrominated biphenyls (PBBs) and polybrominated diphenyl ethers (PBDEs):** IBM prohibited PBBs and PBDEs from its product designs in the early 1990s and then extended the prohibition to purchased commodities through its procurement specifications in 1993.
- **Cadmium:** IBM prohibited the use of cadmium in inks, dyes, pigments and paints in 1993; in plastics and plating in 1994; and in CRT monitors along with nickel cadmium batteries in the mid-1990s.
- **Polyvinyl chloride (PVC) and tetrabromobisphenol A (TBBPA):** IBM ceased the specification of PVC in its IT system enclosures in 2000 and prohibited the use of TBBPA as an additive flame retardant in IT system enclosures for newly released products by year-end 2007.

A table summarizing IBM's voluntary material prohibitions and restrictions from 1978 through 2007 may be found at www.ibm.com/ibm/environment/products/materials.shtml.

A Recent Initiative

- **Specific perfluorinated compounds:** One current initiative is the company's work to eliminate PFOS (perfluorooctanesulfonic acid) and PFOA (perfluorooctanoic acid).

PFOS is perhaps most commonly known for its use in stain repellents. In the semiconductor industry, these materials have been used for wafer patterning and etching processes.

IBM made a commitment to transition away from PFOS and PFOA based on growing evidence of their persistent bioaccumulative and toxic properties. The commitment began with a prohibition on the development of new photoresist materials with these chemicals in 2003, followed by a prohibition on new uses of PFOS and PFOA in the company's manufacturing in 2007 and a goal to eliminate all existing uses of these chemicals by the end of 2009.

The company has an active program to identify appropriate alternatives for these existing uses.

IBM's restrictions on specific substances and other environmental requirements for its products may be found in its *Engineering Specification: Baseline Environmental Requirements for Supplier Deliverables to IBM*, which can be found at www.ibm.com/ibm/environment/products/especs.shtml.

NANOTECHNOLOGY

Nanotechnology is the application of scientific and engineering principles to make and utilize very small things (dimensions of roughly 1 to 100 nanometers). An important aspect of nanotechnology is creating materials in the nanoscale, where unique properties enable novel and useful application.

Nanotechnology is already part of a wide variety of products—from cosmetics and sunscreens to paints, clothing and golf equipment. It can make products lighter, stronger, cleaner, less expensive and more precise, and has been critical to the success of the IT industry.

A pioneer in the field, IBM has achieved numerous breakthroughs that are fundamental to the development of nanotechnology. One significant example is the scanning tunneling microscope. As is often the case with the introduction of new technologies, there are some environmental, health and safety questions related to nanoparticles because of the relatively limited information available about them.

IBM has taken proactive steps to respond to this uncertainty. IBM was one of the first companies to create safe work practices and health and safety training for its employees working with nanoparticles.

IBM is also partnering with governmental agencies and other organizations such as the National Institute of Occupational Safety and Health (NIOSH) to engage in and support the development of the necessary environmental, health and safety information that will lead to greater human health and environmental protection, and responsible and sustainable nanotechnology development.

PRODUCT STEWARDSHIP

PROTECTING THE ENVIRONMENT THROUGHOUT THE PRODUCT LIFE CYCLE

IBM's Product Stewardship program was established in 1991 as a proactive and strategic approach to the company's environmental management of products. The program's mission is to develop, manufacture and market products that are increasingly energy efficient; can be upgraded and reused to extend product life; incorporate recycled content and environmentally preferable materials and finishes; and can be recycled and disposed of safely.

One example of IBM's early action in product stewardship is the company's proactive approach on environmentally preferable substances and materials. As can be seen in the listing referenced on page 8, IBM has long been a leader in materials substitution and innovating to utilize environmentally preferable materials.

IBM's environmental product design requirements are integrated into its EMS and also are part of the Integrated Product Development process used by product development engineers.

UPDATING TOOLS FOR PRODUCT CONTENT MANAGEMENT

In the same manner in which the European Union's RoHS Directive (2005/95/EC) affected product design paradigms for electronic products earlier in this decade, the REACH Regulation (EC) No 1907/2006 is also transforming the applications for chemicals in every industry.

With REACH, the regulatory obligations to track and report substances in products will expand in scope, and it is essential to manufacturers' compliance activities that industry standard materials declarations practices keep pace.

In 2008, IBM participated actively with the European Information & Communications Technology Industry Association (EICTA), Japan Green Procurement Survey Standardization Initiative (JGPSSI) and the U.S. Consumer Electronics Association (CEA) in the development of Edition 2.0 for the *Joint Industry Guide for Materials Composition Declaration for Electrotechnical Products* (JIG). This substantive revision added many new substances for declaration based on regulations promulgated since Edition 1.0 in 2005 and defined new criteria for the classification of substances that should be declared (including REACH substances of very high concern). The Guide also established a globally managed maintenance process for annual reviews of the JIG substance table. While the International Electrotechnical Commission is also developing a materials declaration standard, JIG Edition 2.0 is an important bridge between early efforts to consolidate reporting requirements for the electronics supply chain and the transition to new models for product declarations.

IBM HAS A NUMBER OF GOALS FOR ITS PRODUCT STEWARDSHIP PROGRAM

2008 GOALS AND PERFORMANCE

Product Energy Efficiency

Powder Coatings

99% of the decorative metal covers of IBM products were finished using powder coatings, versus IBM's corporate goal of maintaining powder use at or above 90%. This environmentally preferred material enabled IBM suppliers to avoid the emission of more than 124 metric tons of volatile organic compounds (VOCs) that would have occurred if liquid paints had been used to achieve the same powder coverage. Since the inception of the Powder Coatings program in 1997, IBM has avoided the emission of 2,119 metric tons (4.7 million pounds) of VOCs.

Recycled Plastics

Recycled plastic represented 10.3% of the plastics (recycled and virgin plastics) procured under IBM's corporate contracts for use in its products versus IBM's corporate goal of 5% or more. Since the inception of this program in 1995, 5,743 metric tons (12.7 million pounds) of recycled resins have been procured by IBM and its suppliers under IBM's corporate contracts for use in IBM products.

Use of Landfills

IBM's product end-of-life management operations worldwide processed 42,302 metric tons of end-of-life products and product waste, and sent only 0.6% of the total to landfills or to incineration for treatment, versus IBM's corporate goal of minimizing its combined landfill and incineration rate to no more than 3% of the total amount processed.

Monitors*

No new monitors were released.

Servers**

IBM System i®: One model with a previous generation model was released, which achieved a 73% reduction in the typical power consumption per relative performance.
IBM System p®: Of the 3 models released with a previous generation model, an 8.9% reduction in the typical power consumption per relative performance for a 1-processor, 1-core system was achieved, and a 49% and 55% improvement for 2 systems, which extended from 2-core to 4-core processors was achieved.
IBM System x®: Of the 5 models released with a previous generation model, improvements of 19%, 80%, 91%, 93% and 93% were achieved as measured by the Japan Energy Law watts/MTOPS*** metric.
IBM System z®: Six new models were introduced in 2008 with improvements in the maximum power consumption per relative performance ranging from 1.3 – 14% depending on the model changes and upgrade paths.

Point-of-Sale Terminals**

No new Point-of-Sale products were introduced.

Storage Subsystems**

One new DASD subsystem, the DCS9900 was introduced in 2008, reducing the power required per gigabyte of storage by 87%.
 Several tape drive products and frames were introduced, all of which reduced the power required per gigabyte of storage. Reductions ranged from 9-86% depending on the system.

Optical Storage**

No new Optical Storage Library models were introduced.

* IBM's product energy goal is to qualify 100% of applicable monitors introduced to meet ENERGY STAR criteria.

** IBM's product energy goal is to continually improve the computing power delivered for each kilowatt-hour of electricity used with each new generation or model of a product.

*** MTOPS–Million theoretical operations per second is a calculation of machine operations based on a specified formula.

PRODUCT ENERGY EFFICIENCY

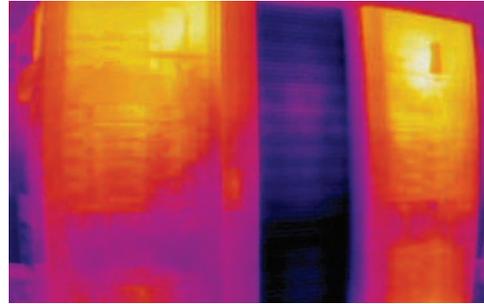
Product energy efficiency has long been one of IBM's environment and climate protection objectives. It was formalized as one of the company's corporate objectives when IBM's Product Stewardship program was established in 1991.

In addition to its ongoing program and objectives regarding energy efficient products, IBM has initiated and invested in innovations and integrated solutions involving its hardware, software and services business to address the energy efficiency of IT equipment and the data center.

As described in the table on page 11, the new server models released in 2008 for which comparable products existed delivered from 1.3 to 93 percent more computing power for each kilowatt-hour (kWh) of electricity used than the previous model/product. Of particular note is that increasing the available processor cores on a processor socket from 2 to 4 increased work delivered per power input by over 50 percent on IBM System p models.

Energy Efficient Technology

- **Energy Efficient Servers:** IBM's full line of servers is designed with energy efficiency in mind, from IBM System z mainframes, which can run at utilization rates as high as 100 percent for extended periods of time, through its IBM System x servers, which are capable of up to 37 percent lower overall power consumption over previous generation servers in high demand environments.



Thermal (top) and conventional (bottom) images of three IBM server racks demonstrate the capabilities of the water cooling device, IBM's Cool Blue™ Rear Door Heat eXchanger. The server in the middle gives off virtually no heat, lowering energy consumption by reducing cooling requirements.

- **Rear Door Heat eXchanger:** Patented “cooling doors” that utilize chilled water right at the rack to collect between 50 and 100 percent of the heat generated by computer systems before it reaches the room, and without requiring any additional fans or electricity.
- **Storage Systems:** IBM is the leader in storage virtualization, allowing customers to take advantage of virtualization technology to leverage their investment in current storage devices. One IBM customer combined storage and server virtualization to reduce its data center footprint through consolidation of servers, improve storage utilization and reduce power and cooling costs, which reduced the total cost of ownership of the IT infrastructure and increased the work delivered for each unit of energy used.

- **IBM Power Processor Systems:** IBM's POWER6™ architecture with EnergyScale™ technology provides features such as power trending, power-saving, capping of maximum power and thermal measurement. These features, enabled via IBM® Systems Director Active Energy Manager™, allow you to measure the energy of the system and direct policies toward the energy efficient operation of the server, while the underlying hardware automatically adjusts to deliver the desired operating solution. Innovative virtualization technologies have a feature called Live Partition Mobility, which allows you to move running partitions from one POWER6 server to another, providing the capability to conserve power by moving workloads off underutilized servers to achieve optimal system utilization and energy efficiency.
- **Retail Store Systems:** The IBM SurePos 700 systems offer clients a choice of 3 high-performance, energy-efficient processors that help reduce their power consumption by 36 percent or more compared to previous models. IBM also introduced a Remote Management Agent (RMA) that enables power management policies to be set centrally, reducing power use when terminals are not in use or after hours.

PRODUCT RECYCLING AND REUSE

As part of its product end-of-life management (PELM) activities, IBM began offering product take-back programs in Europe in 1989 and has extended and enhanced them over the years.

IBM's Global Asset Recovery Services organization offers Asset Recovery Solutions to commercial customers in 57 countries, including:

- Management of data security and disk overwrite services
- Worldwide remarketing network for product resale
- State-of-the-art refurbishing and recycling capability for IT equipment
- Optional logistic services such as packing and transportation

Additionally, in many countries, IBM offers solutions to household consumers for the end-of-life management of computer equipment, either through voluntary IBM initiatives or country programs in which the company participates.

In 2008, IBM's PELM operations worldwide processed 42,302 metric tons of end-of-life products and product waste. This represents 49.9 percent of the estimated 84,800 metric tons of new IBM IT equipment manufactured and sold in 2008.

PRODUCT END-OF-LIFE MANAGEMENT (PELM)

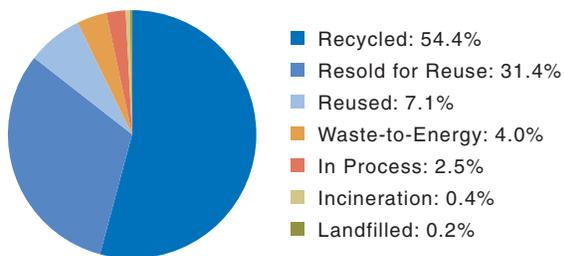
GOAL: Reuse or recycle end-of-life products such that the amount of product waste sent by IBM's PELM operations to landfills or to incineration for treatment does not exceed a combined 3% of the total amount processed.

RESULT: In 2008, IBM's PELM operations sent only 0.6% to landfills or to incineration facilities for treatment.

IBM's PELM operations also reused or recycled 96.9 percent of the total amount processed.

Since 1995, when IBM first began reporting volumes of product waste it collected and recovered in the company's annual corporate environmental report, IBM has documented the collection and recovery of more than 1.6 billion pounds (729,179 metric tons) of product and product waste worldwide through year-end 2008.

PRODUCT END-OF-LIFE MANAGEMENT OPERATIONS
(2008: Percentage by Weight)



PRODUCT PACKAGING

IBM has had a program focused on the environmental attributes of its packaging since the late 1980s. Under the program, IBM packaging engineers develop solutions that minimize packaging waste by keeping packaging to a minimum and, whenever feasible, composed of recyclable and/or reusable materials.

In 2008, the packaging team saved 1,277 metric tons of packaging materials (waste) and \$16.1 million through initiatives such as:

- Using air-filled dunnage (void filler) to achieve package weight reductions
- Improving packaging designs

- Continuing its incoming packaging initiative with the company's suppliers
- Implementing 100 percent post consumer recycled (PCR) cushions in IBM Retail Store Systems' new 4610 printer

To reduce product packaging, either the product must become more rugged or the hazards of the distribution environment must be reduced. Since IBM has limited control over the latter, its strategic approach is to increase product ruggedness, thereby reducing the amount of necessary packaging. Products go through extensive unpackaged testing to ensure they will survive those hazards. Using the results of this testing, the team can design the smallest possible package, achieving reductions in both packaging waste and emissions associated with transportation.

The following are highlights of some projects in 2008:

- The packaging team implemented a new density calculator tool that allows engineers to identify and prioritize opportunities for further reduction. Dimensional weight/actual weight, package/product size, volume ratios, density ratios and other ways to analyze efficiency are all possible with this tool. The density calculator tool was used to analyze IBM and supplier product packaging data, identifying "under-performing" packages. Improving these packages allows the company's carriers to operate much more efficiently, getting more cargo onto each airplane, which is good for the environment and IBM's costs as well. One specific project improved packaging for pairs of 1U servers and the company's standard blade package, saving IBM \$1.3 million in transportation and \$275,000 in materials.

- Annually, the overall weight of internal void filler packaging has been reduced from 50 metric tons of paper void filler (equating to 162 pallets of paper), to just over 7.25 metric tons (equating to just 14 pallets) of air-filled void. This has resulted in fewer pallets of packaging being delivered to the site, resulting in a decrease in carbon dioxide (CO₂) and other air emissions associated with logistics.
- IBM Global Logistics evaluated air-filled void filler versus paper filler packaging and, as a result, was able to reduce packaging material usage by 60 percent compared with the previous dunnage material. The newly implemented program of air-filled packaging is very efficient; for example, one pallet of air-filled packaging is equivalent to 4.7 pallets of paper in available packaging material occupancy. The air-filled packaging system also used 98 percent less material and is made from a 100 percent recyclable polyethylene film. The cost savings to IBM totaled \$197,000 on the first phase of the project alone, with similar results expected for ongoing projects.

Supplier Collaboration

In 2008, the IBM packaging team implemented 36 packaging design projects with its suppliers. The resulting packaging solutions reduced the packaging materials from incoming parts by 209 metric tons, saving \$1.5 million in both materials and transportation and reducing the transportation-related greenhouse gas emissions. When the supplier applies the lessons learned from working with IBM to packaging designs for other customers, the environmental benefits are extended well beyond IBM's supply chain.

IBM's environmental requirements for packaging are included in its Environmental Packaging Guidelines, first published in 1990 and updated numerous times over the years. Key elements of IBM's Packaging Guidelines have also been embedded in various engineering specifications and procurement documents, which extend their reach beyond IBM to include its supply chain and other business partners.

These documents may be found at www.ibm.com/procurement/proweb.nsf/ContentDocsByTitle/United+States-Information+for+suppliers.

PRODUCT SAFETY

IBM's product safety requirements are included in various steps of the product design, development, manufacture and test process, and include the supply chain for both IBM hardware and solutions. Required reviews by IBM Product Safety Review Boards help product and project managers comply with applicable standards and national regulations, and help IBM to obtain third-party certifications where required.

Programs for continual improvement include internal and third-party assessment of IBM's products' safety and conformity assessment programs. These assessment results are continually fed back into the evaluation and planning cycle. This process is augmented by incident management tools that provide effective capture and management of any product safety-related incident.

POLLUTION PREVENTION

HAZARDOUS WASTE

One way to prevent pollution is to reduce the generation of hazardous waste at its source. This has been a basic philosophy behind IBM's pollution prevention program since 1971.

Where possible, IBM redesigns processes to eliminate or reduce chemical use and substitute more environmentally preferable chemicals. Chemicals needed for research, development and manufacturing must be properly managed, from selection and purchase through storage, use and disposal. For waste that is generated, IBM focuses on preventing pollution through a comprehensive, proactive waste management program.

HAZARDOUS WASTE GENERATION

GOAL: Achieve year-to-year reduction in hazardous waste generation from IBM's manufacturing processes indexed to output.

RESULT: In 2008, IBM's hazardous waste generation indexed to output was reduced by 10.9%. This means that source reduction efforts avoided the generation of hazardous waste by 330 metric tons.

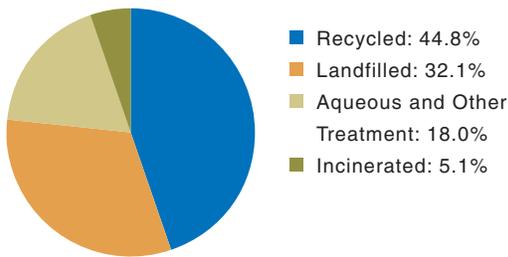
This goal covers approximately 90 percent of IBM's manufacturing and hardware development-related hazardous waste, which comes from 3 manufacturing sites. Hazardous waste from other operations, such as assembly and facility operations, is not included in this metric.

IBM's hazardous waste generation from 2007 to 2008 decreased by 3,716 metric tons, or 31 percent. Part of the decrease was the result of source reduction and part was due to the fact that two unusual waste streams last year were not present this year (an emergency holding tank cleanup and the disposition of some contaminated soil). These two waste streams were the drivers of last year's increase in hazardous waste.

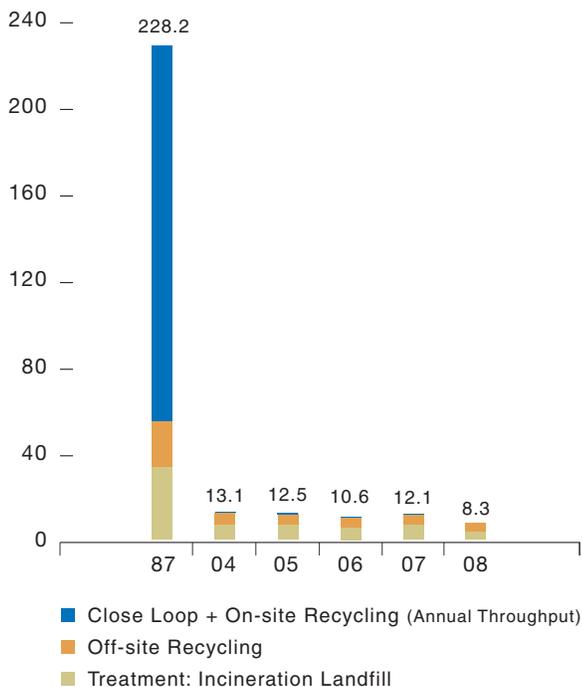
In 2008, IBM recycled 44.8 percent of its hazardous waste, and 32.1 percent was sent to landfills. Of the total amount that went to landfill, 91 percent was sludge from industrial wastewater treatment plants. Local government regulations required disposition of this sludge in secure hazardous waste landfills.

IBM's total hazardous waste has decreased by 96.3 percent since 1987, the base year of this metric.

HAZARDOUS WASTE MANAGEMENT WORLDWIDE
(2008 Quantities: 8,343 Metric Tons)



HAZARDOUS WASTE QUANTITIES WORLDWIDE
(2008 Quantities: Metric Tons x 1,000)



NONHAZARDOUS WASTE

IBM also has long been focused on recycling its nonhazardous waste.

Nonhazardous waste includes such waste as paper, metals, plastics, deionized resins and nonhazardous chemicals. The goal also includes end-of-life (EOL) IT product waste generated by IBM's business (e.g., equipment scrapped from IBM locations) as well as IBM-owned equipment returned by external customers at the end of lease.

NONHAZARDOUS WASTE RECYCLING

GOAL: Send an average of 75% of the nonhazardous waste generated at locations managed by IBM to be recycled.

RESULT: In 2008, IBM sent 79% of its nonhazardous waste to be recycled.

In 2008, 41 percent of the reporting entities achieved or exceeded the 75 percent recycling goal. This goal was expanded last year to include certain leased locations that are not managed by IBM, but generate nonhazardous waste from their operations. Those leased locations account for nearly 70 percent of IBM total leased area (square feet).

IBM generated 94,791 metric tons of nonhazardous waste last year, representing a decrease of 11 percent when compared to 2007 volumes. This reduction is mainly due to a reduction of EOL IT product waste processed and a reduction in construction activities/projects, which reflects directly in the amounts of nonhazardous construction debris and soil generated by IBM.

NONHAZARDOUS WASTE GENERATED AND RECYCLED WORLDWIDE

(Metric Tons x 1,000)

YEAR	04	05	06	07	08
Total recycled	83	83	102	84	75
Total generated	109	108	134	107	95
Percent recycled	76%	77%	76%	78%	79%

CHEMICAL USE AND MANAGEMENT

Under the U.S. Superfund Amendments and Reauthorization Act (SARA) of 1986 and the U.S. Pollution Prevention Act (PPA) of 1990, companies are required to file an annual inventory of routine releases and off-site transfers in addition to recycling, treatment and energy recovery activities for more than 600 chemicals listed on the U.S. Toxic Release Inventory (TRI) list.

IBM's operations rely on the use of some chemicals on the TRI list.

International Performance Measures

IBM has used the TRI metric to measure its chemical quantities, releases and transfers for its operations globally since 1993. IBM's objective continues to be the continual reduction in the worldwide use of chemicals on the U.S. TRI list.

In 2008, IBM sites worldwide used 18 of these chemicals in quantities greater than the reporting threshold of 10,000 pounds (4.54 metric tons) of use per year.

WORLDWIDE USE OF CHEMICALS ON THE U.S. TOXIC RELEASE INVENTORY (TRI) LIST

GOAL: Continual reduction in worldwide use of chemicals on the U.S. TRI list of chemical quantities.

RESULT: From 2007 to 2008, IBM's total chemical quantities covered by both SARA and PPA worldwide decreased by 682 metric tons to a total of 3,641 metric tons, a reduction of 15.8%.

IBM's total releases to the environment and waste transferred off-site for treatment and disposal from IBM's worldwide operations decreased in 2008 to a total of 560 metric tons.

The decreases from 2007 to 2008 noted above were primarily due to pollution prevention projects where xylene usage was reduced in IBM's manufacturing site in Bromont, Canada. Though not required by regulations, IBM Bromont reduced its total generation of spent xylene from its Flip Chip and Multi-Chip Module cleaning processes by 381 metric tons.

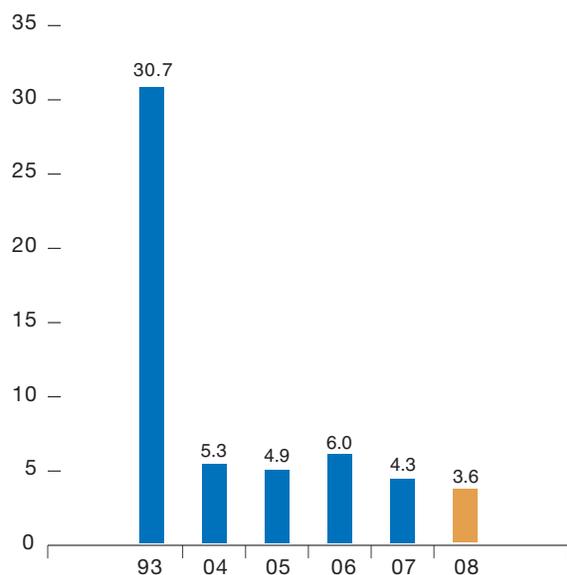
Since 1993, the base year of this metric, IBM has reduced its total TRI chemical quantities worldwide by 88.1 percent.

WORLDWIDE USE OF CHEMICALS ON THE U.S. TOXIC RELEASE INVENTORY LIST*
(2008 Reportable Quantities)

CHEMICAL	METRIC TONS
Nitrate compounds	704
Xylene	649
Copper and compounds category	450
Sulfuric acid (aerosol only)	734
n-Methyl-2-pyrrolidone	176
Hydrogen fluoride	175
Nitric acid	137
All others	616
TOTAL	3,641

*As defined by U.S. SARA Section 313 and PPA.

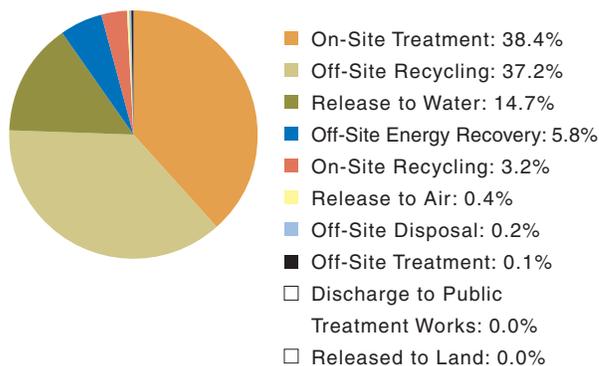
WORLDWIDE USE OF CHEMICALS ON THE U.S. TOXIC RELEASE INVENTORY LIST*
(Reportable Quantities in Metric Tons x 1,000)



*As defined by U.S. SARA Section 313 and PPA.
 Includes recycling, treatment, energy recovery, releases and off-site transfers.

Note: Data for previous years have been revised.

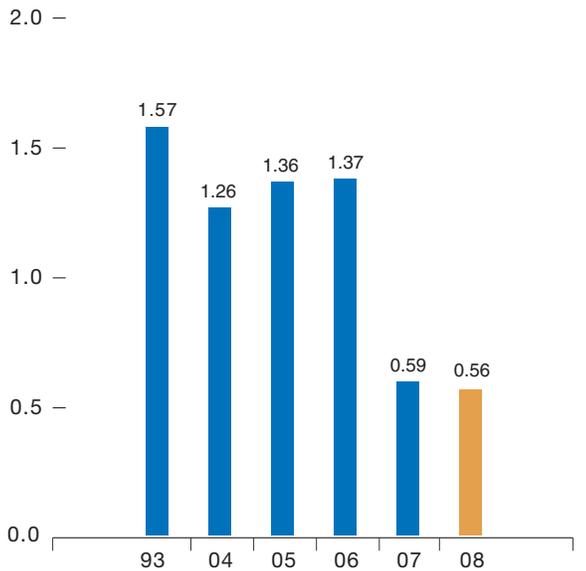
WORLDWIDE USE OF CHEMICALS ON THE U.S. TOXIC RELEASE INVENTORY LIST*
(2008 Reportable Quantities: 3,641 Metric Tons)



*As defined by U.S. SARA Section 313 and PPA.

TOTAL RELEASES TO ENVIRONMENT AND WASTES TRANSFERRED OFF-SITE FOR TREATMENT AND DISPOSAL WORLDWIDE*

(Metric Tons x 1,000)



*As defined by U.S. SARA Section 313 and PPA.

WATER CONSERVATION

In 2000, the company’s evaluation of water use at its plants and labs indicated that IBM’s microelectronics operations represented its most water-intensive operations at these facilities. To address this, IBM established an annual water savings goal.

WATER CONSERVATION IN MICROELECTRONICS MANUFACTURING OPERATIONS

GOAL: To achieve an annual water savings equal to 2% of total annual water usage in its microelectronics manufacturing operations, based on the water usage of the previous year and measured as an average over a rolling 5-year period.

RESULT: As of year-end 2008, IBM’s microelectronics manufacturing operations had achieved an average annual water savings of 4.6% over the past 5 years versus the 2% goal.

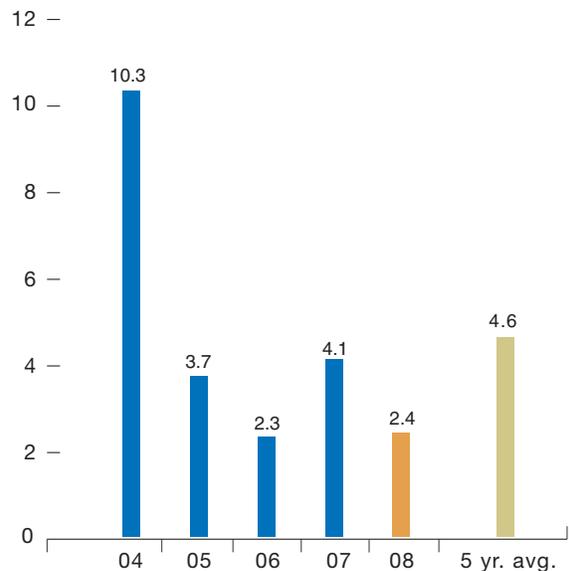
In 2008, water conservation and recycling initiatives in IBM’s microelectronics manufacturing operations achieved a 2.4 percent savings. This translates to an annual conservation savings of 1,214 thousand cubic meters (TCM) of water.

Over the past 5 years, IBM’s microelectronics manufacturing operations’ average annual water savings resulted in the conservation of over 7,400 TCMs of water resource.

From 2000 through 2008, IBM’s microelectronics manufacturing operations achieved an average annual water savings of 5.5 percent.

ANNUAL WATER SAVINGS IN MICROELECTRONICS MANUFACTURING OPERATIONS

(Savings as percentage of previous year’s total water use)



ENERGY AND CLIMATE PROGRAMS

IBM recognizes climate change as one of the most critical global environmental challenges facing the planet. The company believes that businesses, governments and civil societies throughout the world need to work together to stabilize the atmospheric concentration of greenhouse gases (GHGs).

IBM has been a leader in addressing climate change through its energy conservation and climate protection programs for decades. The company's leadership has been defined by its:

- Longstanding global commitment
- Comprehensive and multifaceted programs—covering the company's operations, products and services
- Leading-edge innovations and client solutions
- Significant results, both early and ongoing, benefiting IBM, its clients and the world

A FIVE-PART STRATEGY

To reduce the company's operational environmental impact, IBM has a five-part strategy to reduce GHG emissions:

1. Designing, building, updating and operating facilities and manufacturing operations to optimize their use of energy and materials and minimize GHG emissions
2. Purchasing electricity generated from low CO₂-emitting, renewable energy-generating sources where feasible

3. Efficiently use perfluorocompounds (a family of GHG materials) needed in semiconductor manufacturing and minimize their emissions
4. Reducing employee commuting and business travel
5. Increasing the efficiency of IBM's logistics operations

In addition, in the area of hardware and software products and services, IBM's strategy includes designing energy efficient products and providing the company's clients with energy efficient solutions that also help protect the climate (see Product Energy Efficiency section on page 12 and Data Center Energy Efficiency on page 31).

The company does not have plans to use emissions offsets to become "carbon neutral" for all or part of its operations. IBM's efforts to reduce its GHG emissions are focused on delivering results in the areas where the company can make the greatest positive impact on climate protection—by devoting its available resources to actions, products and solutions that actually increase energy efficiency and reduce GHG emissions for both the company and its clients.

CONSERVING ENERGY

IBM's commitment to energy conservation dates back to 1974 and has continued, unabated, over the intervening years. Energy conservation is a major component of IBM's comprehensive, multi-faceted climate protection program because the release of CO₂ by utility companies powering the company's facilities, or from the use of fuel for heating or cooling, represents the greatest potential climate impact associated with IBM's operations.

Energy Conservation Goal

ENERGY CONSERVATION

GOAL: Achieve annual energy conservation savings equal to 3.5% of IBM's total energy use.

RESULT: In 2008, IBM's energy conservation projects across the company delivered savings equal to 6.1% of its total energy use.

In 2008, IBM's energy conservation projects across the company delivered savings equal to 6.1 percent of its total energy use versus the corporate goal of 3.5 percent. These projects avoided the consumption of 235 million kilowatt-hours (kWh) of electricity and 6.3 million gallons of fuel, representing the avoidance of 215,000 metric tons of CO₂ emissions. The conservation projects also saved \$32.3 million in energy expense as a result of the increased, across-the-board focus on energy efficiency and the implementation of standard, global energy conservation strategies for facilities operating systems.

The company's energy conservation goal recognizes only those projects that actually reduce or avoid the consumption of energy in its operations. Reductions in energy consumption from downsizings, the sale of operations and cost avoidance actions, such as fuel switching and off-peak load shifting, are not included in the energy conservation goal. Moreover, the above results are conservative in that they include only the first year's savings from the conservation projects. Ongoing conservation savings beyond the first year are not included in the tally. Accordingly, the total energy savings and CO₂ emissions avoidance from these conservation actions is actually greater than this simple summation of the annual results.

Between 1990 and 2008, IBM saved 4.9 billion kWh of electricity consumption, avoided nearly 3.3 million metric tons of CO₂ emissions (equal to 48 percent of the company's 1990 global CO₂ emissions) and saved over \$343 million through its annual energy conservation actions.

The 2008 energy conservation results show a significant increase compared to the 2007 energy efficiency achievement of 3.8 percent. These results were facilitated by the strong internal energy management program, with a single, global department of full-time professional energy engineers. The energy team has global best practices teams and utilizes detailed checklists they developed for lighting, heating, ventilating and air conditioning (HVAC), central utility plants, compressed air, data center and IT systems, cafeterias and office systems. These checklists were deployed in 2007 on an enterprise-level database to the top 130 IBM energy-using locations (72 percent of IBM's energy use) and are being deployed to all locations using over 2 million kWh of electricity over the next 2 years.

Based on the resulting analysis, IBM committed \$9 million per year for 2007 and 2008 to energy projects beyond those funded through the regular operational budget process.

The energy management team has been focused on a full range of energy efficiency projects. In 2008, 214 locations delamped, installed higher efficiency lighting or changed lighting schedules, saving a total of 38 million kWh and \$3.9 million with project savings that ranged from 130 kWh at a small office location to 5.4 million kWh at

a large IBM facility. Similar results were achieved for HVAC control modifications and scheduling for buildings, with a net savings of 45.7 million kWh and 75,500 MMBTU (one thousand thousand British Thermal Units) in electricity and fuel use and \$5.6 million in savings for projects implemented at over 125 locations. As can be seen from the results, the checklists have provided an effective program focus that has driven further improvements.

IBM made a significant commitment in 2007 and 2008 to expand its recommissioning program and engaged with the Texas A&M Energy Systems Lab Continuous Commissioning® team at 28 of IBM's major sites. In 2007 and 2008, 25.2 million kWh of electricity savings (\$2.2 million), 166,000 MMBTU of fuel savings (\$1.9 million) and 88,000 MMBTU of chilled water savings (\$0.9 million) were identified through the program. The disciplined, data-driven focus of the recommissioning program has assisted IBM in maximizing the performance of its existing asset base with minimal investment. To complement this effort, IBM maintains a centralized, Internet-based software system that tracks energy use on 15-minute intervals at over 1,500 metering points at 24 major locations in North America to identify where energy settings are drifting from optimum.



IBM has also established a major program for improving data center energy efficiency. Using Mobile Measurement Technology, a thermal mapping tool developed by IBM Research, best practice and air rebalancing surveys were performed at 9 strategic IBM data centers with over 30,000

kilowatts (kW) of demand. The assessments identified opportunities for 2,100 kW demand

reduction (7 percent), of which approximately 110 kW have been captured. Work is underway to capture much of the remaining opportunity. Another aspect of the program is server consolidation to do more work with less energy. In 2008, 19 data centers consolidated various server operations, saving 10 million kWh of electricity use and \$1 million in expense. IBM is offering these services and capabilities to its clients globally, extending the energy and climate benefits well beyond the company's operations.



IBM FREE COOLING PROJECT

IBM's site in Burlington, Vermont, completed a new

project that uses the frigid winter air to help produce the chilled water it needs to operate the plant's high-tech manufacturing facilities.

The new system, called Free Cooling, integrates cold air into the plant's large climate control system to produce 50% of its winter-cooling needs. By taking advantage of the plentiful wintry air, IBM can shut down some of its large chillers, resulting in a projected savings of \$400,000 per year in electric costs.

The Free Cooling system was paid for in part out of Green Mountain Power's Energy Efficiency Fund, which was started in 2007 to maximize for its customers the financial and environmental benefits of energy efficiency. IBM received approximately \$1.5 million from the Fund to help support the costs of the project.

The Free Cooling system has the ability to circulate up to 12,000 gallons of cold water each minute and can create the cooling equivalent of 2,500 window air conditioners. The system started running in December 2008 and will be used annually from November through April as weather permits.

ELECTRICITY AND FUEL USE AND RELATED CO₂ EMISSIONS

(Scope One and Two)

YEAR	ELECTRICITY AND FUEL USE (Thousand MMBTU)	CO ₂ (EST) (Metric Tons x 1,000)
2004	21,360	2,192
2005	22,630	2,489*
2006	22,491	2,420
2007	23,638	2,541
2008	22,443	2,502

*Actual operational CO₂ emissions without adjustments for acquisition and divestiture driven baseline changes.

The above figures include estimates for portions of IBM's office space that are leased. CO₂ emissions are calculated for all energy use, including electricity, fuel oil and natural gas.

IBM uses the greenhouse gas reporting protocol developed by the World Resources Institute and the World Business Council for Sustainable Development to gather and report its CO₂ emissions.

CO₂ emissions data includes the CO₂ avoidance associated with IBM's purchases of renewable energy.

CO₂ EMISSIONS REDUCTION

Between 1990 and 2005, IBM's energy conservation actions reduced or avoided CO₂ emissions by an amount equal to 40 percent of its 1990 energy use. To further extend this achievement, IBM set itself an aggressive "2nd generation" goal: to reduce the CO₂ emissions associated with its energy use 12 percent by 2012 against a 2005 base year through energy conservation and the procurement of renewable energy.

In 2008, IBM's significant conservation results delivered a 3.4 percent reduction in its energy-related CO₂ emissions over 2007. The company's procurement of renewable energy equaled 8.6 percent of IBM's total 2008 energy use.

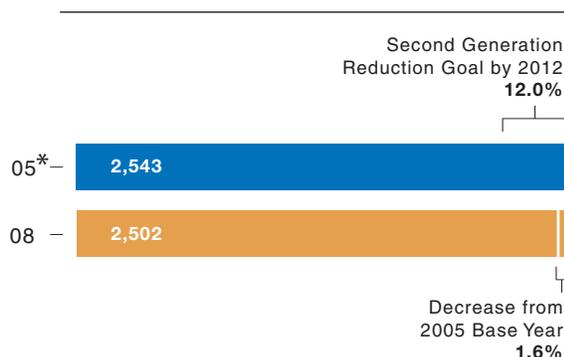
CO₂ EMISSIONS REDUCTION

GOAL: Between 1990 and 2005, IBM's energy conservation actions reduced or avoided CO₂ emissions by an amount equal to 40% of its 1990 emissions. To further extend this achievement, IBM set itself an aggressive "2nd generation" goal: to reduce the CO₂ emissions associated with IBM's energy use 12% between 2005 and 2012 through energy conservation and the procurement of renewable energy.

RESULT: As of year-end 2008, the company's energy conservation results and procurement of renewable energy resulted in a 1.6% reduction in IBM's energy-related CO₂ emissions from the 2005 base year of this goal.

CO₂ EMISSIONS REDUCTION

(Metric Tons x 1,000)



*2005 emissions baseline adjusted for acquisitions and divestitures of operations.

The key contributor to the year-to-year reduction from 2007 to 2008 was the strong energy conservation efforts across the business.

PFC EMISSIONS REDUCTION

IBM releases some perfluorocompounds (PFCs) from its semiconductor manufacturing operations. Although the releases are in relatively small amounts (in carbon dioxide equivalents, when compared to indirect CO₂ emissions), IBM was the first semiconductor manufacturer to set a numeric reduction target for PFCs in 1998.

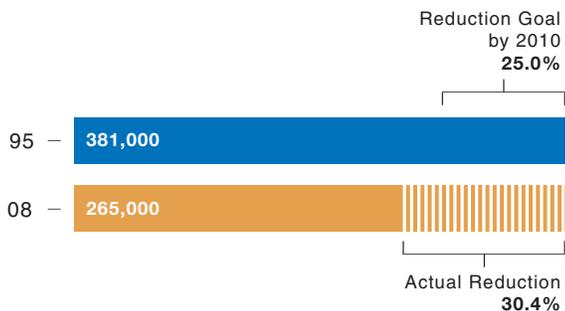
PFC EMISSIONS REDUCTION

GOAL: To reduce PFC emissions from semiconductor manufacturing 25% by 2010 against a base year of 1995.

RESULT: As of year-end 2008, IBM's emissions were 30.4% below the 1995 baseline amount of 381,000 metric tons of CO₂ equivalent.

PFC emissions were up slightly year-to-year in 2008 due to variations in manufacturing volumes and product mix at the semiconductor manufacturing facilities.

PFC EMISSIONS REDUCTION (In Carbon Dioxide Equivalent)



PROCURING AND FOSTERING RENEWABLE ENERGY

In 2008, IBM purchased 450 million kWh of renewable energy, which represented 8.6 percent of the company's 2008 global electricity usage. This represents a CO₂ emissions avoidance of 176,000 metric tons.

RENEWABLE ENERGY PROCURED (Percentage of Total Electricity)

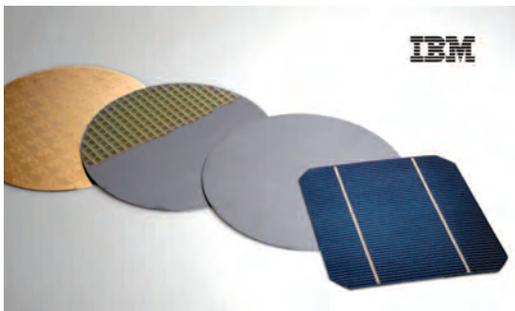


IBM's energy conservation efforts and its procurement of renewable energy in 2008 avoided the emissions of more than 391,000 metric tons of CO₂.

In addition to procuring renewable energy for its own use, IBM is working to further the availability and affordability of renewable energy by investing in IT-related research and development.

- Advancing solar technology:** IBM is exploring four main areas of photovoltaic research: using current technologies to develop cheaper and more efficient silicon solar cells; developing new thin film photovoltaic devices; pioneering concentrator photovoltaic technology to harness the sun's power more efficiently and cost effectively; and researching future generation photovoltaic architectures based upon structures such as semiconductor quantum dots and nanowires.

- **Developing smart grids:** IBM is developing and offering solutions to help utilities add a layer of digital intelligence to their grids and thus automate, monitor and control the two-way flow of energy across operations—from power plant to plug. Smart grids can also incorporate new sustainable energy sources such as wind and solar power and interact locally with distributed power sources or plug-in electric vehicles.
- **Repurposing scrap silicon wafers:** Solar energy technology is affected by the availability of silicon. IBM has developed a polish process that enables the repurposing of scrap silicon “wafers”—the base material used for chips in everything from computers to consumer electronics—from its semiconductor manufacturing operations for use in solar panels. The new process is helping to reduce the estimated three million silicon wafers discarded each year across the computer industry, while also providing new supplies of raw materials to the solar energy industry.



This photo illustrates the patented process of converting IBM built wafers to solar panels. From left, defective wafers are scraped of their proprietary information, resulting in bare, gray silicon wafers. Instead of going to the landfill, they are sold to manufacturers who square them off for reuse as solar panels.

VOLUNTARY CLIMATE INITIATIVES

IBM is a charter member of the Chicago Climate Exchange® (CCX), a voluntary emissions trading system with binding commitments for GHG emissions reduction by its member companies. IBM’s participation in CCX covers scope one and two GHG emissions from the company’s operations in Canada, Mexico and the U.S. By the end of 2008, IBM had reduced its GHG emissions 18.5 percent against the 1998-2001 CCX baseline, compared to the commitment of a 4.5 percent reduction.

IBM continued its participation in the U.S. EPA Climate Leaders program in 2008 and entered into a second generation goal with the World Wildlife Fund’s Climate Savers program. The core of this commitment is IBM’s “2nd generation” CO₂ emissions reduction goal.

In support of this commitment, and consistent with IBM’s vision that information and communications technology (ICT) is an instrumental part of the transformation to a more energy efficient economy, IBM further committed, under Climate Savers, to improving the energy efficiency and energy utilization of the backbone of the ICT system—data centers—through implementing projects within the company as well as helping clients do likewise (see Data Center Power Management and Services section on page 33). Through these commitments, IBM intends to continue its leadership in energy conservation, which improves energy efficiency both within its data centers and in data center facilities infrastructure.

In recognition of IBM's ongoing excellence in implementing strategies to address climate change, IBM Global Business Services became a technical assistance provider to the Climate Savers program, with offerings available to assist participants in developing GHG emissions inventories, climate change strategies and management approaches.

TRANSPORTATION INITIATIVES

Employee Commuting and Leased/Rental Vehicles

IBM has been active in promoting programs that reduce the commute to work for its employees. Key contributors to this effort are IBM's two flexible work programs:

- Work-at-home: Enables many employees to have their offices in their homes
- Mobile employees: Enables many other employees to work from home a designated number of days each week

More than 118,000 employees (over 25 percent) globally participate in one of these programs, which not only helps employees balance their work and personal responsibilities, but also benefits the environment. In the U.S. alone, IBM's work-at-home program conserved approximately 7.1 million gallons of fuel and avoided more than 62,600 metric tons of CO₂ emissions in 2008.

Globally, many IBM locations provide support for the use of public transit systems, including shuttles from locations to mass transit stations, and alternate transportation or "loaner" cars for business trips during the workday. Where IBM provides leased vehicles for employees, the company continues its effort to move to more fuel-efficient vehicles.

Business Travel

IBM's main sources of business travel are airline and rental car use, with some miles also attributed to train travel. IBM has developed an inventory of travel miles and continues to ensure an understanding of travel patterns and opportunities for optimization in meeting business needs and minimizing environmental impact.

While IBM's businesses require employees to travel to fulfill client and other business needs, IBM has also developed, deployed and continued to enhance a full suite of IT tools to reduce business travel where feasible. These IT tools enable real-time collaboration without travel and are widely deployed throughout IBM. They include e-meetings, Web conferencing, advanced audio conferencing, video conferencing and instant messaging. As an example, during 2008, IBM held approximately 175,000 Web conferences involving over 1.3 million participants and over 103 million connection minutes.

Efficiency of Logistics

IBM is reducing the CO₂ emissions associated with transporting its products through the efficient design of its packaging, working with suppliers on their packaging designs and optimizing logistics. In the area of logistics, IBM is a member of the U.S. EPA's SmartWay™ Transport Partnership, a voluntary initiative to improve fuel efficiency and reduce GHG emissions associated with logistics operations.

In 2008, 86 percent of IBM's spending for shipping goods within the U.S. and from the U.S. to Canada and Mexico was spent with SmartWay carriers. IBM also committed to ship 100 percent of its IBM System z and supercomputer product families to customers in North America (within the U.S. and from the U.S. to Canada and Mexico) exclusively using a SmartWay carrier. This commitment makes IBM part of a select few SmartWay shippers allowed to use the SmartWay logo on product packaging for these product families and shipments. IBM also voluntarily applies specific SmartWay requirements to its distribution operations globally.

IBM Global Logistics has been analyzing its logistics transaction level data and utilizing an IBM developed tool, the Carbon Trade-Off Modeler, to model the interaction among various levers: transportation mode, fuel, packaging weight, load consolidation, alternate sourcing and service level agreement. This initiative has enabled IBM Global Logistics to make decisions that optimize the benefits identified from the Modeler across these levers.

IBM's packaging programs also help reduce transport-associated CO₂ emissions by reducing the volume and weight of the company's product shipments through innovative packaging design. Accomplishments in this area were discussed earlier in the report (see pages 14-15).

SUPPLY CHAIN REQUIREMENTS

In general, IBM does not estimate the CO₂ emissions of its suppliers or its external distribution systems. Like many manufacturers, IBM has thousands of suppliers around the world. They are in all types of businesses and very few, if any, work solely for IBM.

In addition, the energy mix of the power used by all of these suppliers varies, and IBM does not believe it could determine a meaningful estimate or apportionment of the energy used by these suppliers that would be associated with the products or services provided to IBM versus that associated with products or services provided to other companies/customers. Moreover, the business scope with any given supplier remains dynamic, as it is driven by business need.

Finally, and perhaps most importantly, IBM believes real results in GHG emissions reduction are directly achieved when each enterprise takes responsibility to address its own emissions and improve its energy efficiency.

IBM has long been committed to working with environmentally responsible suppliers. The company has undertaken two specific initiatives relative to climate change:

- As a member of the Electronic Industry Citizenship Coalition (EICC), IBM is helping to develop a common approach that companies in the electronics industry can use to encourage their suppliers to inventory, disclose and reduce their GHG emissions. EICC is developing a tool to enable energy use and GHG emissions disclosure from the supply

chain and education modules to assist suppliers in developing their energy use and GHG emissions inventories.

- In early 2008, IBM joined the Carbon Disclosure Project (CDP) Supply Chain Project. Through this collaboration, IBM invited 114 of its major suppliers to complete a questionnaire on climate change, looking at issues related to carbon risks and opportunities, emissions reporting, reduction targets and plans, governance, supplier engagement and product life cycles. These 114 suppliers represent 80 percent of IBM's expenditures with production-related suppliers and 30 percent of spend with services and general procurement suppliers. Of the 114 IBM suppliers that received questionnaires, 72 responded. This 63 percent response rate is relatively high compared to that received by other participating companies. The following are highlights of the questionnaire responses received:
 - 55 percent disclosed Scope 1 emissions.
 - 54 percent disclosed Scope 2 emissions.
 - 46 percent are able to break down their total Scope 1 and 2 emissions within their business.
 - 44 percent have a system in place to assess the data accuracy of GHG emissions.
 - 44 percent have a GHG emissions reduction plan in place.

- 36 percent have a strategy for engaging their suppliers on their GHG emissions and the impact of climate change on their business, and 17 percent have indicated that a supplier engagement strategy may be developed in the future.
- 32 percent have developed emissions reduction targets.
- 26 percent assess or provide incentives for individual management of climate change issues.
- 18 percent have developed emissions intensity targets.

IBM participated in this endeavor because the company wants to work with its critical suppliers to gain an understanding of their operational impacts and assess where the suppliers are with regard to having a GHG emissions inventory and reduction plan. Survey responses showed that about one-third of production suppliers had reduction plans, and about one-half of non-production suppliers had plans. This is an encouraging sign, but these numbers highlight the infancy of this initiative in the supply chain. In addition to nominating suppliers to receive a questionnaire, IBM also completed the questionnaire as a supplier to its clients.

In 2009, IBM is again participating in this initiative and further collaborating with its core suppliers—both those who did and did not respond—in order to encourage them to understand and reduce GHG emissions from their operations.

The results of these activities will be used to determine the next steps IBM can take to encourage actions by these suppliers that will lead to improved energy and process efficiency and reductions of GHG emissions in their operations.

SUPPORTING CLIMATE RESEARCH

IBM's commitment to climate protection is integrated throughout the company and is also a focus of the company's corporate philanthropy. For example, climate change is the topic of two of the current research projects selected for the IBM-sponsored World Community Grid™ and an aspect of a significant IBM partnership.

World Community Grid

- **AfricanClimate@Home:**
The AfricanClimate@Home project of the Climate Systems Analysis Group at the University of Cape Town is focused on developing more accurate climate models of specific regions in Africa. The research being conducted will serve as a basis for understanding the impact of future climate change so that measures to alleviate its adverse effects can be developed and implemented. World Community Grid's tremendous computing power is being used to understand and reduce the uncertainty with which climate processes are simulated over Africa. Phase 1 of African Climate@Home has ended, and the scientists for this project are analyzing the results to prepare for Phase 2 of the project.

- **Solar Cell Research:**

The scientists in the Aspuru-Guzik group at Harvard University are using the World Community Grid to discover materials for renewable energy technology. The mission of this Clean Energy Project is to find new materials for the next generation of solar cells and later, energy storage devices. Chemistry can help meet this challenge by discovering new materials that efficiently harvest solar radiation, store energy for later use and reconvert the stored energy when needed. By harnessing the immense power of World Community Grid, researchers can calculate the electronic properties of tens of thousands of organic materials—many more than could ever be tested in a lab—and determine which candidates are most promising for developing affordable solar energy technology.



Water for Tomorrow

Climate is also an aspect of the new computer-modeling framework being developed by IBM and The Nature Conservancy in their “Water for Tomorrow” partnership. The partnership is creating a decision support system that can analyze wide-ranging data on climate, rainfall, land use, vegetation and biodiversity across major watersheds.

Through computer modeling and scenario forecasting, users will be able to simulate the behavior of river basins around the world based on the varying factors and their potential impacts on the watersheds. Rich, three-dimensional visualizations of the scenarios will help planners and policy makers understand the possible outcomes of various land use and watershed management options. This knowledge can facilitate more sustainable management of the world’s great rivers to benefit both the environment and the people who rely on these freshwater resources.

The project will initially be implemented in the Paraguay-Paraná river system in Brazil with the goal of replicating the decision support system in the Yangtze River in China, the Mississippi River in the U.S. and eventually other river systems throughout the world. The tool developed in the first phase of this research will be released later this year.

ENVIRONMENTAL INNOVATIONS AND SOLUTIONS

IBM is also using its research and IT expertise to solve environmental challenges through the application of IT hardware and software.

DATA CENTER ENERGY EFFICIENCY

One area especially challenged to become more energy efficient is the data center. Based on the data center energy efficiency hardware, software and services announcements made as part of Project Big Green in May 2007 (a \$1 billion commitment to deliver technologies that help clients dramatically increase the level of energy efficiency in their data centers), IBM has engaged with clients to deliver hardware, software and services technologies that have helped them reduce data center energy consumption and cut energy costs by as much as 40 percent.

In May 2008, IBM extended this announcement, expanding its global efforts to deliver greater IT equipment and system efficiency to businesses and governments. For more details on IBM’s energy efficient hardware, software and services, visit www.ibm.com/systems/greendc/. Highlights of some of the related products, technologies and offerings are provided below.

Modular Data Centers

IBM has developed three “modular” data center designs:

- **Enterprise Modular Data Center (EMDC)**— IBM has standardized a data center design in 5,000 square foot (450 square meter [m²]) modules. The standard design optimizes the Data Center Infrastructure Efficiency (DCiE),

the percent of total data center power used to power the IT equipment, and shortens construction times, while enabling data center space and equipment energy use to match the specific IT needs.

- **Portable Modular Data Center**—This system provides a fully functional data center using an optimized cooling system in a podlike form, enabling rapid deployment of new IT infrastructure.
- **High Density Zone (HDZ)**—This modular system provides incremental cooling and power capability in existing data centers that are tapped out of capacity. The HDZ system can be swapped into an existing data center without disrupting current operations and can provide up to 35 percent cost savings compared to retrofitting an existing data center, while making the cooling operations more energy efficient.

These systems mimic the power and energy efficiency of IBM's renowned data centers, delivering computing power in an energy efficient package.

Both hardware and software systems are critical to driving such product energy improvements. Some examples:

Data Center Energy Management

- **IBM Systems Director Active Energy Manager:** Active Energy Manager 4.1 (AEM) is an IBM Systems Director extension that can support all of IBM's server systems: IBM BladeCenter®, Power Systems™, System x and System z servers. IBM storage systems and non-IBM platforms can be monitored through IBM or non-IBM (Raritan and

Eaton) Power Distribution Units (PDUs) support. Monitoring and management functions apply to all IBM systems that are enabled for IBM Systems Director Active Energy Manager.

- **Monitoring functions** include power trending, thermal trending, IBM and non-IBM PDU support, support for facility providers, energy thresholding and altitude input.
- **Management functions** include power capping and power savings mode.

AEM can also collect information from select facility providers, enabling monitoring and some control of energy use across the data center, and provide a source of energy management data that can be exploited by Tivoli® enterprise solutions such as IBM Tivoli Monitoring.

- **Virtualization:** Enables consolidation of workload from multiple servers or storage equipment onto a single piece of equipment, saving energy and data center space. Consolidating the workload from many existing computers onto new, high-capacity servers with virtualization capabilities can enable data centers to deliver the same amount of computing capability with 20 - 70 percent of the existing space and power requirements. This can either free up space for additional business process growth or reduce the cost, energy use and associated CO₂ emissions of running the current business.

- **Upgrade of IBM Tivoli management software:** IBM announced enhancements to Tivoli software designed to help customers address the growing need to maximize energy efficiency and reduce costs associated with power and cooling. The latest version of IBM Tivoli Monitoring software consolidates views of energy management information that enable optimization across data centers and facilities infrastructures. Monitoring capabilities offer customers the ability to understand energy usage and alert data center managers to potential energy-related problems so that they can take preventive action. Historical trending and forecasting capabilities enable greater precision in existing environments and energy planning. Autonomic capabilities allow customers to set power and utilization thresholds to help control energy usage. The new software can also help customers handle physical constraints in the data center related to space, power and cooling. The software can be combined with partner solutions to provide customers with a comprehensive view of energy consumption across the enterprise—not just in data centers but also in non-IT assets such as air conditioning equipment, power distribution units, lighting and security systems.

Data Center Power Management and Services

The increasing use and importance of IT solutions in optimizing the day-to-day operations of businesses—and the increasing power demand and density of these ever more powerful IT systems—have placed a heavy demand on power and cooling systems in data centers.

IBM's comprehensive hardware, software and services portfolio can address end-to-end needs, which can range from assessments to planning, implementation and management of energy efficient IT equipment, infrastructure and data center operations. These services are enabling IBM and its clients to design and implement data center “ecosystems” that minimize the energy requirements of data centers and maximize the workload delivered.

For example, IBM Global Technology Services and Systems and Technology Group lab services provide a full range of offerings to assist clients with evaluating, designing, implementing and managing their IT infrastructure and physical environment. Some examples:

Data Center Air Flow and Best Practices

Assessment: IBM's experience in data center energy use reductions through the application of Mobile Measurement Technology developed by IBM Research, and best practice and air rebalancing surveys are discussed on page 23 of this report. These services are offered to clients who can realize data center energy savings of 5 - 10 percent.

Server Consolidation: IBM offers a comprehensive set of services that can help clients increase the flexibility of their server infrastructure, achieve utilization rates of up to 60 percent, significantly reduce the number of servers they manage and reduce their energy use and space requirements by putting multiple applications and workloads on a single server.

Data Center Design: As discussed previously, IBM is offering data center design services that assist clients and IBM in building more efficient data center space.

IBM is offering these services and capabilities to its clients globally, extending the energy and climate benefits well beyond the company's operations.



IBM OPENS ITS GREENEST DATA CENTER IN NORTH AMERICA

IBM officially opened its “greenest” data center in North America at its Boulder, Colorado, site in 2008. It is IBM’s largest data center location worldwide. The 115,000-square-foot, energy efficient facility includes 70,000 square feet of raised floor space and is part of a \$350 million investment by the corporation in Boulder to help meet customer demand worldwide for green data centers, while helping IBM and its clients reduce energy costs.

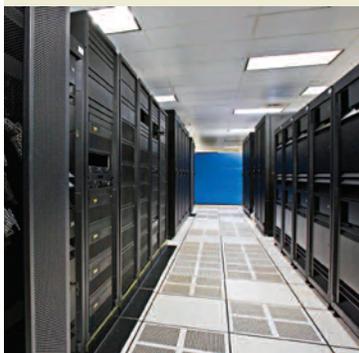


The new data center features numerous leading-edge technologies and services, including high density computing systems utilizing virtualization technology, along with energy efficient power and cooling technologies. These, in conjunction with the center’s energy efficient design and construction, will allow IBM to reduce its overall carbon footprint compared to standard data centers.



To build the new data center, IBM retrofitted an existing office building on the Boulder campus. It reused 98% of the original building’s shell, recycled 65% of the materials from the original building, and 25% of newly purchased material came from recycled products.

The facility is partially powered by alternative energy sources, including more than one million kilowatt hours per year of wind-powered electricity purchased by IBM. This should result in a planned reduction of approximately two million pounds of CO₂ produced per year.



Given Boulder’s geographic location and existing infrastructure reliability, the site is an optimal location to leverage energy efficiency. When exterior temperature and humidity levels are favorable, the new data center’s technology switches to free-cooling mode – utilizing a water economizer to dramatically reduce energy consumption.

INTEGRATING IT AND PHYSICAL INFRASTRUCTURE

The company is applying IT and supercomputing capabilities to the intelligent energy grid, smart transportation systems, biofuel development, energy and material use optimization in manufacturing processes, logistics planning and other applications.

These solutions include such projects as the Stockholm smart traffic solution. This project generated an approximate 18 percent reduction in traffic, a 12 percent drop in emissions and a reported 40,000 additional daily users of public transportation. Based on the pilot results, the people of Stockholm voted to put it in permanently. The U.K. equivalent in London is estimated to achieve inner city emissions reductions of up to 20 percent.

IBM has been closely involved with key research areas that highlight the importance of IT enabled data to inform smarter decisions. For example, IBM Research was involved with a project by the Pacific Northwest National Laboratory of the Energy Department and Invensys Controls that showed if households have digital tools to set temperature and price preferences, the peak loads on utility grids could be trimmed by up to 15 percent a year.

IBM's smart logistics solutions, such as the Supply Chain Optimization Workbench, uses advanced mathematics to optimize operations, lowering one client's costs by 23 percent and avoiding 90,000 metric tons/year of CO₂ emissions.

IBM's IT has been critical in enabling energy efficiency across key areas from "dematerializing" physical goods and services, such things as electronic medical records or on-line music purchases, to travel displacement activities such as telepresence and virtual worlds. Ensuring that well-managed information and communication technologies is a net investment in reducing energy use and the associated CO₂ emissions for IBM and its clients is a key part of the company's competitive success.

RESEARCH CAPABILITIES

IBM's research capabilities are being applied to energy- and weather-related issues through its "Alternative Energy Research Program." In addition to the computational innovations discussed above, IBM is using its materials expertise to develop innovations in photovoltaic materials and processes and its expertise in nanoscience engineering to the challenges of developing highly efficient, low energy membranes for batteries, water filtration and other applications. Specific examples of research innovations include:

IBM Hydro Cluster Water Cooling Technology: High performance silicon and copper microchannel coolers, which remove heat at the processor, have been developed and a prototype cooler has been demonstrated for possible use in IBM System p and System z servers.

Hydro-air Cooling: To increase energy-usage efficiency for Blue Gene®/P, a hydro-air cooling option has been developed in which air is repeatedly reused by the introduction of large air-to-water

heat exchangers between adjacent racks. Because the airflow path through the racks is more efficient in this design, the heat exchangers incur no additional loss, yet they allow the airflow requirements of typical Blue Gene/P systems to be drastically reduced (e.g., by a factor of eight for a system with eight-rack rows), thereby drastically reducing the need for computer room air-conditioning units that typically consume 40 - 70 percent of data center energy. Additionally, the new hydro-air cooling system reduces the space requirement for Blue Gene/P by 25 percent.

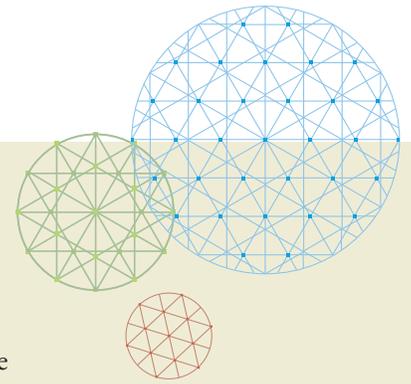
Solar Cells: A research team at IBM's Thomas J. Watson Research Center, New York, has developed a way of making thin film solar cells from materials that can be spun on from liquid precursors, without requiring expensive and slow vacuum deposition processes, yielding solar cell efficiencies of approximately 12.5 percent with a material called copper indium gallium selenide. This work has enormous potential to reduce the cost of making solar cells without compromising efficiencies.

Concentrated Photovoltaics: Using IBM's proprietary solutions, IBM researchers have used a standard lens to concentrate sunlight to 2,300 times its normal power density, cooled the photovoltaic cell with a liquid metal, thermal interface-based package, and showed that an unprecedented 75 watts of electrical power could be extracted from the cells. This development has

paved the way for truly high concentration photovoltaics technologies, and the IBM team is currently building and testing a prototype for long-term performance.



Flood Forecasting: In recent years, severe storms have impacted several large cities around the world, producing floods and significant property damage due to the lack of adequate flood warning systems. IBM Research has developed a numerical urban flood forecasting model. It has two major integrated components: a hydrological model and a meteorological model. The hydrological component can capture local terrain effects at very fine resolution (e.g., for streets and sewers) to model the surface flow using techniques that are accurate but computationally very efficient. The meteorological component is either coupled to an analysis of a data feed of weather radar and/or surface stations, or to a local weather forecasting model to simulate precipitation impact on public infrastructure. The former would provide a near real-time estimate of flooding, providing a planning tool or an early warning system.



SHARING INNOVATIONS TO BENEFIT THE ENVIRONMENT— THE ECO-PATENT COMMONS

The Eco-Patent Commons is a unique opportunity for global business to make a difference—sharing innovation to foster sustainable development. The Commons, which is an online collection of environmentally beneficial patents pledged by companies for free use by anyone, was initiated by IBM and the World Business Council for Sustainable Development and launched in January 2008 with Nokia, Pitney Bowes and Sony.

The idea was born out of IBM's Global Innovation Outlook conversations; it is designed to facilitate the use of existing innovation to protect the environment and encourage collaboration for new innovation. Bosch, DuPont and Xerox joined the Commons in September 2008, and Taisei and Ricoh joined in March 2009.

Examples of the environmental benefits of patents that may be pledged to the Eco-Patent Commons include:

- Energy conservation or improved energy or fuel efficiency
- Pollution prevention (source reduction, waste reduction)
- Use of environmentally preferable materials or substances
- Water or materials use reduction
- Increased recycling opportunity

Member companies pledge their patents, and any individual or company pledging one or more patents is eligible for membership. To date, the 9 member companies have pledged nearly 100 patents to the Eco-Patent Commons, 28 of which were pledged by IBM. Many of the member companies have been contacted directly about their patents.

For example, Yale University has used one of the patents pledged by IBM to substitute a chemical-based developer with an environmentally preferable mixture of alcohol and water for their quantum computing device research. The new solution IBM developed eliminates the need for treating the wastewater from this process.

For more information, to join the Commons or to view pledged patents, visit the Eco-Patent Commons Web site at www.wbcds.org/web/epc/.

SHARING INNOVATIONS TO BENEFIT THE WORLD

The Eco-Patent Commons is not IBM's only commitment to sharing innovation. Concurrent with the announcement of IBM's continued patent leadership in January 2009, IBM also announced plans to help stimulate innovation and economic growth. The company plans to increase by 50 percent—to more than 3,000—the number of technical inventions it publishes annually instead of seeking patent protection. This will make these inventions freely available to others.

IBM also will contribute the advanced statistical and analytical capabilities of IBM Research to a collaborative project that is developing an empirical measure of patent quality.

Publication of technological information is one means to “promote the Progress of Science and useful Arts,” the phrase in the U.S. Constitution giving Congress the power to enact patent laws.

Publications also improve patent quality, since they can be cited by patent offices in limiting the scope of patent applications, and help spur follow-on innovation that ensures dynamic business growth.

While IBM will continue to seek patents and will protect its intellectual property, its planned increase in publishing inventions will focus on those technology areas that will increase the build out of a new, smarter infrastructure. The evolution of IBM's patent strategy builds on prior efforts to stimulate innovation by pledging not to assert certain patent rights in the area of open source software, health care, education, the environment and software interoperability.

AUDITS AND COMPLIANCE

IBM measures its environmental performance against both external and internal requirements. Every manufacturing, hardware development and research site completes a comprehensive self-assessment every year, some more frequently. Each year, certain sites are audited for environmental, health and safety compliance by IBM's Corporate Internal Audit staff. Audit results are communicated to top management. Follow-up, accountability and actions are clearly delineated.

In addition, as part of IBM's single, global registration to ISO 14001, approximately 20 sites or registered entities are audited annually by an

independent ISO 14001 registrar. The company's manufacturing, hardware development and chemical-using research sites are audited, by either the Corporate Internal Audit team or the external ISO 14001 registrar, at least once every two years.

ACCIDENTAL SPILLS AND RELEASES

IBM sites around the world report environmental incidents and accidental releases to IBM management through the company's Environmental Incident Reporting System (EIRS). Every event meeting IBM's environmental incident reporting criteria, which equal or surpass legal reporting requirements, must be reported through EIRS.

Each IBM location must have a documented incident prevention program (including provisions for preventing environmental incidents or their recurrence) and reporting procedure.

In 2008, a total of 27 accidental releases related to IBM operations were reported through EIRS. Of these, three were released to secondary containment (one acid, one hydraulic fluid and one calcium hydroxide [lime]) leaving 24 actual accidental releases to the environment. Of those 24, 6 were to air and 18 to land.

All emissions to the air were of refrigerants. Emissions to land included one release of particles, three releases of chilled water, nine releases of waste water, and one each of petroleum, steam condensate, calcium hydroxide, industrial wastewater and hot water.

The root cause was investigated for all releases, and corrective actions were taken as appropriate. None of the releases were of a duration or concentration to cause long-term environmental impact.

FINES AND PENALTIES

One significant measure of a company's environmental performance is its record of fines and penalties.

IBM received 86 agency visits worldwide in 2008 and was not assessed any fines during the year. Over the past 5 years, IBM has paid 1 administrative fine for a total amount of \$1,000.

FINES AND PENALTIES WORLDWIDE

(\$ in Thousands)

	04	05	06	07	08
Number	0	0	0	1	0
Fines	\$0.0	\$0.0	\$0.0	\$1.0	\$0.0

REMEDIATION

When groundwater contamination was first discovered at one of IBM's sites in 1977, the company initiated groundwater monitoring at all of its manufacturing and development locations worldwide. Today, IBM has 2,801 monitoring and 115 extraction wells.

In 2008, 14,430 pounds of solvents from past contamination were extracted while remediating, controlling and containing groundwater at 7 currently operating sites and 10 former sites in 2 countries. At 4 of these sites, an additional

3,226 pounds of solvents were removed by soil vapor extraction or other methods. IBM also has financial responsibility for remediation at two other former sites.

As a result of the U.S. Superfund law, IBM is involved in cleanup operations at some non-IBM sites in the U.S. The Superfund law creates a retroactive responsibility for certain past actions even though they may have been technically and legally acceptable at the time.

As of year-end 2008, IBM had received notification (through federal, state or private party) of its potential liability at 110 sites. Of these, 57 are on the

U.S. National Priority List. At the majority of the 110 sites, it has been determined that IBM either never had liability or has resolved liability. As a result, IBM believes it may have potential liability at only 17 sites.

When investigation and/or remediation at an IBM location or an off-site facility is probable, and its costs can be reasonably estimated, IBM establishes accruals for loss contingency. Estimated costs connected with closure activities (such as removing and restoring chemical storage facilities) are accrued when the decision to close down a facility is made. As of December 31, 2008, the total accrual amount was \$267 million.

AWARDS AND RECOGNITION

INTERNAL RECOGNITION

Chairman's Environmental Award Program

IBM established the Chairman's Environmental Award Program in 1991 to encourage leadership and recognize achievement and progress in environmental affairs on the part of IBM's organizations.

In 2008, the program focused solely on energy conservation and energy efficiency, as it has the past two years, and the competition continued to be among major business units. The recipient was selected based on their degree of leadership, results, innovation and integration with regard to their programs and initiatives in the areas of energy conservation and energy efficiency. IBM's Global Technology Services (GTS) received the 2008 IBM Chairman's Environmental Award.



(Left to right) IBM Chairman Sam Palmisano presents the 2008 IBM Chairman's Environmental Award trophy to Mike Daniels, Senior Vice President, Global Technology Services.

With most data centers built before the dot.com era and now technically obsolete, GTS has quickly moved to fill a new customer need to evaluate and extend existing IT, while deploying more efficient future IT—with better controls, at lower cost and with less environmental impact. Through hands-on experience in numerous client engagements, GTS has developed a deep understanding of how to design energy and environmental infrastructures unique to IBM's clients' specific needs. The organization has driven significant results with its keen focus on energy efficient operations and newly expanded portfolio of services to benefit its clients with energy conservation and sustainability needs. The following are examples of some of the GTS service offerings and the benefits they can provide to clients:

- IBM Data Center Family™ of modular data centers for mid-size and large enterprise clients are 30 - 50 percent more energy efficient than existing data centers.
- Data Center Energy Efficiency Assessments can deliver 15 - 40 percent in annual energy savings for existing data centers.

- Server and Storage Optimization and Integration Services can provide up to a 70 percent reduction in overall operational costs, including energy savings.
- Virtual Infrastructure Access Services help limit the use of less energy efficient PCs to new thin client devices, offering a total cost of ownership savings of about 40 percent.
- Managed Business Process Services—in collaboration with other IBM teams—has developed an innovative traffic congestion charging system to reduce traffic in the city of Stockholm, Sweden, by 18 percent, improving both the environment and access to the city.

GTS owns or manages the largest portfolio of data centers in the world. The organization's leadership in improving IBM's IT alone has created numerous efficient IBM data centers that have saved money, reduced energy consumption and increased utilization. Some examples:

- IBM's internal Enterprise Computing Model (ECM) project is underway to virtualize 25 percent of its server infrastructure in order to use 80 percent less energy and 85 percent less floor space.
- IBM Strategic Outsourcing brought the company's "greenest" data center in North America on-line in Boulder, Colorado. The organization also initiated a Leadership Data Center (LDC) program last year and began design of the first modular, 60,000 square foot (expandable to 100,000 square feet) LDC facility in Raleigh, North Carolina, with an energy efficiency or DCiE (Data

Center Infrastructure Efficiency) of 71 percent, significantly above the industry average of 43 percent, which will showcase energy efficient design best practices.

- Business Continuity and Resiliency Services announced an investment of \$300 million to construct 13 additional business resilience service delivery centers in 10 countries, increasing its ability to address surging demand from businesses and governments seeking to keep their operations safe from disruption.

Issues and opportunities around energy, the environment and sustainability impact every individual and every business worldwide. GTS is addressing these with a business process strategy enabled and executed through the application of technology.

EXTERNAL RECOGNITION

IBM's environmental leadership and significant environmental accomplishments were externally recognized during 2008 in many ways. Some examples include:

- IBM ranked #1 in a report on corporate climate change governance practices released by CERES and its investor network. The report analyzed the climate change practices of 63 of the world's leading companies across 11 industry sectors. Using a framework developed by RiskMetrics, in consultation with CERES, the companies were evaluated on how they are addressing climate change through board oversight, management execution, public disclosure, GHG emissions accounting and strategic planning and performance.

- IBM again ranked #1 in the electronic sector by Climate Counts for Corporate Leadership in Climate Change.
- IBM was among five companies identified as “best positioned to sustain competitive advantage on a combination of cash returns, industry structural positioning and ESG (environmental, social and governance) performance” in Goldman Sachs’ GS SUSTAIN report and ranking of companies in the technology hardware and electronics industry.
- IBM received an AA+ ranking from the Climate Protection Office of the Tokyo Government, recognizing IBM’s leadership in environment, energy and climate protection.
- IBM received an ECOFIRA Innovación 2008 Award for its “Recycled Silicon for Solar Panels” initiative. The award was presented at ECOFIRA, one of the leading trade events for the environment in Spain. This wafer monitor recycling process was also recognized with a Vermont Governor’s Award for Environmental Excellence & Pollution Prevention.
- IBM was selected as one of the Best Green Companies for America’s Children by *Working Mother* magazine.
- IBM again achieved a “Gold” level ranking in the Business in the Community Environment Index in the U.K. IBM received a score of 91.81 percent, maintaining its Gold level performance (90-95 percent). IBM also placed first in its sector.
- IBM topped the list in the 7th Annual Best 50 Corporate Citizens in Canada, the definitive annual *Corporate Knights* magazine listing of Canada’s top corporate citizens. IBM’s Key Performance Indicator score was second to none, and it scored tops in energy efficiency of products, eco-social product innovation, proportion of products with sustainable development differentiation, and active technology transfer to the developing world.
- IBM again topped the Supercomputing “Green 500 List” published by The Green500.org. No fewer than the top 15 positions in the ranking of energy efficiency are held by supercomputers built on IBM high performance computing technology.
- IBM was among the companies making the 2008 Sustainable Business 20 (SB20) List: The World’s Top Sustainable Stocks. The SB20 List identifies 20 public companies leading the way to a sustainable society through either greening their internal operations or growing a business based on an important green technology.
- IDG’s *Computerworld* selected IBM as the “Top Green IT Company” for 2008. This honor was part of *Computerworld*’s very first Top Green IT Companies feature.
- IBM was awarded a Gold rating under the Corporate Responsibility Index for 2008 administered by the St. James Ethics Centre, Australia. The index highlights companies that are recognizing and acting on their responsibilities to a broad range of stakeholders including shareholders, clients, employees, the broader community and the environment.

- IBM Guadalajara received an Environmental Excellence Award from the Mexican Federal Environmental Protection Office (PROFEPA). The award is the highest environmental recognition granted to business in Mexico.
 - IBM's Westchester, New York, sites were recognized with four awards for encouraging employees to reduce drive-alone commuting and for promoting clean air practices. MetroPool presented three awards to IBM for the company's participation in its Earth Day Race to the Finish Challenge and Clean Air NY honored IBM, along with seven other organizations, as a Clean Air NY Champion.
 - IBM's Research Triangle Park (RTP), North Carolina, site received the Commuter Leadership Award—Large Company for its contribution to Durham's "Commute Trip Reduction" Program. IBM RTP was recognized for work-at-home, vanpools, carpools, bicycle facilities, and its support of SmartCommute.
 - IBM Montpellier, France, won the 2008 first trophy as the most "eco-mobile" company by Montpellier Agglomeration, Montpellier Transportation and the French Department Agency for Environmental Protection.
 - IBM Austin, Texas, was announced as the winner of the 2008 Greater Austin Business Award for Environmental Achievement in the Large Company category. The competition was sponsored by the Austin Chamber of Commerce with nearly 200 companies submitting applications in 7 categories.
- IBM Austin's consistent hard work and accomplishments in energy conservation, solid waste recycling, and conservation of natural resources has long been recognized throughout the community.
- IBM Ireland received two awards at the Chambers Ireland Presidents Awards. IBM received the awards in the supply chain category for Most Innovative CSR Project and Best Marketplace Supplier Programme by a Multinational Corporation for its "Air-Filled Void Filler Process" and its innovation in reducing the level of cost to the consumer, the environment and the company.
 - IBM Burlington, Vermont, received two 2007-2008 Vermont Governor's Awards for Environmental Excellence & Pollution Prevention for "Performance Optimization and Increased Treatment at IBM's Waste Water Treatment Facility" (Environmental Excellence in Environmental Stewardship and Resource Protection category) and "PerFluoro Octyl Sulfonate (PFOS) Elimination in Buffered Oxide Etch Chemicals used in Semiconductor Manufacturing Operations" (Environmental Excellence in Pollution Prevention category). This marked 15 consecutive years that IBM has been recognized with at least 1 of these awards—which is every year the competition has been held.

IBM ENVIRONMENTAL AFFAIRS POLICY

IBM is committed to environmental affairs leadership in all of its business activities. IBM has had long-standing corporate policies of providing a safe and healthful workplace, protecting the environment, and conserving energy and natural resources, which were formalized in 1967, 1971 and 1974, respectively. They have served the environment and our business well over the years and provide the foundation for the following corporate policy objectives:

- Provide a safe and healthful workplace and ensure that personnel are properly trained and have appropriate safety and emergency equipment.
- Be an environmentally responsible neighbor in the communities where we operate, and act promptly and responsibly to correct incidents or conditions that endanger health, safety or the environment. Report them to authorities promptly and inform affected parties as appropriate.
- Conserve natural resources by reusing and recycling materials, purchasing recycled materials, and using recyclable packaging and other materials.
- Develop, manufacture and market products that are safe for their intended use, efficient in their use of energy, protective of the environment, and that can be reused, recycled or disposed of safely.
- Use development and manufacturing processes that do not adversely affect the environment, including developing and improving operations and technologies to minimize waste; prevent air, water, and other pollution; minimize health and safety risks; and dispose of waste safely and responsibly.
- Ensure the responsible use of energy throughout our business, including conserving energy, improving energy efficiency, and giving preference to renewable over nonrenewable energy sources when feasible.
- Participate in efforts to improve environmental protection and understanding around the world and share appropriate pollution prevention technology, knowledge and methods.
- Utilize IBM products, services and expertise around the world to assist in the development of solutions to environmental problems.
- Meet or exceed all applicable government requirements and voluntary requirements to which IBM subscribes. Set and adhere to stringent requirements of our own no matter where in the world the company does business.
- Strive to continually improve IBM's environmental management system and performance, and periodically issue progress reports to the general public.
- Conduct rigorous audits and self-assessments of IBM's compliance with this policy, measure progress of IBM's environmental affairs performance, and report periodically to the Board of Directors.

Every employee and every contractor on IBM premises is expected to follow this policy and to report any environmental, health or safety concern to IBM management. Managers are expected to take prompt action.



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