IBM Corporate Environmental Affairs

2014 IBM and the Environment Report

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IBM

A quarter century of environmental reporting

This year marks the 25th consecutive year of our "IBM and the Environment" report, and while our business has continued to transform in those 25 years, I am proud to say that IBM's commitment to environmental sustainability has been constant.

At IBM, protection of the environment is and always will be a part of our fabric—from our research, product design and supply chain, to the environmental benefits derived from our services and solutions.

We had another year of environmental accomplishment across our business as we continued our record of energy conservation and reduction in greenhouse gas emissions. In 2014, IBM's energy conservation projects across the company delivered savings equal to 6.7 percent of our total energy use, surpassing our annual goal of 3.5 percent. These projects avoided the consumption of 325,000 megawatt-hours of electricity and 267,000 million British thermal units of fuel oil and natural gas, representing the avoidance of 142,000 metric tons of carbon dioxide (CO_2) emissions. They also saved $37.4 million in energy expense. Between 1990 and 2014, IBM saved 6.8 billion kilowatt-hours of electricity consumption, avoided 4.2 million metric tons of CO_2 emissions, and saved $550 million through its annual energy conservation actions.

Having achieved these and other significant accomplishments, we can and will do more. In March 2015, at a White House Council on Environmental Quality meeting in Washington, we announced a new goal to increase our procurement of renewable electricity and a third-generation greenhouse gas reduction goal:

1. Procure electricity from renewable sources for 20 percent of IBM's annual electricity consumption by 2020 while matching our purchased renewable electricity directly to our operations, as opposed to purchasing renewable energy certificates as offsets. This makes a clear connection between our purchases and our consumption.
2. Reduce CO_2 emissions associated with IBM's energy consumption 35 percent by year-end 2020 against base year 2005 adjusted for acquisitions and divestitures. This represents an additional 20 percent reduction from year-end 2012 to year-end 2020 over the reductions achieved from 2005 to 2012 under our second-generation goal.

However, even as we build upon our legacy of embedding environmental sustainability into our operations, we know that our greatest opportunities to contribute to a more sustainable planet come from helping our clients transform their operations to improve their efficiency and conserve energy, water, and other resources. New IBM innovations such as data-driven agricultural solutions, enterprise-wide analytics for energy companies, and the use of cognitive computing systems to analyze pollutant discharges and their impacts are all helping our clients transform their business to become more efficient, while protecting the environment.

This report highlights a few of these important innovations along with results from IBM's wide-ranging environmental programs. All of the accomplishments highlighted in the report are the result of innovative and hardworking IBMers around the world. I want to thank them all for their continued dedication and commitment to IBM's environmental leadership.

Wayne S. Balta

Vice President
Corporate Environmental Affairs & Product Safety

Commitment to environmental leadership

IBM's Corporate Policy on Environmental Affairs calls for environmental leadership in all of the company's business activities.

The phenomena of big data, cloud computing, and social and mobile technologies are changing business, society and the way the world works. At IBM, we are intent on enabling this transformation by providing technology, research and expertise to address grand environmental and sustainability challenges for our clients and the world. In doing so, we are building on a long history of protecting the environment.

IBM's corporate environmental programs date back to the 1960s. In 1971, Thomas J. Watson Jr., IBM's CEO at the time, formalized the company's commitment to environmental protection with our Corporate Policy on IBM's Environmental Responsibilities. Updated a number of times over the years, that policy and the wide range of environmental programs supporting it have defined and driven IBM's longstanding commitment to environmental leadership in all of our business activities.

As a company, we recognize the far-reaching impact we can make across all aspects of the environment — from conserving energy and natural resources and pollution prevention, to the environmentally responsible development and manufacturing processes we use in our operations, to products and solutions we provide our clients.

- Since 1990, IBM's conservation actions have saved 6.8 million megawatt-hours (MWh) of electricity consumption, avoided 4.2 million metric tons of carbon dioxide (CO_2) emissions and saved the company $550 million.
- IBM has a 40-plus-year history of leadership in prohibiting or restricting substances of concern from our processes and products before regulatory requirements were imposed.
- From 1995 through the end of 2014, IBM documented the collection and processing of approximately 2.1 billion pounds of product and product waste worldwide.
- Our solutions are providing clients with unprecedented views of their data, improving decision-making, allocation of resources and overall operational efficiency to build a more sustainable planet.

This report marks a quarter century of our annual, voluntary corporate environmental reporting. Our business has changed over the decades and will continue to transform, but IBM's commitment to environmental leadership will not.

Global governance and management system

IBM implements its environmental programs through a global environmental management system that integrates corporate directives that govern IBM's conduct and operations worldwide.

Global environmental management system

Our corporate environmental affairs policy objectives range from workplace safety, pollution prevention and energy conservation to product design for the environment and the application of IBM's expertise to help address some of the world's most pressing environmental problems.

IBM's corporate environmental affairs policy calls for environmental affairs leadership in all of the company's business activities. This leadership is implemented through a global environmental management system (EMS) that integrates corporate directives that govern IBM's conduct and operations worldwide. These directives cover areas such as pollution prevention, chemical and waste management, energy management and climate protection, environmental evaluation of suppliers, product stewardship, and incident prevention and reporting. It is through the consistent implementation of this global EMS that IBM ensures operations are executed with the same protective standards for the environment in every country where business is conducted.

Employee and management responsibility

As noted in IBM's Business Conduct Guidelines, all IBMers have a role to play in protecting the environment. IBM's corporate policy on environmental affairs and its supporting global EMS provide more specific detail on IBM's environmental requirements. Every employee is expected to follow IBM's corporate environmental policy 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 its directives. IBM executives are responsible for the environmental performance of their businesses functions or locations.

Our environmental programs and performance are routinely monitored and results are reviewed annually by all levels of management up to the Directors and Corporate Governance Committee of IBM's Board of Directors to ensure the ongoing suitability, adequacy and effectiveness of IBM's single global

EMS for IBM's activities, products and services. Formed in 1993, the Directors and Corporate Governance Committee reviews IBM's position and practices on significant issues of corporate public responsibility, including protection of the environment.

Environmental goals

Environmental goals are an important part of IBM's EMS. We maintain a range of environmental goals designed to drive continual improvement of our environmental programs — including climate protection, energy and water conservation, pollution prevention, waste management and product stewardship. These voluntary goals and our performance against them are discussed in their respective sections of this report, and a summary of key goals and their outcomes are provided in the listing of IBM's environmental key performance indicators.

ISO 14001:2004 standard on environmental management systems

In 1997, IBM became the first major company to earn a single global registration to the International Organization for Standardization (ISO) 14001 environmental management systems standard. We achieved this credential within just one year of the finalization of the standard, in part due to the results already delivered under our environmental policy, first issued in 1971, and the early implementation of our environmental management programs.

The initial registration covered IBM's manufacturing, product design and hardware development operations across our business units worldwide. We have since expanded our global ISO 14001 registration to include additional entities such as our research locations that use chemicals, several country organizations and their non-manufacturing locations, our product development function, as well as our Global Asset Recovery Services and supply chain organizations.

As our business model has evolved to include more services offerings, we have updated our EMS to address environmental opportunities and challenges in the services area. IBM's single global ISO 14001 EMS accreditation with a complete list of registered entities worldwide can be viewed on IBM's ISO 14001 webpage.

ISO 50001:2011 standard on energy management systems

IBM has always been committed to the efficient use of energy, and our CEO issued a formal corporate policy in 1974, calling for the conservation of energy and materials in all of IBM's activities. Over the intervening years, we improved our global energy management program and integrated it into the company's global EMS.

Once ISO issued the ISO 50001 standard on energy management systems in June 2011, IBM set forth a strategy to achieve verification of conformity of our EMS against this newly published standard.

Within one year of the issuance of the ISO standard, we achieved ISO 50001 registration of our energy management program at the corporate level as an integral component of IBM's global EMS. Our approach recognizes and leverages the fact that IBM's existing EMS addresses both environmental and energy management.

Following our successful ISO 50001 EMS registration at the corporate level, IBM's major energy-consuming locations received registration audits of their site-specific energy programs under IBM's single global ISO 50001 certification.

As of year-end 2014, 15 locations — 10 in the United States and one each in Canada, France, Hungary, Ireland and Mexico — had successfully concluded their ISO 50001 registration audits.

Public disclosure

IBM's Corporate Policy on Environmental Affairs also calls for the company to publicly disclose information on our environmental programs and performance. This report marks IBM's 25th consecutive year of annual corporate environmental reporting.

In addition to providing information on our environmental programs and performance in this report since 2002, and in IBM's annual corporate environmental report, which we have been publishing annually since 1990, we provide a report based on the Global Reporting Initiative and supply information through a number of other voluntary reporting programs and tools, such as the Carbon Disclosure Project, EcoVadis and OneReport. For more details on IBM's environmental reporting, see the IBM environmental reporting, disclosure and verification webpage.

Stakeholder engagement

IBM has a variety of outreach programs to engage various groups and individuals on the subject of the environment. Our community environmental 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. Engaged stakeholders include socially responsible investors and other shareholders, environmental nongovernmental organizations (eNGOs), governments, employees, clients, suppliers and others. We consider these relationships to be very valuable, as they allow us to share ideas and obtain various perspectives, input and feedback regarding our programs, activities and performance. They also inform our reporting, enabling us to better meet the information needs of a wide variety of interested people and entities.

Some examples of engagements in 2014 included:

- We met with a leading bank in Europe and participated in their sustainability summit, explaining IBM's practices and discussing possible collaborative initiatives with the client.
- We met with a group of stockholders and clarified IBM's practices and programs for the recycling of lead-acid batteries worldwide.
- We met with several leading universities and participated in several of their events to explore the impact of big data on sustainability.

In addition, IBM Stockholder Relations holds an annual call and webcast for financial analysts, in which executives from a range of IBM organizations are available to discuss all aspects of our corporate responsibility programs and performance.

Another example of engagement is collaborative innovation. We believe that integrating different expertise and unique perspectives can accelerate new solutions to longstanding problems. You will find examples of IBM's collaborative innovation — in research and solutions, with business partners, clients, universities and other entities — throughout this report and in the section on solutions for environmental sustainability.

Voluntary partnerships and initiatives

IBM is strongly committed to participation in voluntary programs, and we have founded or joined many voluntary initiatives and partnerships with governments and eNGOs over the years.

Some current governmental examples include the US Environmental Protection Agency's (EPA) ENERGY STAR and SmartWay programs, and the European Community's EU ENERGY STAR program and EU code of conduct for energy-efficient data centers.

Examples of partnerships with eNGOs include membership in the Center for Climate and Energy Solutions, Best Workplaces for Commuters and the Wildlife Habitat Council. We also work with and support organizations such as the Conservation Fund, the Environmental Law Institute and the World Environment Center.

In addition, we partner with other companies and institutions to foster solutions for environmental sustainability:

- GridWise Alliance — IBM is a founding member of the GridWise Alliance, an organization representing a broad range of the energy supply chain — from utilities and technology companies to academia and venture capitalists. Its mission is to transform the electric grid to achieve a sustainable energy future.

- The Nature Conservancy — IBM has continued its collaboration and partnership with the Nature Conservancy (TNC) in several ways. Ten IBMers participated in our pro bono Corporate Service Corps program and spent one month in Belém, Brazil, helping TNC further develop a land management tool it created to help landowners comply with Brazil's forest code. IBM also participates in the Latin American Conservation Council, which works with TNC to develop strategies for the design and implementation of projects aimed at addressing water security, sustainable food security and smart infrastructure in Latin America.

- Eco-Patent Commons — Together with Nokia, Pitney Bowes, Sony and the World Business Council for Sustainable Development, IBM launched the Eco-Patent Commons in January 2008. The Eco-Patent Commons provides a unique opportunity for business to share innovation that can foster sustainable development through an online collection of environmentally beneficial patents pledged by the member companies for free use by anyone. Since its launch, more than 100 patents have been pledged by 11 member companies representing a variety of industries worldwide: Bosch, Dow, Fuji-Xerox, HP, IBM, Nokia, Pitney Bowes, Ricoh, Sony, Taisei and Xerox. The Environmental Law Institute became the host organization in 2013.

Environmental investment and return

Over the past five years, IBM has spent $80.7 million in capital and $463.6 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.

Environmental capital and expense worldwide

($ in millions)

	2010	2011	2012	2013	2014
Capital	$15.1	$18.4	$9.9	$17.0	$20.3
Expense	$90.6	$96.1*	$98.2	$92.3	$86.4
Total	**$105.7**	**$114.5**	**$108.1**	**$109.3**	**$106.7**

**IBM modified its methodology for estimation of operating expenses in 2011 to collect information on expenses associated with compliance with worldwide environmental legal requirements for products, including costs associated with compliance with worldwide product takeback and recycling requirements.*

IBM has tracked environmental expenses related to our facilities, corporate operations and site remediation efforts for more than 25 years, and began publicly disclosing this information in our environmental report for 1992. In 2011, IBM expanded its tracking of environmental expenses to include expenses associated with compliance with environmental legal requirements related to products, including those costs incurred for compliance with product takeback and recycling requirements. In 2014, total environmental expenses associated with IBM's operations were $106.7 million.

IBM also estimates savings it has realized from its policy of environmental leadership. These include savings 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 previous years' initiatives are not carried over in this calculation, yielding very conservative estimates.

In addition, IBM realizes avoidance of costs that likely would occur in the absence of its environmental management system. 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. In 2014 IBM's combined, estimated environmental savings and cost avoidance worldwide totaled $121.1 million.

IBM's experience has shown that annual savings from its focus on conservation, pollution prevention and design for the environment consistently exceed environmental expenses, thereby demonstrating the value of proactive environmental programs and leadership performance.

2014 environmental expenses worldwide

($ in millions)

Personnel	38.3
Superfund and former IBM site remediation	12.4
Surface water and wastewater management operations	8.6
Waste treatment and disposal	6.4
Waste and materials recycling	3.9
Consultant and legal fees	3.0
Laboratory fees	2.3
Groundwater protection operations	1.2
Permit fees	0.8
Product takeback and recycling costs	0.6
Air emission control operations	0.2
Other environmental operations	8.7
Total	**86.4**

$121.1 million

IBM's environmental savings and cost avoidance worldwide in 2014 was an estimated $121.1 million.

2014 estimated environmental savings and cost avoidance worldwide

($ in millions)

Energy conservation and cost avoidance	56.2
Location pollution prevention operations*	28.4
Compliance cost efficiency**	17.3
Corporate operations*	7.0
Spill remediation cost avoidance***	4.9
Potential fines, penalty and litigation avoidance****	4.3
Packaging improvements	2.0
Superfund and site remediation efficiencies	0.8
Environmentally preferable materials usage	0.2
Total	**121.1**

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

*** Compliance cost efficiency considers costs avoided through proactive efforts to stay ahead of environmental regulations and requirements.*

**** These savings are estimated considering IBM's actual experience with remediation costs.*

***** The estimation for the avoidance of potential fines, penalties and litigation does not include 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).*

Chairman's Environmental Award program

For nearly 25 years, the Chairman's Environmental Award has promoted the contributions of IBM's business units toward the objectives of IBM's Corporate Policy on Environmental Affairs. Recipients of the Chairman's Environmental Award are selected based on their degree of leadership, initiative and results in contributing to IBM's environmental policy objectives. Performance against these criteria is evaluated against each nominee's opportunity to contribute given its mission and operations.

IBM's Global Asset Recovery Services (GARS) organization received the 2014 Chairman's Environmental Award. GARS is the line of business within IBM Global Financing that is responsible for remarketing pre-owned and end-of-lease IBM system assets externally, reutilizing and redeploying assets internally, and providing an environmentally responsible product end-of-life management structure for the disposal of scrap IT equipment. GARS is uniquely positioned to help clients in the areas of equipment buyback and disposal as they upgrade their own IT infrastructure or move to one of IBM's cloud solutions.

Highlights from their operations in the three years covered by the Chairman's Environmental Award nomination included:

- Sent 2.4 million assets for refurbishment, with more than 90 percent resold or reused
- Generated significant revenue and savings for IBM clients from reuse of 1,293 IBM System z® and IBM Power Systems™ equipment through a technology exchange program
- Enabled energy savings for IBM and its clients by replacing and consolidating older technology hardware with more energy-efficient refurbished assets
- Achieved excellent waste minimization and pollution prevention results: less than 0.7 percent of materials sent for de-manufacturing and scrap was landfilled or incinerated despite increased activities in countries with underdeveloped recycling infrastructure

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. IBM's chairman presents the award to an executive from the recipient business unit at a gathering of IBM senior executives from all business units.

IBM Chairman, President and CEO Ginni Rometty presents the 2014 IBM Chairman's Environmental Award to Martin Schroeter, senior vice president and chief financial officer, in recognition of IBM's Global Asset Recovery Services organization.

Energy conservation and climate protection

IBM recognizes climate change is a serious concern that warrants meaningful action on a global basis to stabilize the atmospheric concentration of greenhouse gases (GHGs). We believe all sectors of society and the economy, as well as governments worldwide, must participate to address climate change.

Climate change

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

- 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, our clients and the world

A six-part strategy

We have a longstanding commitment to climate protection and execute a six-part strategy to reduce the GHG emissions related to our operations:

1. Designing, building, updating and operating facilities, including data centers and manufacturing operations, that optimize their use of energy and materials and minimize GHG emissions
2. Purchasing electricity generated from low carbon dioxide (CO_2)-emitting and renewable sources where it makes both business and environmental sense
3. Minimizing the use and emissions of GHGs in semiconductor manufacturing, including perfluorocompounds (PFCs, a family of GHGs) and other GHGs
4. Requiring our suppliers to maintain an environmental management system that includes energy use and GHG emissions inventories and reduction plans
5. Reducing employee commuting and business travel
6. Increasing the efficiency of IBM's logistics operations

In addition, for our hardware and software products and services, IBM's strategy includes designing and providing clients with energy-efficient offerings that also help reduce their climate impact.

IBM considers energy and material conservation to be the cornerstone of our climate protection efforts. IBM does not have plans to use emissions offsets to become "carbon neutral" for all or part of our operations. Our efforts to reduce IBM's GHG emissions are focused on delivering results by devoting available resources to actions, products and solutions that actually increase energy efficiency and reduce GHG emissions for both IBM and our clients, rather than merely offsetting them.

Conserving energy

IBM formalized its energy conservation and management program in 1974 and has continued it unabated ever since. Energy conservation is a major component of our comprehensive, multifaceted climate protection program because the release of CO_2 by utility companies powering our facilities, or from our use of fuel for heating or cooling, represents the greatest potential climate impact associated with our operations.

In 2014, IBM's energy conservation projects across the company delivered annual savings equal to 6.7 percent of our total energy use, versus the corporate goal of 3.5 percent. These projects saved and avoided the consumption of 325,500 megawatt-hours (MWh) of electricity and 267,200 million British thermal units (MMBtu) of fuel oil and natural gas, and an associated 142,000 metric tons of CO_2 emissions. The conservation projects also saved $37.4 million in energy expense, an increase of $1.6 million over 2013 savings. These strong results are due to our continued, across-the-board focus on energy demand reduction, efficiency, and the implementation of standard, global energy conservation strategies for facility operating systems.

IBM's energy conservation goal recognizes only completed projects that actually reduce or avoid the consumption of energy in our 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 results for measuring performance against achieving this goal. Moreover, the conservation results cited above are conservative in that they include only the first year's savings from the projects. Ongoing conservation savings beyond the first year are not included in the results. Accordingly, the total energy savings and CO_2 emissions avoidance from these conservation actions is actually greater than this simple summation of the annual results.

Electricity and fuel use and related CO_2 emissions

Scope 1 and Scope 2 CO_2 emissions

		CO_2 emissions (estimated) metric tons x 1,000	
	Electricity and fuel use (1,000 MMBtu)	Calculated with grid emissions factors	Reduced by the CO_2 avoided by renewable electricity purchases
2014	20,842	2,092	1,842
2013	21,190	2,186	1,962
2012	21,613	2,404	2,195
2011	21,758	2,397	2,182
2010	21,622	2,426	2,156

IBM uses the Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard, developed by the World Resources Institute and the World Business Council for Sustainable Development, for estimating and reporting its CO_2 emissions.

Between 1990 and 2014, IBM saved 6.8 million MWh of electricity consumption, avoided 4.2 million metric tons of CO_2 emissions (equal to 61 percent of the company's 1990 global CO_2 emissions), and saved $550 million through its annual energy conservation actions.

Managing IBM's energy program

Our global energy management program leverages the expertise of more than 50 IBM energy management professionals deployed around the world. The team has created best-practices checklists that set minimum expectations for building systems and operations, including controls and equipment for lighting, heating/ventilating/air conditioning (HVAC), central utility plants, compressed air, data center and IT systems, cafeterias, and office systems.

All IBM sites using 2,000 MWh/year or more of energy must complete the checklists, perform a gap analysis and develop an energy conservation implementation plan a minimum of every four years. The program is buttressed by several enterprise-level databases that collect, store and analyze energy-use data, conservation project results, completed checklists, and relevant key performance indicators. These analyses enable monthly metrics reporting to the management team and the identification of opportunities for improvement. The continuous review of energy use and conservation performance has driven the strong results noted above.

More than 2,200 energy conservation projects involving a full range of energy efficiency initiatives delivered savings by 341 IBM locations globally in 2014. Examples include:

- Projects to match building lighting and occupancy schedules or install more efficient lighting systems were implemented at 181 locations, reducing electricity use by 9,800 MWh while saving $1.4 million.
- HVAC systems or operating schedules were modified at 155 locations, reducing 36,100 MWh of electricity use and 97,800 MMBtu of fuel use, saving $4.4 million.
- Central utility plant projects were implemented at 72 locations, reducing 33,600 MWh of electricity and 103,200 MMBtu of fuel use, saving $5.1 million.
- More than 200 manufacturing energy efficiency projects — including fab tool consolidation, idling test tools when not in use, optimization of manufacturing temperature and humidity settings, and data center efficiency improvements — were implemented, saving 53,200 MWh of electricity, 37,700 MMBtu of fuel and $4.8 million.
- Data center cooling and server and storage virtualization and consolidation projects saved over 160,000 MWh of electricity consumption and $17.5 million.

6.7%

In 2014, IBM's energy conservation projects delivered annual savings equal to 6.7 percent of its total energy use — surpassing our goal of 3.5 percent.

6.8 million MWh

From 1990 through 2014, IBM conserved 6.8 million MWh of electricity, avoiding 4.2 million metric tons of CO_2 emissions and saving $550 million.

Applying analytics to drive further efficiencies

IBM's TRIRIGA® Real Estate Environmental Sustainability Manager (TREES) is being deployed in IBM facilities to increase energy efficiency.

The TREES solution is an IBM-designed software product that integrates existing controls infrastructure across a location, collecting data on an hourly basis and analyzing it for anomalies. It has been deployed at 28 locations around the globe, representing over one-third of IBM's building space. There are 74 basic operating rules in the TREES solution focused on the air conditioning systems, small chilled-water systems, air compressors, boilers and heat exchangers. New rules can be proposed and adopted by users based on operating experience, driving advances in the system's capabilities. Identified problems include equipment operating outside scheduled hours or running at full design speed because of broken components and incorrectly configured control logic.

IBM has sustained an average of 10 percent reduction in energy use annually since 2011 for the buildings and systems monitored and managed by the TREES solution. In 2014, the 28 connected sites achieved energy savings of 30,500 MWh and $1.6 million. Since the start of the program in 2011, total energy savings of 78,700 MWh ($4 million) have been realized.

$3.6 million

Nearly 290 energy conservation projects at more than 120 existing data center locations reduced energy use by almost 28,000 MWh in 2014, saving $3.6 million.

IBM also has installed chiller optimization software (COS) at eight locations. COS enables integration of chiller units and free cooling systems using a rules-based approach to optimize the overall efficiency of cooling delivery considering the efficiency characteristics of the individual units and the availability of free cooling. By balancing the operation of all the system components under the rules, cooling delivery is maximized while energy use is minimized. IBM saved 6,800 MWh of energy ($0.7 million) in 2014 and has realized annualized savings of 42,500 MWh (more than $4 million) at the eight locations since deployment began in 2011.

Data centers

IBM manages a diverse portfolio of data centers, consisting of both IBM and IBM-managed customer facilities all over the world. IBM operates additional raised-floor space to support internal hardware and software development operations including design and test centers.

We take a holistic approach to managing our data centers — building new, high-efficiency data center space where needed to meet the needs of existing and new clients, and retrofitting and improving existing data center space to increase utilization and derive more workload per area, equipment and energy resources.

In 2014, we completed nearly 290 projects at more than 120 existing data center locations. These projects reduced energy use by almost 28,000 MWh, and saved more than $3.6 million. This energy savings is equivalent to the total annual energy use of 2,500 homes in the United States. IBM took the following actions in 2014 to achieve these energy reductions:

- Installed Measurement Management Technology (MMT), which monitors and controls the thermal profile of the data center. In additional data centers, MMT is now used in systems representing more than 60 percent of IBM's data center electricity use.
- Installed thousands of blanking panels and cable cutout plugs, reducing the short-circuiting of cooling air in the data center.
- Increased the average raised-floor temperature by 0.4ºC in 2014 and 2.0ºC for the period 2011-14, with work continuing to further raise temperatures toward an average of 24ºC.
- Shut down over 120 computer room air conditioning (CRAC) units. Overall, IBM has shut down more than 33 percent of the total installed CRAC units from 2010 to 2014, reducing the energy required to cool the data center and improving the average power usage effectiveness (PUE).

Data center power usage performance

IBM measures or uses estimating protocols to determine the PUE of the data centers we manage. These data centers include more recently constructed Leadership Data Centers as well as large existing data centers. The average PUE for IBM's raised-floor space is 1.71, a slight improvement over our 2013 average of 1.73. The average PUE is based on data collected from data centers representing over 69 percent of IBM strategic outsourcing and resiliency services raised-floor space and is calculated by aggregating monthly IT and total power consumption for the 12 months of 2014.

Because the majority of the data centers in IBM's portfolio consists of spaces that are 10-30 years old and contain IT equipment varying in age from new to 10 years, improving the energy efficiency of these data centers requires thoughtful planning and execution to meet operational objectives and commitments to clients.

The overall performance of IBM data centers compares favorably with the average PUE of 1.7 as reported in the Uptime Institute 2014 Data Center Industry Survey of 1,000 data center users predominately located in North America, and with an average PUE of 2.0 as reported by a February 2014 Forrester Consulting Survey commissioned by Digital Realty Trust. IBM has made — and will continue to make — significant investments to reduce energy demand and improve energy efficiency in our data centers.

Voluntary data center energy efficiency initiatives

In January 2012, the European Commission awarded 27 IBM data centers in 15 European Union (EU) countries with "Participant" status in Data Center Energy Efficiency, based on the EU Code of Conduct (CoC) for Energy Efficiency in Data Centres. Over the last three years we registered an additional 18 data centers, bringing the total number of data centers participating in this program to 45 in 19 countries. The 45 registered data centers represent the largest portfolio from a single company to receive the recognition to date. These registered data centers represent more than 70 percent of IBM's IT delivery and resiliency services data center space in the EU. The EU CoC for Energy Efficiency in Data Centres is a voluntary initiative that aims to promote energy efficiency performance standards for data centers.

IBM's leadership data center in Boulder, Colorado, has been certified as a US Environmental Protection Agency (EPA) ENERGY STAR data center. The ENERGY STAR certification recognizes that the Boulder Leadership Data Center performs in the top 25 percent of similar facilities nationwide for energy efficiency and meets strict energy efficiency performance levels set by the EPA.

45

IBM data centers in 19 countries have received "Participant" status in energy efficiency, based on the EU Code of Conduct.

IBM data center and IT system professionals continue to be involved in governmental and industry data center energy efficiency initiatives, including the EU CoC for Energy Efficiency in Data Centres program, ENERGY STAR and the Green Grid. These programs set operating criteria or metrics that inform and encourage data center operators and owners to reduce energy consumption in a cost-effective manner without compromising the objectives of mission-critical operations of their data centers.

System virtualization and cloud computing

Virtualizing server and storage systems allows individual systems to support multiple applications or images, making greater use of the full capabilities of the IT equipment and executing more workloads in less space with less energy.

IBM continues to virtualize and consolidate workloads from multiple servers and storage systems with low utilization onto single systems, reducing energy use and expense. In 2014, IBM virtualized more than 30,000 applications in our owned and leased data centers, avoiding almost 135,000 MWh and $14 million. Implementation of server and storage virtualization across client accounts and IBM's internal operations has been a key contributor in reducing the overall electricity consumption by our data centers over the past three years.

IBM continues to expand its cloud computing offerings. SoftLayer,® an IBM company, now operates 24 data center locations in 18 cities worldwide, and IBM's Cloud Managed Services operates from 13 data centers in 12 countries. Cloud computing is an efficient model for providing IT services that optimize hardware utilization and virtualization technologies across the server, storage and network infrastructure.

Renewable energy

In 2014, IBM contracted with its utility suppliers to purchase 683,000 MWh of renewable energy over and above the quantity of renewable energy provided as part of the mix of electricity that we purchased from the grid. The 683,000 MWh represented 14.2 percent of our global electricity consumption and resulted in the avoidance of 250,000 metric tons of CO_2 emissions.

IBM's renewable energy purchases increased by 17.9 percent from 2013 to 2014. The increase was achieved through the addition of 17,325 MWh of wind- and biomass-generated electricity in Ireland, 43,810 MWh of wind-generated electricity for three cloud data centers in Texas, and increased purchases of renewable energy in Germany, Italy, Spain and Switzerland. In addition, approximately 5 percent of IBM's electricity purchases from the grid were generated from renewable sources — bringing our total renewable energy purchases to approximately 19 percent of our consumption in 2014.

IBM continued to contract for defined renewable energy purchases above and beyond the renewable electricity supplied as part of the grid mix in Australia, Austria, Belgium, Denmark, Finland, Germany, Ireland, Italy, Japan, Netherlands, Spain, Sweden, Switzerland, the United Kingdom and the United States in 2014. In addition, three on-site solar photovoltaic systems with capacities of 780, 50 and 40 megawatts, respectively, generate electricity for our consumption at the following IBM locations: Littleton, Massachusetts; Zurich, Switzerland; and New Delhi, India. We also have a 480-megawatt geothermal heating/cooling system at IBM Zurich. As the result of these purchases and systems, approximately 33 percent of IBM's locations with data centers, IT and product development labs, and 28 percent of our cloud data centers, currently source some or all of their electricity from renewable-generation sources.

14.2%

Renewable energy represented 14.2 percent of IBM's global electricity purchases in 2014, or 683,000 MWh.

We procure renewable electricity generated from wind, large and small hydro, biomass, and solar installations around the globe. We report all of our contracted renewable electricity purchases — be they from new, "additional" or existing generation sources, and without discriminating large hydro installations — and the associated CO_2 avoidance. Our rationale is that all purchases signal to our suppliers our desire for them to maintain and broaden their renewable electricity offerings. We value all economically accessible renewable generation sources and their availability from our utility suppliers.

Our procurement of renewable energy must meet our business needs. Not only should the offerings be cost-competitive with market prices over time, but the electricity supply must also be reliable in providing uninterrupted power for our critical operations. IBM's strategy of contracting for defined renewable energy has been most successful in Europe, and we continue to request the inclusion of electricity generated from renewable sources as an option in our contracts in all geographies.

Procuring electricity from renewable sources remains complicated by the relatively low energy density and intermittent nature of wind- and solar-generated electricity; limitations and choke points in the electricity transmission system; and by international treaties and national, state and local regulatory and legislative requirements. Continued advances are needed in renewable electricity generation, distribution and storage technologies, and in contracting and delivery mechanisms to increase the availability of economically viable renewable

electricity in the marketplace, and to supply that electricity directly to consuming locations. IBM is working with industry peers, utilities, NGOs and other renewable-energy industry participants to identify, develop and capture opportunities to procure electricity generated from renewable sources where it makes business sense.

IBM also endeavors to incorporate co-generation or tri-generation systems on an individual location basis. Three facilities in Europe have co-generation/tri-generation systems that provide 10-20 percent of facility electricity use, as well as heating and cooling, to support building operations.

In December 2014, IBM commissioned a one-megawatt fuel cell to provide electricity to IBM's data center in Connecticut. The system is delivering more than 8.5 million kWh per year, beginning in 2015. The fuel cell will reduce IBM's expenses for the electricity it purchases while lowering the associated CO_2 emissions by over 600 metric tons per year.

New renewable electricity procurement goal

In February 2015, IBM established a new goal to procure electricity from renewable sources for 20 percent of IBM's annual electricity consumption by 2020.

To achieve this goal, IBM plans to contract for over 800,000 MWh per year of renewable electricity — an amount that can power a city of 100,000 people. IBM works with its electricity providers to directly procure renewable electricity to supply IBM's facilities, making a clear connection by matching purchases to consumption, as opposed to purchasing renewable energy certificates as offsets.

Research and solutions to advance the use of renewable energy

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

20%

IBM's goal is to procure 20 percent of its electricity from renewable sources by 2020.

- Watt-sun solar management program — IBM research has developed a solar forecasting platform that continually gathers data from a wide range of sources — from existing models to satellite views to cloud cover imagery captured by cameras lashed to poles — to predict the output of photovoltaic solar panels. The Watt-sun program has been tested at about a dozen solar sites in the United States, demonstrating that its predictions are 35 percent better than comparable tools. The program can help power companies manage the intermittent nature of photovoltaic generation and more effectively integrate solar generation systems into their supply grids.

- Solar concentrator — IBM Research has partnered with Airlight Energy, a Swiss-based supplier of solar power technology, to bring affordable solar technology to the market by 2017. Each system can concentrate the sun's radiation 2,000 times and convert 80 percent of it into useful energy to generate 12 kilowatts of electrical power and 20 kilowatts of heat on a sunny day — enough to power several average homes.

- Spray-on solar cells — Researchers with the Department of Electrical and Computer Engineering at the University of Toronto and IBM Canada's Research and Development Centre have invented a new way to spray solar cells onto flexible surfaces using minuscule light-sensitive materials known as colloidal quantum dots (CQDs). The invention is considered a major step toward making spray-on solar cells easy and inexpensive to manufacture.

Operational CO_2 emissions management

IBM's operational CO_2 emissions, those associated with IBM's use of fuel and electricity at its locations, were reduced 6.1 percent from 2013 to 2014. There were four main factors that drove this reduction:

- IBM's energy conservation efforts drove year-over-year reductions in our electricity use for the third year in a row. Electricity use was reduced by 1.9 percent from 2013 to 2014, resulting in a decrease of associated CO_2 emissions of 1.8 percent.
- The average CO_2 emissions factors associated with our grid-supplied electricity were reduced by 0.01 metric tons of CO_2 per MWh as a result of a change in the mix of generation sources supplying our locations. These changes contributed to a reduction of approximately 2.6 percent in our operational CO_2 emissions.
- A reduction in our fuel use of 36,000 MMBtu resulted in a 0.3 percent decrease in our CO_2 emissions.

The shift to greater use of renewable electricity during 2014, discussed above, resulted in a 1.4 percent reduction in our CO_2 emissions.

New third-generation CO_2 emissions reduction goal

IBM has aggressively reduced GHG emissions since 1990 and has had an annual worldwide energy conservation goal since 1996.

From 1990 to 2005, IBM's conservation actions helped us avoid three million metric tons of CO_2 emissions — an amount equal to 40 percent of its 1990 emissions. We then exceeded our second-generation CO_2 emissions reduction goal to reduce operational CO_2 emissions by 12 percent from 2005 to 2012, achieving a further reduction in CO_2 emissions of 15.7 percent. Building on this accomplishment, IBM established a third-generation CO_2 reduction goal in February 2015 to reduce CO_2 emissions associated with our energy consumption 35 percent by year-end 2020 against a base year of 2005, adjusted for acquisitions and divestitures. This represents an additional 20 percent reduction, from year-end 2012 to year-end 2020, over the reductions achieved from 2005 to 2012 under IBM's second-generation goal.

6.1%

IBM's operational CO_2 emissions associated with the use of fuel and electricity at our locations was reduced by 6.1 percent from 2013 to 2014.

35%

IBM's third-generation CO_2 reduction goal is to reduce emissions by 35 percent below 2005 levels by 2020.

IBM plans to achieve this new goal through continued focus on energy conservation and a shift to greater use of renewable electricity. With ongoing efforts, IBM's 2014 CO_2 emissions were already more than 25 percent below the 2005 baseline.

IBM's new CO_2 emissions reduction and renewable electricity procurement goals were recognized during a White House Executive Roundtable on Federal Supplier GHG Reduction in March 2015.

10.8%

IBM's PFC emissions were reduced by 10.8 percent between 2010 and 2014.

PFC emissions management

IBM releases some perfluorocompounds (PFCs) from our semiconductor manufacturing operations. PFC emissions represented approximately 10 percent of IBM's Scope 1 and 2 emissions during 2014. IBM was the first semiconductor manufacturer to set a numeric reduction target for PFCs in 1998. We subsequently set a second-generation goal to achieve an absolute reduction in PFC emissions of 25 percent by 2010 against a base year of 1995. We exceeded that goal by reducing IBM's PFC emissions by 36.5 percent at the end of 2010.

We continue to take actions to reduce our PFC emissions. In 2014, our PFC emissions were approximately 215,900 metric tons of carbon dioxide equivalents (CO_2e), a reduction of 10.8 percent from 2010. Our reported emissions increased by 11.1 percent from 2013 to 2014 as a result of using revised emissions factors required by the US EPA for estimating emissions associated with semiconductor manufacturing processes. In 2014, IBM's semiconductor manufacturing plant in Vermont continued to convert from hexafluoroethane (C_2F_6) to octafluorocyclobutane (C_4F_8) on selected chamber cleaning processes, reducing the CO_2 emissions associated with chamber clean operations by 40 percent. Because C4F8 has a much higher utilization rate and much lower global warming potential than C_2F_6, it significantly reduced the GHG emissions from the process. In addition, IBM's manufacturing facility in New York continues to abate PFC emissions associated with its semiconductor operations, minimizing the emissions from that facility.

Overall CO_2 emissions inventory

IBM tracks and manages Scope 1 and 2 emissions across its operations from data center, semiconductor research and manufacturing, hardware development and assembly, and office operations. As discussed in the previous sections, IBM executes a range of programs and processes to reduce GHG emissions. IBM decreased its overall Scope 1 and 2 emissions by 3.6 percent from 2013 to 2014. The summary of our 2014 emissions inventory is provided in the following table:

IBM 2014 Scope 1 and 2 emissions inventory

(Metric tons [MT] of CO_2 equivalent)

Scope 1 emissions	Emissions type	2013	2014
Fuel use	Operational	225,514	226,187
Perfluorinated compounds	PFC	194,301	215,893
Nitrous oxide	Other	23,150	23,724
Heat transfer fluids	Other	61,747	83,566
HFCs	Other	9,752	7,283
Total Scope 1 emissions		514,464	556,653
Scope 2 emissions			
Electricity: Using grid and location MT CO_2/MWh emissions factors	Operational	1,934,736	1,847,141
Purchased energy commodities	Operational	43,858	34,871
Total Scope 2 emissions		1,978,594	1,882,012
Total Scope 1 and 2 emissions		**2,493,058**	**2,438,665**
CO_2 avoidance: Renewable electricity purchases	Operational	(223,624)	(250,345)
Total Scope 1 and 2 emissions adjusted for renewable electricity		**2,269,434**	**2,188,320**

Transportation and logistics initiatives

Employee commuting and leased/rental vehicles

IBM has been active for decades in promoting programs that reduce employees' work-related commutes. Key contributors to this effort are IBM's two flexible work programs that are available to many employees:

- Work-at-home — Enables employees to work from a home office
- Mobile employees — Enables employees to work from home for a designated number of days each week

In 2014, 100,000 of our 379,592 global employees participated in one of these two programs, which not only helps employees balance their work and personal responsibilities but also benefits the environment. In the United States alone, IBM's work-at-home program conserved approximately 4.8 million gallons of fuel and avoided 38,000 metric tons of CO_2 emissions in 2014.

IBM is a member of the Best Workplaces for Commuters (BWC) program. Currently, 25 IBM locations in the United States are registered as BWC sites, which represent approximately 60 percent of the company's US employees. Many locations actively work with their local or regional transit commissions to integrate IBM's programs with regional programs to increase commuting options for our employees. Globally, many of our 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.

In some countries, IBM provides leased vehicles for employees that they may use for both business and personal purposes. For these vehicles, we continue our effort to move to more fuel-efficient models by setting standard guidelines for vehicles with lower emissions profiles. These guidelines enable reductions in average car emission levels as the car fleets are renewed. For the cars our employees rent while travelling for business, we have worked with rental car companies to require and/or offer more fuel-efficient vehicles.

Efficiency of logistics

IBM is reducing the CO_2 emissions associated with transporting our products through the efficient design of our packaging, working with suppliers on their packaging designs and optimizing logistics. IBM has been an active participant of the US EPA's SmartWay Transport Partnership since 2006. SmartWay is a voluntary initiative to improve fuel efficiency and reduce GHG emissions associated with logistics operations.

Since 2009, 100 percent of IBM's spending on shipments of goods within the United States and from the United States to Canada and Mexico went through a SmartWay logistics provider. IBM also voluntarily applies specific SmartWay requirements to our distribution operations globally.

IBM's packaging programs also help reduce transport-associated CO_2 emissions by reducing the volume and weight of the company's product shipments through innovative packaging design. Accomplishments in this area are discussed in the product stewardship section of this report.

Energy and climate protection in the supply chain

IBM is committed to doing business with environmentally responsible suppliers. One of the supply chain areas we focus on is our suppliers' energy efficiency and climate protection programs.

We require that all of our "first-tier" suppliers (those with which we hold a direct commercial relationship) establish and sustain a management system to address their corporate and environmental responsibilities — including their use of energy and Scope 1 and 2 GHG emissions — and to cascade IBM's requirements to their suppliers. Our suppliers are also required to measure their performance, establish voluntary goals in these areas and publicly disclose their performance against those goals. We manage this requirement through two processes: IBM's own supplier environmental management system requirements and our membership in the Electronic Industry Citizenship Coalition (EICC).

IBM has continued to work with first-tier suppliers to further our requirement that all IBM suppliers have an environmental and social management system in place and disclose information on goals and performance. More information on this supplier program may be found in the environmental requirements in the supply chain section. The IBM Supply Chain organization assesses suppliers (existing and new) regarding their compliance with the IBM Social and Environmental Management System requirements as a component of its broader supplier management and assessment process.

IBM's requirements for our suppliers rest on the foundational belief that real results in GHG emissions reduction are made possible by actionable information about a company's energy use and GHG emissions, and that each company is best positioned to assess and implement actions to address its own emissions in a way that is meaningful and sustainable. In short, each enterprise must take responsibility to reduce its own energy use and GHG emissions.

IBM has been an active participant in the EICC Environmental Reporting Initiative, which asks EICC members and suppliers in the global electronics supply chain to measure and report key energy consumption, carbon emissions, water and waste indicators. We believe, as do the other EICC members, that as companies gain an understanding of their energy use and GHG emissions, they are more likely to take actions to improve their performance. EICC and its member companies have developed education modules to assist suppliers in tracking their energy use and GHG emissions. Companies in the electronics industry share many suppliers, and the EICC GHG emissions disclosure process enables efficiency associated with information disclosure. We use the EICC reports completed by our component and parts suppliers to augment and validate our internal supplier assessment work.

IBM's position on the determination of Scope 3 GHG emissions

Approximations of Scope 3 GHG emissions can help entities recognize where the greatest amounts of GHGs may occur during the lifecycle of a typical process or general product or service on a macro level. This can be helpful when assessing, for example, what phases of a general product's design, production, use and disposal are ripe for improved energy efficiency and innovation. However, IBM does not assert the specific amount of Scope 3 GHG emissions associated with our value chain. The necessary estimating assumptions and corresponding variability simply do not allow for adequate credibility, let alone calculations that could be perceived as deterministic.

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. Furthermore, the sources of energy used by these suppliers vary, and IBM does not believe we could determine a credible estimate or apportionment of the energy used by these suppliers that would be associated with the products or services provided to IBM alone, versus those emissions associated with products or services provided to their other customers. In addition, IBM's specific scope of business with any given supplier remains dynamic, as it is driven by business need.

Moreover, one company's asserted Scope 3 emissions are another company's Scope 1 and 2 emissions. Since the ultimate goal for climate protection is for global societies to achieve demonstrable reductions in actual GHG emissions, 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. This is reinforced by IBM's announcement in 2010 that all of our first-tier suppliers are expected to develop a management system, identify their significant environmental impacts — including GHG emissions — and develop reduction plans for those impacts.

Product stewardship

IBM established its product stewardship program in 1991 as a proactive and strategic approach to the environmental design and management of our 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.

Framework

IBM's product stewardship objectives and requirements are implemented through our global environmental management system (EMS), internal standards, product specifications, and other requirements in IBM's integrated product development process. Product environmental attributes such as energy efficiency, materials content, chemical emissions testing, design for recycling, end-of-life management plans, and packaging data must be documented and reviewed in IBM's Product Environmental Profile (PEP) tool at various checkpoints during the development process.

Compliance management tools like the Product Content Declaration for IBM Suppliers support the assessments required for a complete PEP prior to product release. IBM's design and compliance controls — including a specification for Baseline Environmental Requirements for Supplier Deliverables to IBM, Product Content Declarations, and compliance assessment protocols — are managed by an interdisciplinary team with representatives from IBM organizations that design, manufacture, procure, deliver, and service our product offerings. The team's activities are coordinated by IBM's Center of Excellence for Product Environmental Compliance.

Product environmental compliance process

Regulatory and legislative requirements affecting electrical and electronic equipment continue to proliferate globally. Integrated within IBM's global environmental management system, IBM has programs — underpinned by robust processes and state-of-the-art tools — that ensure IBM's continued compliance with worldwide environmental laws and regulations without impacting business. In 2014, we identified 120 new or modified product-related regulations and acted on 64 of those regulations to meet the milestones defined by the regulations.

Frequent verification of product data is required to maintain the accurate status of parts and products relative to both IBM's product environmental requirements and the latest regulatory requirements, such as the expiration schedule for exemptions in the European Directive on the restriction of hazardous substances (RoHS, 2011/65/EU) or the disclosure of the regularly amended list of Substances of Very High Concern developed for the European Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation (REACH, Regulation (EC) No 1907/2006). In 2013, IBM developed a new process to automate the revalidation of Product Content Declarations (PCDs) for procured parts. The process includes a regular refresh cycle for PCDs whereby we request suppliers to update their declarations. In 2014, this process was further enhanced by the deployment of an automated validation tool that checks submitted PCDs against a series of rules to help ensure quality.

IBM conducts quality audits of selected PCDs to identify improvements in the administrative and technical content of the declarations. These process improvements in product data management ensure that IBM's technical documentation for product hardware meets the quality requirements of European Norm 50581: "Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances."

2014 product stewardship goals and performance

Recycled plastics	Recycled plastic used in IBM's products can range from 50 to 100 percent by weight of the commercial resin. In 2014, 17.1 percent of the plastic resins procured by IBM and its suppliers through IBM's corporate contracts for use in IBM's products were resins that contained 50-100 percent recycled content. Comparing only the weight of the recycled fraction of these resins to the total weight of plastics (virgin and recycled) purchased, 12.1 percent of IBM's total plastic purchases in 2014 were recycled plastic versus the corporate goal of 5 percent.
Use of landfills	IBM's product end-of-life management operations worldwide processed approximately 32,000 metric tons (70.5 million pounds) of end-of-life products and product waste, and sent only 0.5 percent of the total to landfills or to incineration facilities for treatment, versus IBM's corporate goal of minimizing its combined landfill and incineration rate to no more than 3 percent of the total amount processed.
Product energy efficiency	One of IBM's product energy efficiency goals is to continually improve the computing power delivered for each kilowatt-hour (kWh) of electricity used with each new generation of server. In 2014, the IBM Power Systems™ S822, S824, and E880 — the three servers for which typical watts consumed per relative performance are available from the comparable, previous-generation systems — achieved reductions between 4 and 38 percent on this metric. The IBM z13™, announced in January 2015, increases the available capacity per kilowatt over the IBM zEnterprise™ EC12 system by 46 percent for the air-cooled and 58 percent for the water-cooled model.

As of May 2015, IBM had certified seven Power server and three storage machine types to the ENERGY STAR requirements. The Power servers meet the US Environmental Protection Agency's (EPA's) requirements for power-supply efficiency, idle power limits or power management capability, and Standard Performance Evaluation Corporation (SPEC) Server Efficiency Rating Tool (SERT) metric data reporting. The storage products meet requirements for power-supply efficiency and reporting of the Storage Network Industry Association (SNIA) Emerald Power Efficiency Measurement Specification results.

IBM also has a goal to qualify its new server and storage products to the ENERGY STAR program criteria where practical, and where criteria have been developed for the specific server or storage product type. In 2014 the IBM Power Systems S822, S822L, and S824 were certified to the ENERGY STAR server requirements (Version 2). The IBM FlashSystem™ 840, IBM XIV® storage system, and V3700 storage products had some of their available configurations ENERGY STAR certified against Version 1 of the storage requirements.

For links to the data sheets for IBM ENERGY STAR certified servers and storage products, see our ENERGY STAR certified products webpage.

IBM also has deployed analytical tools for managing RoHS exemptions that are due to expire in July 2016. One tool identifies, in real-time, which IBM part numbers (among thousands) are impacted by the expiring exemptions. The tool's speed helps engineers ensure compliance while avoiding a negative impact on the business. Prior to the tool's deployment, engineers spent extensive time analyzing complex bills-of-materials to identify which IBM parts were impacted by changing RoHS exemptions.

Product energy efficiency

Product energy efficiency has long been one of IBM's environmental 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. Through collaboration of IBM Research and our product development teams, we have combined hardware and software technologies to improve the energy efficiency of IT equipment and data centers.

Following are some examples of new products IBM has developed with increased performance and improved energy efficiency. Additional information about these products, and how they are being used by clients to improve their operations, reduce energy use and costs, and lower the greenhouse gas emissions associated with their operations, can be found on IBM's energy efficient products, services, and solutions webpage.

IBM Power Systems

IBM's Power Systems provide enterprise-class server capabilities for traditional and cloud applications, with an emphasis on data-centric and highly virtualized operations requiring high reliability and availability. IBM POWER8® servers offer a broad range of specialized functional capabilities that may not be available in other servers. They offer 6-12 cores per processor with eight threads per core and large on-processor memory caches, delivering significant performance increases with minimal change in the power footprint of the server systems. From an energy-efficiency standpoint, Power Systems servers can deliver the most workload for unit of energy consumed of any server when the system is configured to achieve maximum utilizations of 50-65 percent through workload virtualization and the use of EnergyScale™ power management capabilities, which matches energy use to the workload levels on the server.

IBM released six models of IBM Power Systems servers in 2014: the one-socket S812 and S814, the two-socket S822 and S824, and the enterprise E870 and E880 systems. These Power Systems servers continue to use 80 PLUS Platinum certified power supplies, one grade above the ENERGY STAR requirements and two grades above requirements established by Directive 2009/125/EC of the Ecodesign Requirements for computers and computer servers. Seven systems, the IBM Power® 730, 740, 750, and 760, and the IBM Power Systems S822, S822L, and S824 are certified to the ENERGY STAR server requirements (Version 2). The two-socket servers reduce idle power 28-50 percent from maximum power, and the four-socket servers 16-30 percent, depending on the configuration

z Systems mainframes

IBM z Systems™ mainframe servers provide the computing infrastructure for the new "app economy." In January 2015, IBM announced the new IBM z13. One of the most sophisticated computer systems ever built, it delivers scale and economics for computing needs together with real-time encryption and analytics to handle workloads that help meet the demands of today's mobile economy, all while transforming the efficiency and economics of IT. The air- and water-cooled z13s offer 46 percent and 58 percent more capacity per kilowatt, respectively, compared to the air-cooled zEnterprise EC12. With its high utilization rates, the z13 offers one of the most efficient computing platforms when measuring the workload delivered per unit of energy consumed.

High-performance computers

IBM offers a full range of purpose-built and "off the shelf" technical computing (supercomputer) solutions. IBM's supercomputer solutions are prevalent on both the TOP500 and Green500 supercomputer lists. As of November 2014, 24 of the top 50 most energy-efficient supercomputers in the world, as rated on the Green500 List, were built on the IBM Blue Gene®/Q high-performance computing (HPC) platform. IBM Blue Gene/Q systems also occupy 4 of the top 10 spots and 9 of the top 50 spots on the November 2014 TOP500 list of the world's top supercomputers. An IBM Power 775 system is also in the top 50 of the TOP500 list. Technologies developed through IBM's HPC development efforts are leveraged across the entire IBM Systems product line to improve performance and energy efficiency.

The speed and expandability of IBM's HPC products and solutions have enabled business and the scientific community to address a wide range of complex problems and simulations and make more informed decisions in the life sciences, astronomy, climate, system simulations and modeling, and many other applications. IBM continues its leadership performance in a space-saving, power-efficient HPC package to address the most demanding performance applications, having recently been selected by the US Department of Energy to develop two IBM OpenPOWER™ supercomputers based on IBM's Data Centric computing architecture. The "Sierra" supercomputer at Lawrence Livermore and "Summit" at Oak Ridge will be offered to researchers to solve scientific and research projects in the areas of energy, national defense, healthcare, genomics, economics, financial systems, social behavior, and visualization of large and complex datasets.

Storage systems

IBM continues to enhance the portfolio of storage systems, utilizing and improving various software-based data management capabilities such as Easy Tier,® thin provisioning, data compression and de-duplication, and storage virtualization which can reduce the storage hardware and energy footprint as well as the number of terabytes required to accomplish a given storage task.

IBM expanded its range of flash-based storage systems, announcing the FlashSystem 900 in March 2015. The FlashSystem 900 provides a 40 percent performance/power improvement as measured by the Storage Network Industry Association (SNIA) Emerald Power Efficiency Measurement Specification when compared to the FlashSystem 840. Flash storage reduces energy use by 60 percent or more compared to disk drives, and significantly improves server and storage performance by minimizing the latency associated with data transfer within the data center.

IBM's other storage product offerings provide clients efficiency improvements for their IT operations. The IBM XIV high-end, grid-scale disk storage system offers excellent economics, achieving an 80 percent reduction in space footprint and power consumption over previous-generation technologies configured to handle and store comparable amounts of data. Its grid-scale architecture automatically enables 95 percent utilization of storage capacity with no performance degradation.

The IBM Storwize® family of disk storage systems include built-in functions such as Real-time Compression™ and Easy Tier technology combining flash and hard-disk drives to deliver extraordinary levels of efficiency and high performance. Similar to the IBM XIV storage product, these capabilities enable the Storwize hardware to manage more data than previous-generation systems, decreasing the hardware and energy consumption footprint required to manage a given amount of data by 20-80 percent, depending on the application.

IBM has continued to expand its software-defined Elastic Storage offerings, which enable storage automation and virtualization in both traditional and cloud environments. Elastic Storage enables the reduction of storage energy consumption and costs through data consolidation and the use of data placement technologies to optimize the use of available storage devices, including tape storage. The ultimate outcome is to maximize the amount of data stored on a minimum number of storage products, in turn minimizing energy use.

Appliances

IT appliances combine server, storage and network capabilities, and then optimize them to execute a specialized task or group of tasks with a significantly smaller IT hardware and energy footprint than would be required if individual systems were deployed in a conventional manner.

IBM MessageSight, a server appliance, is designed to help organizations manage and communicate with the billions of mobile devices and sensors found in systems such as automobiles, traffic management systems, smart buildings and household appliances. Previously, achieving connectivity at this level required hundreds of servers. The MessageSight appliance manages the same connectivity with a single server appliance, reducing the energy use by two orders of magnitude. IBM also offers appliances for data warehousing, storage data compression, data security and masking, and other specialty activities to offer optimized capabilities with a minimal energy footprint.

SoftLayer Cloud and Cloud Managed Services IT offerings

IBM has increased both its public SoftLayer Cloud and private or hybrid Cloud Managed Services offerings, with 37 cloud data center locations around the globe. Cloud computing offers an on-demand, more efficient way to deploy and run IT applications and systems. As an example of the benefits of the cloud, a banking client transferred its IT infrastructure to an IBM hybrid cloud solution, placing the bank's online and mobile workloads on the public cloud and its large-scale transaction workloads on a private cloud. This reduced the server infrastructure by 60 percent, achieving significant reductions in energy consumption and other operations and maintenance costs.

Development of energy efficiency standards

IBM actively assists in the development of external product energy efficiency standards. As in 1992 when we helped to develop and were a charter member of the US Environmental Protection Agency's (EPA) ENERGY STAR computer program, IBM staff are actively participating in the development of updates to the ENERGY STAR requirements for server and storage products.

We are providing technical assistance regarding the assessment of the Standard Performance Evaluation Committee (SPEC) Server Efficiency Rating Tool (SERT) and the SNIA Emerald Power Efficiency Measurement Specification, working both inside IBM and in conjunction with industry groups to evaluate the SERT and Emerald results. We are also assisting the EPA and various regulatory bodies outside the United States in developing server energy efficiency criteria based on the SERT metric. Our activities have expanded to include providing extensive comments and technical data to the European Union Energy-related Products (ErP) Lot 9 Study on Server and Storage products and to the China National Institute of Standardization's server energy efficiency requirements effort.

Product recycling and reuse

As part of our product end-of-life management (PELM) activities, IBM began offering product takeback 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 countries where we do business. These solutions include:

- 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

In many countries and US states, we offer solutions for the end-of-life management of computer equipment, either through voluntary IBM initiatives or programs in which we participate.

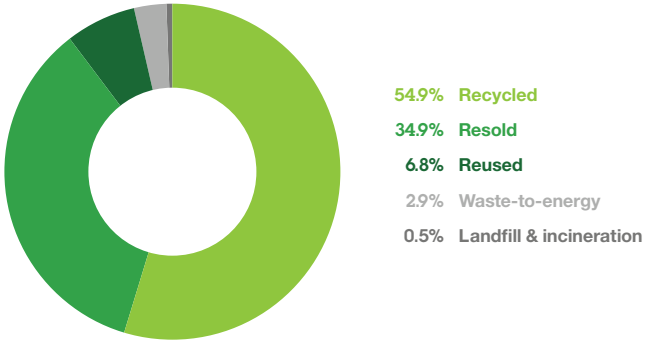
In 2014, the total weight of end-of-life products and product waste processed by these operations was approximately 32,000 metric tons (70.5 million pounds). This represents 76 percent of the estimated 42,000 metric tons of new IBM IT equipment put on the market in 2014.

IBM's voluntary environmental goal is to reuse or recycle end-of-life products such that the amount of product waste sent by our PELM operations to landfills or to incineration facilities for treatment does not exceed a combined 3 percent of the total amount processed.

IBM's global PELM operations sent approximately 0.5 percent by weight of end-of-life products and product waste directly to landfill or incineration as a disposal treatment in 2014, versus a target of not exceeding 3 percent. IBM has sent less than 1 percent of the PELM processed annually to landfill or incineration as a final treatment since 2006.

2014 product end-of-life management operations

Total processed: 32,000 metric tons (% by weight)



Of the 32,000 metric tons processed by IBM PELM operations worldwide, 54.9 percent was recycled as materials, 34.9 percent was resold as products, 6.8 percent was product reused by IBM, 2.9 percent was incinerated for energy recovery, and an estimated 0.5 percent was sent to landfills or incinerated for final disposal.

In 1991, IBM expanded our supplier environmental evaluation program — first introduced in 1972 — to include a corporation-wide requirement to evaluate the company's PELM suppliers. We evaluate these suppliers prior to doing business with them and every three years thereafter. Our objective is to use only those suppliers that have a strong focus on environmental management, including complying with laws and regulations as well as sound management practices. More about IBM's requirements for our PELM suppliers may be found in the environmental requirements in the supply chain section of this report.

From 1995, when we first began including product recovery in our annual corporate environmental report, through the end of 2014, IBM has documented the collection and processing of approximately 945,000 metric tons (about 2.1 billion pounds) of product and product waste worldwide.

0.5%

In 2014, IBM's PELM operations sent 0.5 percent of product waste directly to landfill or incineration facilities — surpassing our goal of 3 percent maximum.

Product packaging

IBM's corporate environmental requirements for product packaging are included in our environmental packaging guidelines, which were first published in 1990 and have been updated as needed over the years. Key elements of IBM's packaging guidelines have been embedded in various engineering specifications and procurement documents, which extend their reach to include our supply chain and other business partners.

IBM has had a program focused on the environmental attributes of its product packaging since the late 1980s. Under the program, IBM packaging engineers design solutions that minimize toxic substances and packaging waste by specifying nontoxic materials and inks. We keep packaging to a minimum while continuing to provide protection to the product being shipped. We also collaborate with suppliers to use recycled and recyclable materials and promote reuse. The design of rugged products, the efficient use of protective product packaging, and the environmental benefits resulting from improvements in transportation efficiency are addressed and tracked though this program. Key elements of IBM's packaging guidelines have also been embedded in various engineering specifications and procurement documents which can be found on IBM's information for suppliers webpage.

IBM's environmental packaging requirements incorporate a list of the most commonly used packaging materials. Each is evaluated on a variety of environmental criteria. When options are available, suppliers are required to choose the material that has the least adverse effect on the environment. The materials listed are based on practical and regulatory experience and customer feedback. Other environmental areas addressed in the packaging requirements include:

- Ozone-depleting substances
- Restricted heavy metals and other materials of concern
- Source reduction
- Reusable packaging systems
- Recyclable packaging
- Conserving natural resources

All product packaging suppliers that pack/ship products to customers on behalf of IBM worldwide must submit required packaging environmental compliance data to IBM, along with other relevant packaging compliance and performance data, through web-enabled tools. Any suppliers with a non-conformance must submit and implement supplier improvement plans to close out the identified issues within an agreed timeframe. Applying this process to packaging suppliers worldwide ensures ongoing compliance with IBM's environmental product packaging requirements.

Packaging reduction and improvements

In 2014, the global packaging engineering team saved an estimated 101.6 metric tons of packaging materials through the implementation of two significant packaging redesign projects for parts and assemblies shipped from suppliers to IBM fulfillment locations. These projects delivered an annual materials and transportation cost savings estimated at $2 million.

IBM packaging engineers in the United States and China worked in conjunction with several IBM suppliers to reduce the amount of packaging used to ship parts into IBM fulfillment sites. They designed and tested packaging that reduced packaging materials by as much as two-thirds and decreased the packaging size. This also improved space utilization in transit, and lowered the per-unit fossil-fuel consumption and emissions.

IBM also implemented a new packaging material called RESTORE Mushroom Packaging, to protect our large mainframe computers during domestic US shipping. This material is made from mushroom mycelium (roots) combined with agricultural waste (corn stalks). This mixture is placed in a mold and allowed to grow under ambient temperatures. The product is then removed from the mold and heat-treated. IBM attaches these mushroom cushions to a corrugate end cap, which is then placed on the outside of the mainframe for product protection.

Sourcing of paper and paper/wood-based packaging materials

IBM established its voluntary environmental goal for the responsible sourcing of paper and paper/wood-based packaging in 2002. It stated that the paper and paper/wood-based packaging directly acquired by IBM should be procured from suppliers that source from sustainably managed forests, where such sources exist.

When this goal was first established, sufficient quantities of sustainably sourced paper and packaging materials were not available to meet our needs. In 2014, after a continued focus on this objective by IBM and our suppliers over the years, 99 percent of the paper and paper/wood-based packaging IBM procured worldwide came from suppliers that warranted that the source was derived from forests managed in an ecologically sound and sustainable manner. This requirement is now incorporated into our standard supplier specification for paper/wood-based packaging.

Process stewardship

Among its objectives, IBM's Corporate Policy on Environmental Affairs calls for the use of development and manufacturing processes that are protective of the environment.

Environmentally preferable substances and materials

As an integral part of the global EMS through which we support the objectives of our Corporate Policy on Environmental Affairs, we routinely and consistently monitor and manage the substances we use in our development and manufacturing processes and in our products.

Our precautionary approach includes the careful scientific review and assessment of substances prior to their use in IBM processes and products. In specific instances, we have chosen to proactively prohibit the use of certain substances, restrict their use, or find alternative substances to use in our processes and products when the weight of scientific evidence determines a potential adverse effect upon human health or the environment, even when current laws permit such use.

When IBM develops new processes or significantly modifies existing processes, we conduct a scientific assessment of all substances in the process, even those that have been approved previously. Through these scientific assessments, we seek to identify potential substitutes that may be environmentally preferable. We believe that the same scientific rigor is required to investigate the human health and environmental effects of potential substitutes as was applied to investigate the substances in use.

IBM has a long history of taking proactive steps to evaluate the chemicals used in our processes and products — first, by identifying potential substitutes that may have less impact on the environment, health and safety, and then by eliminating, restricting and/or prohibiting the use of substances for which a more preferable alternative is available that is capable of meeting quality and safety requirements of our processes and products.

The following provides a sampling of IBM's 40-plus years of leadership in prohibiting or restricting substances of concern from our processes and products before regulatory requirements were imposed. For a more complete listing, see our materials use webpage.

- **Polychlorinated biphenyls (PCBs)**
  IBM initiated a multi-year effort to eliminate PCBs from use in our products in 1974 and achieved elimination in 1978.

- **Chlorofluorocarbons (CFCs)**
  In 1989, IBM became the first major IT manufacturer to announce a phase-out of CFCs, a Class I ozone-depleting substance, from our products and 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 substances from our products and processes in 1995.

- **Trichloroethylene (TCE), ethylene-based glycol ethers and dichloromethane**
  Examples of other chemicals that IBM voluntarily prohibited from our 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 our 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 our IT system enclosures in 2000 and prohibited the use of TBBPA as an additive flame retardant in IT system enclosures for newly released products in 2007.

- **Specific perfluorinated compounds (perfluorooctane sulfonate [PFOS] and perfluorooctanoic acid [PFOA])**
  IBM prohibited the use of PFOS and PFOA in the development of new materials in 2005, in new manufacturing applications in 2007, and eliminated the use of these chemicals in manufacturing, development and research processes as of January 31, 2010.

We communicate to suppliers IBM's restrictions on specific substances and other environmental requirements for our products through our Engineering Specification: Baseline Environmental Requirements for Supplier Deliverables to IBM.

Nanotechnology

By definition, nanotechnology is the application of scientific and engineering principles to make and utilize very small things (dimensions of roughly 1 to 100 nanometers), creating materials with unique properties and enabling novel and useful applications. It involves an ever-advancing set of tools, techniques and unique applications involving the structure and composition of materials on a nanoscale.

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, more precise and more energy-efficient. Nanotechnologies have been critical to advancements in the IT industry.

IBM Research became involved in the world of nanoscience in 1981 when Gerd Binnig and Heinrich Rohrer invented the scanning tunneling microscope, revolutionizing our ability to manipulate solid surfaces the size of atoms.

Since then, IBM has achieved numerous developments in the field — from moving and controlling individual atoms for the first time, to developing logic circuits using carbon nanotubes, to incorporating sub-nanometer material layers into commercially mass-produced hard disk drive recording heads and magnetic disk coatings. We were also one of the first companies to create safe work practices and health and safety training for our employees working with nanoparticles.

In 2014, IBM announced it will invest over $3 billion over the next five years in research and development programs, to push the limits of chip technology needed to meet the emerging demands of cloud computing and big-data systems. IBM will be investing significantly in emerging areas of research such as carbon nanoelectronics, silicon photonics, new memory technologies and architectures that support quantum and cognitive computing. This research will focus on providing orders-of-magnitude improvement in system-level performance and energy-efficient computing. In addition, IBM will continue to invest in the nanosciences and quantum computing — two areas of fundamental science where IBM has remained a pioneer for over three decades.

As an example, IBM researchers working in the area of carbon nanotube electronics recently demonstrated — for the first time — two-way complimentary metal-oxide semiconductor (CMOS) NAND gates using 50-nanometer gate length carbon nanotube transistors. Carbon nanotube transistors can operate as excellent switches at molecular dimensions of less than 10 nanometers — the equivalent to 10,000 times thinner than a strand of human hair, and less than half the size of the leading silicon technology. Modeling of the electronic circuits suggests that about a five- to ten-times improvement in performance is possible, compared to silicon circuits.

These advances in chip technology offer potential alternatives to today's higher-power transistors by creating advanced microelectronics that operate at much lower voltage and thus use significantly less power than current technologies.

Pollution prevention

Pollution prevention is an important aspect of IBM's longstanding environmental efforts and it includes, among other things, the management of hazardous waste, nonhazardous waste and chemical releases.

Hazardous waste

The best way to prevent pollution is to reduce the generation of waste at its source. This has been a basic philosophy behind IBM's pollution prevention program since 1971. Where possible, we redesign processes to eliminate or reduce chemical use, or we substitute the use of certain chemicals altogether with more environmentally preferable substances. We maintain programs for proper management of the chemicals used in our operations, from selection and purchase to storage, use and final disposal.

To more effectively track IBM's hazardous waste management performance, we developed a methodology in 1992 to correlate the hazardous waste generated from our manufacturing operations relative to production, and established a voluntary environmental goal based on this methodology in 1995 to drive continual reduction in the hazardous waste generated from these operations.

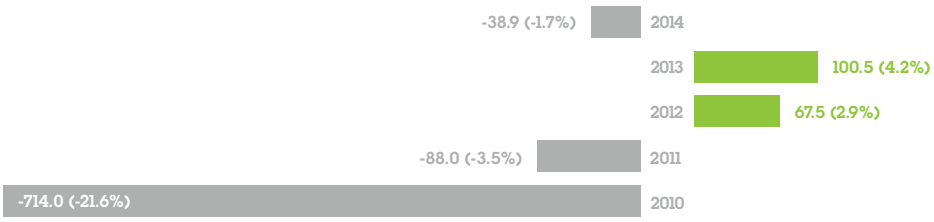
The goal is to achieve a year-to-year reduction in hazardous waste generation from IBM's manufacturing processes, indexed to output. The metric is measured at IBM's three microelectronics manufacturing locations that generate the majority of IBM's hazardous waste that is attributable to manufacturing processes.

In 2014, IBM's hazardous waste generation indexed to output decreased by 1.7 percent, or approximately 39 metric tons, compared to the goal of a year-to-year reduction. The primary factor for this decrease was a reduction in sludge containing fluoride and heavy metals from wastewater treatment at one manufacturing site.

The total hazardous waste generated by IBM worldwide in 2014 decreased by 45 percent from 2013 to 4,040 metric tons. There were two primary factors for this year-to-year decrease: first, the completion of land remediation programs at two IBM locations in the United States, which generated significant quantities of contaminated soil in 2013, and second, a reduction in industrial wastewater treatment plant (IWTP) sludge

Annual change in hazardous waste generation indexed to output

(Metric tons and % change)



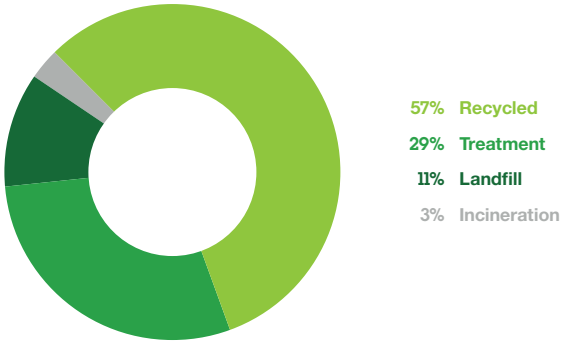
classified as hazardous waste from one of our microelectronics manufacturing locations, resulting from the delisting of the waste stream as "hazardous" in 2013. This IWTP sludge is now used as an alternative daily cover for a landfill.

For the hazardous waste that is generated, we focus on preventing pollution through a comprehensive, proactive waste management program. For example, IBM has an active program for increasing the off-site reclamation and beneficial use of waste solvents from photolithography processes.

Of the total 4,040 metric tons of hazardous waste IBM generated worldwide in 2014, 57 percent was recycled, 29 percent was sent off-site for treatment, 11 percent was sent by IBM directly to suitably regulated landfills, and 3 percent was sent for incineration. Of the total amount of hazardous waste sent to landfills, about 58 percent was sludge from IWTPs. Government regulations required disposition of this sludge in secure hazardous waste landfills.

2014 total generated hazardous waste worldwide by treatment method

(4,040 metric tons)



1.7%

In 2014, IBM's hazardous waste generation from manufacturing processes, indexed to output, decreased by 1.7 percent from 2013 — achieving our goal of a year-to-year reduction.

Nonhazardous waste

IBM also has focused for decades on preventing the generation of nonhazardous waste, and where this is not practical, recovering and recycling the materials that are generated. Nonhazardous waste includes paper, wood, metals, glass, plastics and nonhazardous chemical substances.

We established our first voluntary environmental goal to recycle nonhazardous waste streams in 1988. The goal has since evolved on two fronts. The first expanded the traditional dry waste streams to include nonhazardous chemical waste and end-of-life IT equipment from our own operations, as well as IBM-owned equipment returned by external customers at the end of a lease. The second broadened the goal to include nonhazardous waste generated by IBM at leased locations that meet designated criteria.

Our voluntary environmental goal is to send an average of 75 percent of the nonhazardous waste generated by IBM to be recycled. In 2014, we sent 86 percent of the nonhazardous waste generated by IBM worldwide to be recycled.

Treatment methods that were recognized toward the waste recycling target included reuse, recycle, energy recovery, composting, reclamation and land farming. Treatment methods that were not recognized toward the recycling target included incineration, landfilling and treatment, such as aqueous treatment, biodegradation of organics, filtration, neutralization and stabilization.

Total annual nonhazardous waste quantity and recycling performance
(Metric tons x 1,000)

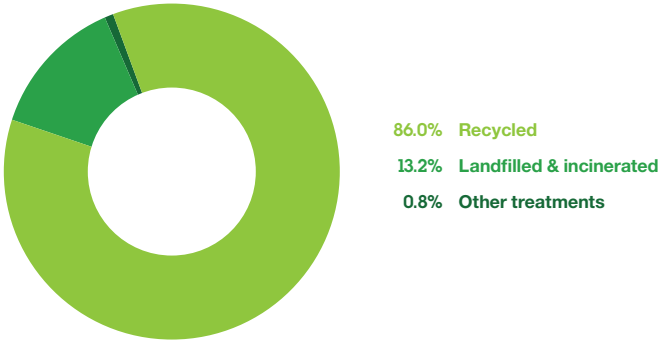
	2010	2011	2012	2013	2014
Total sent for recycling	56	55	60	56	92
Total generated	71	70	69	65	107
Percentage sent for recycling	79%	78%	87%	86%	86%

**IBM's goal is to send 75% for recycling.*

In 2014, our worldwide operations generated approximately 107,000 metric tons of nonhazardous waste, an increase of 42,000 from 2013. This increase resulted from several large construction projects at IBM locations in 2014. Construction debris accounted for about 48 percent of nonhazardous waste we generated in 2014. Without this waste stream, IBM would have seen a 1,400 metric ton reduction compared to 2013.

Source reduction and waste prevention initiatives implemented by IBM worldwide were estimated to have prevented the generation of over 4,000 metric tons of nonhazardous waste in 2014, with estimated annual handling, treatment and disposal cost savings and revenue returns totaling $5.5 million.

2014 total nonhazardous waste worldwide by treatment method
(107,000 metric tons)



Management of chemical releases

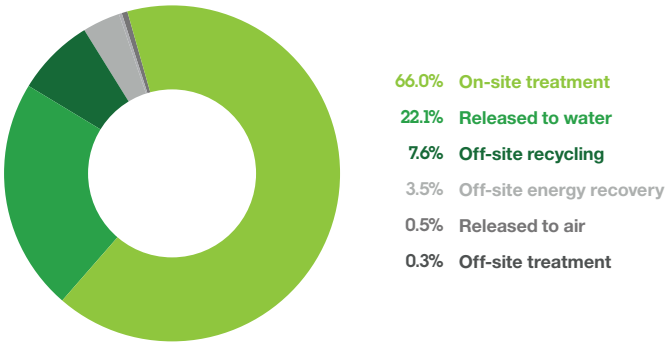
Under Section 313 of the US Emergency Planning and Community Right-to-Know Act (EPCRA), companies are required to file an annual inventory of reportable quantities of more than 600 chemicals that were manufactured, processed or otherwise used in quantities exceeding the reporting threshold of 10,000 pounds (4.54 metric tons) for the preceding calendar year. These reportable quantities include:

- Routine releases of chemicals to the environment (e.g., permitted air emissions and water discharges, etc.)
- Chemical quantities that are treated, recycled or combusted for energy recovery on-site
- Chemical quantities that are sent off-site for recycling, combustion for energy recovery, treatment or disposal

Though EPCRA is a US reporting requirement, we have voluntarily extended this reporting metric to cover our worldwide operations since 1994. In 2014, IBM's worldwide reportable quantities of EPCRA-listed chemicals amounted to 2,778 metric tons, representing a decrease of 3.2 percent compared to 2013. More than 77 percent of this quantity was treated on-site or sent off-site for recycling or combustion for energy recovery.

2014 worldwide reportable quantities of EPCRA-listed chemicals*

(2,778 metric tons)



*As defined under Section 313 of the US EPCRA

2014 worldwide reportable quantities of EPCRA-listed chemicals*

Chemical	Metric tons
Sulfuric acid (aerosol only)	1,053
Nitrate compound	743
Hydrogen flouride	250
Nitric acid	234
Xylene	146
n-methyl-2-pyrrolidone	126
Ozone	41
Ethylbenzene	31
All Others	154
Total	**2,778**

**As defined under Section 313 of the US EPCRA*

IBM's voluntary goal in this area is to achieve a year-to-year reduction in routine releases of EPCRA-reportable chemicals to the environment, indexed to output.

In 2014, IBM's releases of EPCRA-reportable chemicals, indexed to output, increased by 6.2 percent from 2013. The increase resulted from greater nitrate releases at one of our manufacturing locations and the delayed start-up of that location's nitrate reduction process, which was designed and constructed by IBM voluntarily to address these releases. Releases of nitrate compounds from this location are not regulated by a discharge permit and do not materially impact the quality of the receiving water body. However, limiting discharges of nitrate compounds is a requirement of IBM's own corporate environmental practices. Accordingly, we invested in process upgrades and treatments aimed at reducing nitrate discharges in our effluents. The nitrate reduction process was fully operational from the beginning of 2015.

Worldwide reportable quantities of EPCRA-listed chemicals,* 2010-14

(Metric tons x 1,000)

*As defined under Section 313 of the US EPCRA

Water conservation

The preservation of water resources and protection of watersheds are important areas of focus for IBM.

IBM's microelectronics manufacturing operations have been our company's most water-intensive business activities. In 2014, these operations represented 88 percent — or 8,937 of 10,152 thousand cubic meters (TCMs) — of the water used in our manufacturing operations and laboratories worldwide.

Though our microelectronics operations are not located in areas of water scarcity, in 2000 we established a goal to achieve average annual water conservation savings equal to 2 percent of IBM's water use in microelectronics manufacturing operations each year, based on the water usage of the previous year and measured over a rolling five-year period. This voluntary environmental goal measures annual water conservation resulting from new water reduction projects and improvements in water reuse and recycling by these operations.

Water conservation initiatives in IBM's microelectronics manufacturing locations achieved a 3.3 percent annual savings in 2014, versus 2013 usage. Over the past five years, initiatives at these locations have achieved an average of 2.3 percent water conservation savings against the 2 percent goal.

2.3%

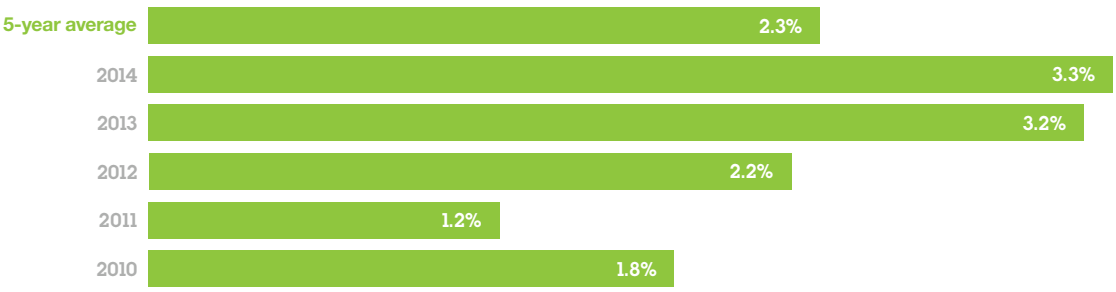
IBM's microelectronics manufacturing operations achieved a 2.3 percent average annual water savings over five years, based on previous years' usage — surpassing our goal of 2 percent.

In 2014, a total of 695 TCMs of water were conserved, of which 469 TCMs of water withdrawals were avoided through on-site water reuse, and wastewater and groundwater recycling projects. New water use reduction projects contributed a further 225 TCMs in water savings. The total accumulated water conservation over the past five-year rolling period was 3,265 TCMs.

The significant efforts undertaken by IBM's microelectronics operations in the early years of our water conservation goal were very effective in capturing opportunities for water conservation. Over the past 14 years, conservation efforts have avoided the accumulated use of 21,039 TCMs of water.

Water conservation in microelectronics manufacturing operations

(annual savings as a percentage of previous year's total water use)



Solutions for environmental sustainability

We apply our expertise, resources, research and innovation to help discover solutions to some of the world's most challenging environmental problems.

More than ever, organizations are applying new technologies to transform their operations, products and services to become more efficient, innovative and sustainable. We recognize that our greatest opportunity for building a more sustainable planet comes from enabling this transformation for our clients. Our activities reflect our longstanding commitment to environmental leadership and one of IBM's core business values: "innovation that matters — for our company and for the world." Examples of IBM solutions that are advancing sustainability follow.

Water

Because water sustains us, water management is as essential as the element itself. As stewards of our planet, leaders and citizens are compelled to act. And as individual users of this essential resource, we are compelled to act together.

The Jefferson Project at Lake George

Rensselaer Polytechnic Institute, IBM and the FUND for Lake George launched the Jefferson Project in June 2013 in an ambitious effort to model Lake George in New York - its depths and shoreline - to get a holistic and accurate view of everything happening in and around one of the United States' pristine lakes. The goals of the project are multifold and include understanding and managing the complex factors impacting the lake from invasive species, pollution and other factors, to developing a template to use in other fresh-water bodies around the globe.

The three partners previously developed preliminary models of key natural processes within the watershed. As part of the first phase of the project, a network of 12 sensor platforms including vertical profilers and tributary monitoring stations were deployed around Lake George and its tributaries in late 2014, providing an unprecedented amount of data for researchers. With the Jefferson Project's sophisticated lake environmental monitoring and data analysis capabilities, scientists are learning how the lake has changed in the past, observing how it functions in real time, and will be able to predict how different variables could impact this valuable resource in the future.

In addition, a new 2,000-square-foot data visualization laboratory at the Darrin Fresh Water Institute in Bolton Landing unveiled in October 2014 features advanced computing and graphics systems that allow researchers to visualize sophisticated models and incoming data on weather, runoff and circulation patterns. The data visualization laboratory displays streaming data from various sensors in and around the lake in real time. Within the new laboratory, scientists are able to zoom in as close as half a meter on high-resolution 3-D models of the lake and surrounding area, a degree of detail unprecedented for a lake of this size.

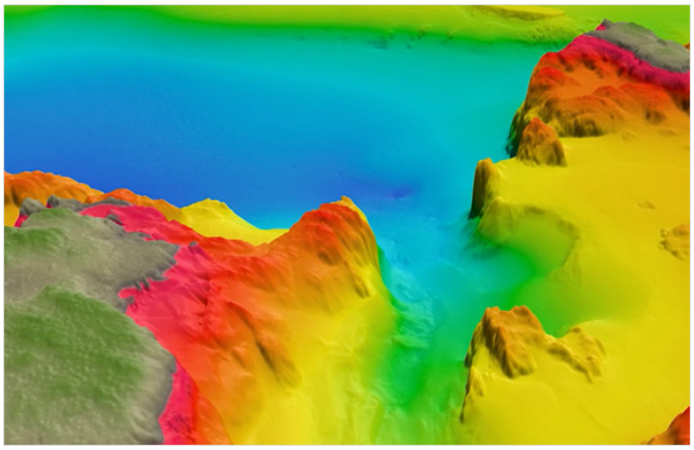
Preliminary models of the lake's circulation and runoff, developed with data from existing bathymetry and a 30-year study of Lake George, will be refined and enhanced with the new high-resolution bathymetric and topographic survey data. In addition, a combination of shore-based weather stations and lake-based sensor platforms - connected via an advanced cyber infrastructure - will be deployed to monitor the temperature of the air and water, flow rates of tributary streams, lake currents and the amount of oxygen and algae in the water as well as additional water quality indicators. The sensor data not only improves the accuracy of the early models, it also opens opportunities for future analytics. To gain a complete view of the lake's ecosystem, project partners will combine biological data with the circulation and other models, to create a "food web model" that simulates the biological impacts physical and chemical changes have on fish and other species in the lake.

Using big data and analytics technology for seamless water distribution in India

The government of Kerala, India, is using IBM analytics and mobility solutions to analyze, monitor and manage water distribution in the city of Thiruvananthapuram.

With a population of more than 3.3 million, providing connections with equitable water supply to 210,000 households across divisions and subdivisions was a challenging task due to aging pipes, leaking infrastructure, and unauthorized use of water. There were huge losses in water distribution, with close to 45 percent of fresh water unaccounted for or wasted due to leakages. In addition, the Kerala Water Authority (KWA) faced challenges in revenue collection because the billing system was unable to track water consumption by consumers accurately. And without systems in place to monitor and provide real-time visibility into water consumption, it was difficult to track the performance of water treatment facilities and the effectiveness of the water supply network.

KWA is working with IBM to put in place the necessary infrastructure, monitoring and analytics to help identify potential issues proactively, in an effort to dramatically reduce water waste, improve customer satisfaction and increase the efficiency of maintenance and business operations. IBM will help KWA establish a water management center using the IBM Intelligent Water software to bring all the distribution and consumption data from meters to a central dashboard - where water usage can be effectively and predictively monitored and managed, thereby reducing billing anomalies and improving revenue collection by more than 10 percent. This provides the city's water supply networks and KWA management with a unified and real-time view of the transmission and consumption of water across the city of Thiruvananthapuram. Smart sensors, working in conjunction with the IBM Intelligent Water software, enable workers to receive alerts through their mobile or smart devices or laptops, so they can respond immediately to irregularities in water supply and react more quickly to repairs that are needed. With the solutions, KWA aims to achieve 100 percent success in equitable water supply.



Scientists will be able to zoom in on high-resolution, 3-D models of Lake George and the surrounding area with a degree of detail unprecedented for a lake of this size.

Cities

Today more than 3.9 billion people - 54 percent of the world's population - live in urban areas, and that amount is expected to increase to 66 percent by 2050. Smarter cities of all sizes are capitalizing on new technologies and insights to transform their systems, operations and service delivery to operate more efficiently and sustainably.

Transforming China's energy systems and protecting citizen health

China's economic growth over the past several decades has raised the living standards of hundreds of millions of its citizens. However, the resulting environmental impact, particularly air pollution, has become a priority for the Chinese government. IBM announced a 10-year initiative to support China in transforming its national energy systems and protecting the health of citizens. Dubbed "Green Horizon," the project sets out to leap beyond current global practices in three areas critical to China's sustainable growth: air quality management, renewable energy forecasting and energy optimization for industry.

- Air quality management — IBM is partnering with the Beijing Municipal Government on a system to enable authorities to pinpoint the type, source and level of emissions, and to predict air quality in the city. By applying supercomputing processing power, scientists from IBM and the Beijing government aim to create visual maps showing the source and dispersion of pollutants across Beijing 72 hours in advance, with street-scale resolution.

- Renewable energy forecasting — The Chinese government has announced increased investment in solar, wind, hydro and biomass energy in a bid to decrease its dependency on fossil fuels. To support the objective, IBM has developed a renewable energy forecasting system solution that combines weather prediction and big-data analytics to enable utility companies to forecast the amount of energy that will be available to be directed into the grid or stored - helping to ensure that as little as possible is wasted.

- Energy optimization for industry — China's economic growth over the past 10 years has led it to become the biggest energy consumer in the world. As part of the transformation of Chinese industry, the government has committed to reducing the country's "carbon intensity" by 40-45 percent by the year 2020 compared with 2005 levels (equivalent to 130 million tons of coal per year). To support this goal, IBM is developing a new system to help monitor, manage and optimize the energy consumption of industrial enterprises - representing over 70 percent of China's total energy consumption.

Click to view the full infographic on Project Green Horizon.

Solutions to transform water, energy and waste management services

IBM and Veolia announced new solutions that integrate intuitive and powerful digital technologies into urban services to improve the efficiency of municipal systems. A world leader in municipal services, Veolia sought IBM's partnership to transform the way they deliver digital services and solutions for cities.

IBM and Veolia will first deliver new solutions for smarter water, incorporating IBM Intelligent Water software that allows for better utilization of big data and provides a management system for the integration, optimization and analysis of all data related to water management. Veolia and IBM will also introduce new digital solutions and services for energy management and waste management — areas in which Veolia has deep operations experience and IBM has proven technology.

Energy

Energy and utility companies are challenged to continuously deliver reliable, affordable, and sustainable energy in an increasingly competitive market. This is putting enormous pressure on the industry that can only be overcome through flexible, scalable and data-driven insights to modernize the utility network and improve power generation.

Cloud-based enterprise-wide analytics for energy companies

IBM Insights Foundation for Energy is an energy analytics, data management and visualization software solution for energy and utility companies. It can integrate disparate data sources and develop actionable analytic insights across and within business domains. Using advanced analytics, energy and utility companies can turn business challenges into opportunities, driving rapid time to value and real business outcomes. The solution can be used to get a 360-degree view from the individual transformer level to the entire grid. It also enables renewable energy forecasting and integration to the network as well as supporting custom analytics development so it can be tailored to meet the specific needs of each energy and utilities provider. The platform can be used to help utilities shift from traditional and costly time-based asset management — where network repairs are done on schedule regardless of how much useful life is left in an asset — to a more informed reliability-based approach of making repairs when they are actually needed.

Bringing solar electricity and heat to remote locations

IBM Research is partnering with Airlight Energy, a Swiss-based supplier of solar power technology, to bring affordable solar technology to the market. The high-concentration photovoltaic thermal (HCPVT) system, which resembles a 10-meter-high sunflower, uses a 40-square-meter parabolic dish and can concentrate the sun's radiation 2,000 times, converting 80 percent of it into useful energy to generate 12 kilowatts of electrical power and 20 kilowatts of heat on a sunny day — enough to power several average homes.

The inside of the parabolic dish is covered with 36 elliptic mirrors made of 0.2-millimeter-thin recyclable plastic foil with a silver coating, which are then curved using a slight vacuum. The mirrored surface area concentrates the sun's radiation by reflecting it onto several microchannel liquid-cooled receivers, each of which is populated with a dense array of multi-junction photovoltaic chips — each one-square-centimeter chip produces an electrical power of up to 57 watts on a typical sunny day.

The photovoltaic chips, similar to those used on orbiting satellites, are mounted on micro-structured layers that pipe treated water within fractions of millimeters of the chip to absorb the heat and draw it away 10 times more effectively than with passive air cooling. The 85-90 degrees Celsius hot water maintains the chips at safe operating temperatures of 105°C, which otherwise would reach over 1,500°C. This direct hot-water cooling design with very small pumping power is an IBM technology that has already been made commercially available in IBM's high-performance computers.

An IBM technology cools the photovoltaic chips in this innovative solar power system being deployed in Switzerland.

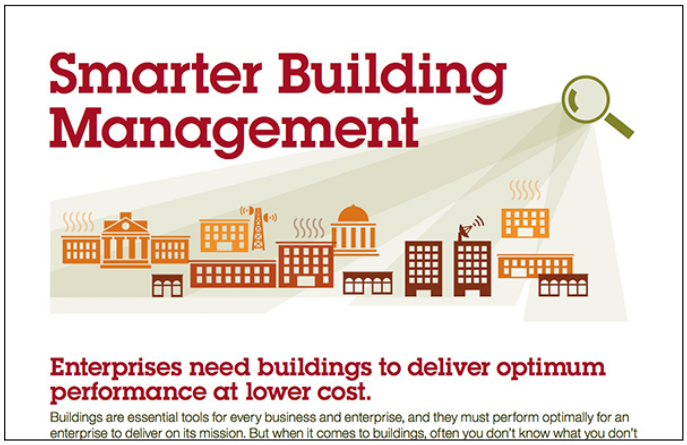
Buildings

Commercial buildings consume large quantities of energy worldwide and are a significant contributor to greenhouse gas emissions. Moreover, about 30 percent of a building's total operating cost goes for energy. So, as concerns for the environment and financial bottom line increase, the need to reduce both energy consumption and overall building expenses takes on new urgency.

IBM Building Management Center solution at Carnegie Mellon

IBM announced an innovative project with Carnegie Mellon University to deliver a cloud-based analytics system for reducing energy and facility operating costs. With 6.5 million square feet of infrastructure, miles of underground utilities, water lines, electrical systems, health facilities, restaurants, and even its own police force, Carnegie Mellon is practically a city unto itself.

This is a campus where the first building was built in 1906 and the most recent is under construction now. More than a century of infrastructure will all be managed through a single system using the new IBM Building Management Center solution, delivered on the IBM SoftLayer cloud. It will monitor thousands of data points from building automation and control systems in order to deliver better building performance, energy efficiency and space utilization.



Click to view the full infographic on Smarter Building Management.

By harvesting intelligence, best practices and value from the big data of buildings, the university expects to save approximately 10 percent on utilities — nearly $2 million annually — when the IBM system is fully deployed across 36 buildings on its Pittsburgh campus. Optimizing energy use and operations drives down costs, improves facility performance and makes buildings more sustainable. The IBM solution can manage all asset classes on a converged, integrated platform. It can identify opportunities to extend asset life, optimize up-time, improve occupant satisfaction and address regulatory compliance. It also has capabilities to measure, manage and reduce facility energy and environmental impact to help achieve sustainability goals.

Read more about this project at the Smarter Planet® blog, the Smarter Cities® website, or in the solution brief.

Agriculture and food

Protecting the global food supply is a monumental public health and sustainability challenge. In the United States alone, one in six people are affected by food-borne diseases each year, resulting in 128,000 hospitalizations, 3,000 deaths and $9 billion in medical costs. Another $75 billion worth of contaminated food is recalled and discarded annually.

IBM and Mars launch effort to drive advances in food safety

In January 2015, scientists from IBM Research and Mars established the Consortium for Sequencing the Food Supply Chain, a collaborative food safety platform that will leverage advances in genomics to further our understanding of what makes food safe. As a first step, the consortium's scientists will investigate the genetic fingerprints of living organisms such as bacteria, fungi or viruses and how they grow in different environments, including countertops, factories and raw materials. This data will be used to further investigate how bacteria interact, which could result in completely new ways to view supply chain food safety management. This pioneering application of genomics will enable an in-depth understanding and categorization of microorganisms on a much bigger scale than has previously been possible.

The first data samples will be gathered at Mars-owned production facilities, while IBM's genomics, healthcare and analytics experts will utilize IBM's Accelerated Discovery THINKLab, a unique collaborative research environment, for the large-scale computational and data requirements of this initiative. Beyond the research, data and findings will be presented in a systematic way to enable affordable and widespread use of these testing techniques.

Read more about this project at IBM Research.

Click to view the full infographic on sequencing the food supply chain.

Environmental requirements in the supply chain

IBM has a longstanding commitment to protect the environment and to pursue environmental leadership across all of our business activities.

As a part of this commitment, IBM does business with suppliers who are environmentally and socially responsible and encourages environmental and social responsibility awareness with these suppliers. Further, IBM must respond to an increased interest from customers and governments for information about the environmental attributes of IBM's products and, in many cases, the source for this type of information is IBM's suppliers.

Program objectives

The objectives of our requirements for suppliers and our supplier evaluation programs include:

- Ensuring that IBM does business with environmentally responsible suppliers who are actively managing and reporting on their environmental intersects and impacts
- Helping our suppliers build capabilities and expertise in the environmental area
- Preventing the transfer of responsibility for environmentally sensitive operations to any company lacking the commitment or capability to manage them properly
- Reducing environmental and workplace health and safety risks of our suppliers
- Protecting IBM, to the greatest extent possible, from potential long-term environmental liabilities or potential adverse publicity

Supplier social and environmental management system requirements

In 2010, IBM established a requirement that all first-tier suppliers maintain a management system to address their social and environmental responsibilities. Our objective was to help our suppliers build their own capability to succeed in this area. These suppliers are required to:

- Define, deploy and sustain a management system that addresses their intersections with employees, society and the environment
- Measure performance and establish voluntary, quantifiable environmental goals in the areas of waste, energy and greenhouse gas emissions
- Publicly disclose results associated with these voluntary environmental goals and other environmental aspects of their management systems
- As part of their management system, conduct self-assessments and audits, as well as management reviews of their system
- Cascade these requirements to any of their suppliers who perform work that is material to the products, parts and/or services supplied to IBM

More information on these requirements may be found on IBM's supply chain environmental responsibility website.

Requirements for suppliers managing chemicals, processing wastes or managing end-of-life equipment
IBM has additional requirements for those suppliers where IBM:

- Specifies and/or furnishes chemicals or process equipment
- Procures materials, parts and products for use in hardware applications
- Procures hazardous waste and nonhazardous special waste treatment and/or disposal services
- Procures product end-of life management services
- Uses extended producer responsibility systems

Specific environmental requirements are documented in our contracts with suppliers conducting these types of activities anywhere in the world. These may include requirements related to chemical content, chemical management, waste management, spill prevention, health and safety, and reporting.

For hazardous waste and product end-of-life management suppliers, IBM conducts a supplier evaluation, which may include an on-site review of the supplier facility. We evaluate these suppliers prior to entering into a contract with them and then approximately every three years thereafter, to ensure their operations and commitment to workplace safety and sound environmental practices continues to meet our requirements. The evaluations are conducted by IBM's Corporate Environmental Affairs staff or internal or third-party environmental professionals under the direction of this staff.

1972
Established a corporate directive requiring the environment evaluation of suppliers of hazardous waste services

1980
Expanded our environmental evaluations of suppliers by establishing a second corporate directive to require the environmental evaluation of certain production-related suppliers

1991
Further expanded our environmental evaluations of suppliers, adding a requirement that product recycling and product disposal suppliers be evaluated

2002
Added a requirement to assess our suppliers and certain subcontractors they may use to handle recycling and/or disposal operations in non-OECD countries

2010
Established a requirement that all of IBM's first-tier suppliers establish a management system to address their social and environmental responsibilities-and that they cascade this requirement to their suppliers

IBM's hazardous waste and product end-of-life management supplier evaluations are comprehensive in the scope of the environmental aspects covered, including:

- Facility operational activities, capabilities, capacities and services:
  - Waste management services, treatment, recycling or final disposal methods, processing capacity and facility construction design (floors, docks, secondary containment)
  - Treatment and recycling methods for the hazardous and nonhazardous special wastes generated by supplier's operations
  - Environmental, health and industrial safety and hygiene management plans, training programs, emergency response plan and fire and safety equipment, personal protective equipment, chemicals used, safety data sheets and hazards communication program, evacuation plans, first aid, medical screening and monitoring programs, etc.

- Corporate environmental and social responsibility:
  - Supplier's compliance to IBM's social and environmental management requirements — supplier's social and environmental management system

- Applicable legal requirements and compliance:
  - Permits, licenses and other applicable regulatory requirements, regulatory agencies and contacts
  - Compliance history (notices of violation, government citations, public complaints and summary of inspections and findings)

- Environmental programs, including:
  - Air emissions, water (consumption and discharges), chemical management, waste management, supplier evaluations, incident prevention and reporting, energy management, soil and groundwater, etc.
  - Underground storage tanks and piping systems
  - Spill prevention, containment and response
  - Environmental liabilities, closure and post-closure care cost funding and plans and insurance coverage

IBM also requires its hazardous waste and product end-of-life management suppliers to track the shipment and processing of any hazardous materials they handle for IBM — down to the final treatment, recycling or disposal location — and to report that information to us.

As with all of our environmental programs, IBM manages its hazardous waste and product end-of-life management programs to the same high standards worldwide. Doing so can be particularly challenging in some countries where processing infrastructure (treatment, recycling and/or disposal) that meets IBM's requirements is lacking or not existent.

Under IBM's waste management program, hazardous and nonhazardous special wastes are treated, recycled or disposed at IBM-approved facilities within the country where they are generated, whenever possible. IBM does not export hazardous and nonhazardous special wastes from the United States or any other country where suitable processing facilities are available within the country.

If there are no suppliers in a country that meet IBM's environmental and safety requirements for hazardous waste or product processing, the waste generated by IBM's operations is shipped to facilities in other countries where those requirements can be met. This shipping is done in compliance with country laws and regulations, and in accord with international treaties such as the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal.

Though rare, there are sometimes situations in which local processing of waste is not possible and shipping to IBM-approved suppliers in other countries is not allowed due to legal requirements. In these situations, IBM will store wastes and product end-of-life materials in properly contained and managed storage facilities as allowed by law, and until suitable processing facilities are available.

Remediation

When groundwater contamination was first discovered at one of IBM's sites in 1977, the company voluntarily initiated groundwater monitoring at all of its manufacturing and development locations worldwide. Today, IBM has 2,609 monitoring wells and 104 extraction wells in place at its current and former locations.

In 2014, IBM's remediation wells extracted approximately 16,100 pounds of solvents from past contamination at six currently operating IBM locations and 12 former IBM locations in three countries. At six of these locations, an additional 1,915 pounds of solvents were removed by soil vapor extraction or other methods. IBM also has financial responsibility for remediation at two additional former locations.

Under the US Superfund law, IBM is involved in cleanup operations at some non-IBM sites in the United States. The Superfund law creates retroactive responsibility for all the parties that may have sent waste or otherwise contributed to contamination at third-party-owned sites, regardless of whether those sites were complying with environmental laws at the time. As of year-end 2014, IBM had received notification (through federal, state or private parties) of its potential liability at 114 such sites since the beginning of the Superfund program in 1980. Of these, 63 are on the US National Priority List. At most of the 114 sites, IBM has either resolved its liability or has proven it has no outstanding liability. Currently, IBM is actively participating in a cleanup or otherwise managing its potential liability at only 17 Superfund sites.

When environmental investigation and/or remediation at a current or former IBM location or a non-IBM facility is probable, and the costs for future activities can be reasonably estimated, IBM establishes financial accruals for loss contingency. IBM accrues for estimated costs associated with closure activities (such as removing and restoring chemical storage facilities), when IBM decides to close a facility. As of December 31, 2014, the total accrual amount for all such environmental liabilities and associated activities was $254 million.

Audits and compliance

IBM measures our environmental performance against both external and internal requirements, and we take prompt and decisive action when any issues are identified.

Every year, and more frequently for some, IBM's manufacturing, hardware development and research locations and organizations — such as product development, Global Real Estate Operations, Global Asset Recovery Services, Global Services Environmental Compliance, and Supply Chain — complete a comprehensive self-assessment. IBM's Corporate Internal Audit staff may also conduct environmental, health and safety audits. Audit and self-assessment results are communicated to top management. Follow-up, accountability and actions are clearly delineated.

In addition, independent external audits are conducted on a scheduled cycle as part of IBM's single, global registration to ISO 14001:2004. Approximately 25 IBM locations and relevant business organizations (known as registered entities) are audited annually by an independent ISO 14001 registrar. Our manufacturing, hardware development and chemical-using research locations and organizations are audited by the ISO 14001 registrar every 12-30 months.

An independent registrar also audits IBM's Energy Management Program and enterprise-wide database for managing energy consumption information, against the ISO 50001:2011 standard, as part of IBM's single global Environmental Management System. Annually, between six and eight of our ISO 14001 registered sites are audited for conformance to the ISO 50001 standard.

On an annual basis, using a sampling approach, the registrar audits between 15 and 25 of IBM's ISO 14001 registered entities to verify energy savings calculations from conservation projects and to validate the accuracy of the energy bill data entry process. The audited entities typically cover 30-60 percent of IBM's global annual energy consumption. During these audits, the registrar tests a sample of the energy consumption records in the enterprise-wide database, comparing the consumption values on the energy bill to the database entries. The audits provide an independent check on the accuracy of energy data and greenhouse gas (GHG) emissions reporting by IBM locations globally. The results of this testing

are used in a separate validation audit of the corporate GHG emissions reporting process and data. The results of the latest audits can be found on the IBM environmental reporting, disclosure and verification webpage.

Accidental releases

IBM sites around the world report environmental incidents and accidental releases to IBM management through the company's Environmental Incident Reporting System (EIRS). IBM's environmental incident reporting criteria are equal to or exceed applicable legal reporting requirements, and every event meeting IBM's reporting criteria 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 2014, a total of 11 accidental releases of substances to the environment related to IBM operations were reported through EIRS. Of these, four were to air, five to land, and two to water.

Emissions to the air were four releases of refrigerants due to minor leaks in refrigeration systems. Releases to land were four releases of cooling tower water and one release of chilled water. Releases to water were two releases of chilled water containing additives. The root cause was investigated for all releases and corrective actions were taken as appropriate. None of the releases was 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.

In 2014, IBM received 87 agency visits worldwide with two Administrative Citations issued by the San Jose Department of Environmental Services Watershed Protection Division as a result of two separate incidents at the same site. Both incidents involved an overflow of water from the cooling tower basin that reached nearby storm drains. IBM paid two fines totaling $1,125. Corrective actions were taken to prevent recurrence, including review and revision of site procedures, retraining of personnel, and installing additional automation.

IBM paid two additional fines in 2014 for two Notices of Violation (NOV) issued by the California Regional Water Quality Control Board (RWQCB) in September 2013 associated with groundwater remediation at a former IBM site. The NOVs were for effluent exceedances — one during a National Pollutant Discharge Elimination System (NPDES) sampling event in 2007, and the other resulting from a leak in a pipeline from an extraction well in 2012.The pipeline was repaired and reinforced immediately after the leak was detected. IBM paid two fines of $3,000 each for these incidents.

Over the past five years, IBM has paid seven fines with a total amount of $81,939.

Fines and penalties worldwide
($ in thousands)

	2010	2011	2012	2013	2014
Number	0	0	3	0	4
Fines	$0.0	$0.0	$74.8	$0.0	$7.1

Awards and recognition

United States

2014 Climate Leadership Award

IBM received a 2014 Climate Leadership Award from the US Environmental Protection Agency (EPA), the Association of Climate Change Officers, the Center for Climate and Energy Solutions and The Climate Registry. The award recognized IBM for attaining our ambitious greenhouse gas (GHG) emissions reduction goal. IBM received the Climate Leadership Award for three consecutive years, 2012-14.

US EPA ENERGY STAR Certification

IBM's Leadership Data Center in Boulder, Colorado, earned the EPA's ENERGY STAR certification, which signifies that the building performs in the top 25 percent of similar facilities nationwide for energy efficiency and meets strict energy efficiency performance levels set by the EPA. This is IBM's first ENERGY STAR certified data center.

US EPA Environmental Merit Award

IBM Burlington, Vermont, was recognized with a 2015 Environmental Merit Award from the EPA for the site's efforts in reducing GHG emissions by more than 30 percent from 2010, while increasing semiconductor production. The projects that contributed to those reductions included modifications to semiconductor process equipment to significantly reduce the process gas flow, heat transfer fluid replacement and substituting gases with lower GHG potential into semiconductor chamber clean operations.

Vermont Governor's Award

IBM Burlington, Vermont, received two 2015 Vermont Governor's Awards for Environmental Excellence. One award was for the site's GHG emissions reduction efforts, and the second recognized the site's resource optimization at the industrial wastewater treatment plant. The optimization allowed significant reductions of electricity to run the plant, while improving process reliability and performance. IBM is the only entity in Vermont to receive the governor's recognition every year since the award program was established in 1993 — 22 consecutive years.

Most Valuable Pollution Prevention Award

IBM's Burlington, Vermont, site received a 2014 Most Valuable Pollution Prevention (MVP2) Award from the National Pollution Prevention Roundtable for resource optimization in our industrial waste water treatment plant, which resulted in reduced energy and chemical usage while maintaining water quality. This was the seventh time the IBM Burlington site has been recognized with an MVP2 Award.

Environment Achievement Award

IBM Rochester, Minnesota, received an Environmental Achievement Award from Olmsted County and Rochester Public Utilities for the site's outstanding promotion of conservation. The award recognized IBM Rochester's work on chiller optimization and Smarter Buildings.

Hong Kong

Platinum Rating in Certificate of Energy Performance Recognition Scheme

IBM China/Hong Kong was recognized for achieving a platinum rating in the Certificate of Energy Performance Recognition Scheme for office occupants in multi-tenant office buildings from the Hong Kong Green Building Council Limited.

Class of Excellence Wastewi$e Label

IBM Hong Kong received the "Class of Excellence" Wastewi$e label for our commitment to environmental protection and waste reduction in the Hong Kong Awards for Environmental Excellence.

India

Golden Peacock Award for Sustainability

IBM India received the Golden Peacock Award for Sustainability in 2014 from the Institute of Directors, India. The award recognized IBM for integrating sustainable development into its business strategy and operations, and for applying our expertise, research and technology to develop solutions that help our company, our clients, and the world to address environmental challenges and operate in ways that are more efficient and sustainable.

Japan

Reduce, Reuse and Recycle Award

IBM Japan received a Reduce, Reuse, and Recycle (3Rs) Award for sustainable IT management practices from the 3Rs Promotion Council in Japan. The award recognized IBM Japan's reuse and recycling of end-of-life IT equipment and comprehensive contributions to resource and energy conservation.

Mexico

Environmental Excellence Award

In June 2015, IBM Mexico was recognized with the Environmental Excellence Award from the Mexican Federal Environmental Protection and Enforcement Agency (PROFEPA) for our outstanding commitment to environmental protection, preservation and social responsibility, and for our continuous improvements in environmental performance. IBM's implementation of EPA's SmartWay program for all our shipments of goods in Mexico, and the development and execution of two Smarter Cities projects, were among the programs and projects recognized by the award. IBM Mexico has been certified under PROFEPA's Clean Industry Program since 2005.

Philippines

Outstanding Energy Award

IBM Philippines received an Outstanding Energy Award from the Philippine Department of Energy in the 2014 Don Emilio Abello Energy Efficiency Awards for their energy savings and carbon dioxide (CO_2) avoidance.

Environmental performance summary

IBM maintains goals covering the range of its environmental programs, including climate protection, energy and water conservation, pollution prevention, waste management, and product stewardship. These goals and our performance against them are discussed in this report. The goals identified here as key performance indicators (KPIs) are based on stakeholder interest and materiality. IBM considers all of its goals to be important metrics of the company's performance against its commitment to environmental protection.

KPI Denotes Key Performance Indicator

Energy conservation KPI

IBM's goal is to achieve annual energy conservation savings equal to 3.5 percent of IBM's total energy use. In 2014 IBM again achieved this goal, attaining a 6.7 percent savings from its energy conservation projects.

Energy conservation	2010	2011	2012	2013	2014
As % of total electricity use	5.7	7.4	6.5	6.7	6.7

Product energy efficiency KPI

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. Please see the product stewardship goals and performance table on page 25.

Recycled plastics

In 2014, 17.1 percent of the plastic resins procured by IBM and its suppliers through IBM's corporate contracts for use in IBM's products were resins that contained 50-100 percent recycled content. Comparing only the weight of the recycled fraction of these resins to the total weight of plastics (virgin and recycled) purchased, 12.1 percent of IBM's total plastic purchases in 2014 were recycled plastic versus the corporate goal of 5 percent.

Recycled plastics	2010	2011	2012	2013	2014
% of total plastics procured through IBM contracts for use in its products that have been recycled	11.5	12.4	12.6	10.8	12.1

Product end-of-life management

IBM's goal is to reuse or recycle end-of-life IT products such that the amount of product waste sent by IBM's product end-of-life management (PELM) operations to landfills or incineration for treatment does not exceed a combined 3 percent of the total amount processed.

In 2014, IBM's PELM operations sent only 0.5 percent of the total processed to landfill or incineration facilities for treatment.

Product end-of-life management KPI	2010	2011	2012	2013	2014
% of total processed sent by IBM's PELM operations to landfill or incineration for treatment	0.6	0.4	0.3	0.3	0.5

Hazardous waste management

IBM's goal is to achieve year-to-year reduction in hazardous waste generated from IBM's manufacturing processes, indexed to output. IBM's hazardous waste generation indexed to output decreased by 1.7 percent in 2014. The primary factor for this decrease was a reduction in sludge containing fluoride and heavy metals from wastewater treatment at one manufacturing site.

Hazardous waste management	2010	2011	2012	2013	2014
% change in hazardous waste generated from manufacturing operations indexed to output	-21.6	-3.5	+2.9	+4.2	-1.7

Nonhazardous waste recycling

Our voluntary environmental goal is to send an average of 75 percent of the nonhazardous waste generated at locations managed by IBM to be recycled. In 2014, we recovered and recycled 86 percent of our nonhazardous waste.

Nonhazardous waste recycling	2010	2011	2012	2013	2014
% recycled of total generated	79	78	87	86	86

Water conservation

IBM's goal is to achieve annual water savings equal to 2 percent of total annual water usage in microelectronics manufacturing operations, based on the water usage of the previous year and measured as an average over a rolling five-year period. In 2014, new water conservation and ongoing reuse and recycling initiatives in IBM's microelectronics operations achieved an annual 3.3 percent savings in water use, resulting in a rolling five-year average of a 2.3 percent savings versus the 2 percent goal.

Water conservation	2010	2011	2012	2013	2014
% annual water savings in microelectronics manufacturing based on previous year usage and measured as an average over a rolling five-year period	2.8	2.6	2.2	2.3	2.3

IBM environmental affairs policy

IBM is committed to environmental affairs leadership in all of its business activities. IBM has had longstanding 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.

IBM Corporate Environmental Affairs
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Please Recycle