



UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

DIVISION OF
CORPORATION FINANCE

January 5, 2016

Stephen L. Burns
Cravath, Swaine & Moore LLP
sburns@cravath.com

Re: International Business Machines Corporation

Dear Mr. Burns:

This is in regard to your letter dated January 5, 2016 concerning the shareholder proposal submitted by Jantz Management LLC on behalf of Christine Jantz for inclusion in IBM's proxy materials for its upcoming annual meeting of security holders. Your letter indicates that the proponent has withdrawn the proposal and that IBM therefore withdraws its December 18, 2015 request for a no-action letter from the Division. Because the matter is now moot, we will have no further comment.

Copies of all of the correspondence related to this matter will be made available on our website at <http://www.sec.gov/divisions/corpfin/cf-noaction/14a-8.shtml>. For your reference, a brief discussion of the Division's informal procedures regarding shareholder proposals is also available at the same website address.

Sincerely,

Adam F. Turk
Special Counsel

cc: Mari C. Schwartzer
Jantz Management LLC
mari@jantzmgmt.com

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OF COUNSEL
MICHAEL L. SCHLER

January 5, 2016

International Business Machines Corporation
Shareholder Proposal of Christine Jantz
Securities Exchange Act of 1934—Rule 14a-8

Ladies and Gentlemen:

I am writing on behalf of our client, International Business Machines Corporation, a New York corporation (the "Company" or "IBM"), to advise the Staff of the Division of Corporation Finance (the "Staff") of the Securities and Exchange Commission that at the Company's direction we are formally withdrawing our request that the Staff concur in our view that the Company may properly exclude the shareholder proposal and supporting statement (collectively, the "Proposal") submitted by Jantz Management LLC on behalf of Christine Jantz, President of Jantz Management LLC (the "Proponent"), from the proxy materials to be distributed by the Company in connection with its 2016 annual meeting of shareholders (the "2016 proxy materials").

I am withdrawing our request of the Staff in light of the fact that the Proponent has withdrawn the Proposal and no longer seeks to have it included in the 2016 proxy materials. A copy of the correspondence between the Proponent and IBM, including the Proponent's withdrawal letter dated January 5, 2016, is set forth in Exhibit A.

If the Staff has any questions with respect to the foregoing, please do not hesitate to contact me at (212) 474-1146 or sburns@cravath.com. Please copy William P. Rogers, Jr. (wrogers@cravath.com) and Stuart Moskowitz (smoskowi@us.ibm.com), Senior Counsel of the Company, on any related correspondence. Any correspondence may also be sent to us via facsimile. My fax number is (212) 474-3700 and Mr. Moskowitz's fax number is (845) 491-3203.

Thank you for your attention to this matter.

Sincerely,



Stephen L. Burns

Office of Chief Counsel
Division of Corporation Finance
Securities and Exchange Commission
100 F Street, NE
Washington, DC 20549

VIA FEDEX AND EMAIL: shareholderproposals@sec.gov

Encls. Copies w/encls. to:

Stuart S. Moskowitz
Senior Counsel
International Business Machines Corporation
Corporate Law Department
1 New Orchard Road, Mail Stop 301
Armonk, New York 10504

VIA FEDEX

and

Christine Jantz
President
Jantz Management LLC
470 Atlantic Avenue
FL 4
Boston, Massachusetts 02210-2241

VIA FEDEX

Exhibit A

Correspondence Between the Proponent and IBM

[see attached]



Withdrawal request (Jantz Mgmt)
Mari Schwartzer to: Stuart Moskowitz
Cc: Christine Jantz

01/05/2016 10:39 AM

History: This message has been replied to.

1 attachment



IBM_Jantz request for withdrawal_2016 (letterhead).pdf

Hi Stu,

Please see the attached letter. We look forward to your reply.

Sincerely,

Mari

Mari Schwartzer

Coordinator of Shareholder Services

mari@jantzmgt.com

Jantz Management LLC

Responsible Quantitative Value Investing™

January 5, 2016

Stuart S. Moskowitz
Senior Counsel, IBM Legal Department
International Business Machines Corporation
1 New Orchard Road
Mail Stop 329
Armonk, NY 10504

Via email: smoskowi@us.ibm.com

Re: Withdrawal of shareholder proposal for 2016 annual meeting

Dear Mr. Moskowitz:

Jantz Management LLC is prepared to withdraw the resolution filed on behalf of Christine Jantz entitled "Net-Zero Greenhouse Gas Emissions by 2030," contingent upon IBM withdrawing its no-action request at the Securities and Exchange Commission.


Please let us know via email (mari@jantzmgmt.com) whether IBM is amenable to this mutual withdrawal. We respectfully request notification by close of business on Wednesday, January 6th, 2016.

Sincerely,



Mari C. Schwartzer
Coordinator of Shareholder Services



Re: Withdrawal request (Jantz Mgmt) 
Stuart Moskowitz to: Mari Schwartzter
Cc: Christine Jantz
Bcc: cmontgom

01/05/2016 11:54 AM

Thank you for your letter. We appreciate your consideration in this matter, and your offer to withdraw your stockholder proposal.

IBM is fully amenable to withdrawing its no-action letter request in accordance with the SEC's procedures for withdrawals. In order for a withdrawal to be able to occur, this is what needs to be done:

1) First, Jantz Management LLC needs to send a letter to IBM, stating simply that:

Jantz Management LLC withdraws its IBM stockholder proposal dated October 21, 2015 entitled Net-Zero Greenhouse Gas Emissions by 2030.

2) IBM will take your withdrawal letter, append it to a separate letter we will send on to the SEC's Division of Corporation Finance (copying you), and state to the SEC that Jantz Management has withdrawn its IBM stockholder proposal, and as a result, IBM requests that our no-action letter request be withdrawn.

3) The SEC's Division of Corporation Finance, in turn, will process IBM's request to withdraw our no-action letter request, and, assuming that our request has not already been ruled on, will confirm in writing to both IBM and Jantz Management LLC that because the matter is moot, the Division will have no further comment.

This process typically takes at least a few days to finalize, but IBM will act promptly upon receipt of your withdrawal letter (which can be sent directly to my attention via e-mail).

Please let me know if you have any questions.

Thank you again for your assistance and attention in resolving this matter with us.

Stuart S. Moskowitz
Senior Counsel, IBM Legal Department
1 New Orchard Road, MS 329
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smoskowi@us.ibm.com
914-499-6148 (tel)

PREPARED BY IBM ATTORNEY / PRIVILEGE REVIEW REQUIRED

This e-mail and its attachments, if any, may contain information that is private, confidential, or protected by attorney-client, solicitor-client or other privilege. If you received this e-mail in error, please delete it from your system without copying it and notify me of the misdirection by reply e-mail.

Mari Schwartzter

Hi Stu, Please see the attached letter. We look f...

01/05/2016 10:39:14 AM

From: Mari Schwartzter <mari@jantzmgmt.com>
To: Stuart Moskowitz/Armonk/IBM@IBMUS
Cc: Christine Jantz <jantz@jantzmgmt.com>

Date: 01/05/2016 10:39 AM
Subject: Withdrawal request (Jantz Mgmt)

Hi Stu,

Please see the attached letter. We look forward to your reply.

Sincerely,

Mari

Mari Schwartzer

Coordinator of Shareholder Services

mari@jantzmgmt.com

Jantz Management LLC

Responsible Quantitative Value Investing TM

PDF



IBM_Jantz request for withdrawal_2016 (letterhead).pdf



Re: Withdrawal request (Jantz Mgmt)
Mari Schwartzer to: Stuart Moskowitz
Cc: Christine Jantz

01/05/2016 12:06 PM

History: This message has been forwarded.

1 attachment



IBM_Jantz_withdrawal_2016.pdf

Hi Stu,

Thank you for your email. Attached, please find our withdrawal letter. Please let me know if anything further is required.

Sincerely,
Mari

Mari Schwartzer
Coordinator of Shareholder Services
mari@jantzmgmt.com

Jantz Management LLC
Responsible Quantitative Value Investing TM

On Tue, Jan 5, 2016 at 11:54 AM, Stuart Moskowitz <smoskowi@us.ibm.com> wrote:

Thank you for your letter. We appreciate your consideration in this matter, and your offer to withdraw your stockholder proposal.

IBM is fully amenable to withdrawing its no-action letter request in accordance with the SEC's procedures for withdrawals. In order for a withdrawal to be able to occur, this is what needs to be done:

1) First, Jantz Management LLC needs to send a letter to IBM, stating simply that:

Jantz Management LLC withdraws its IBM stockholder proposal dated October 21, 2015 entitled Net-Zero Greenhouse Gas Emissions by 2030.

2) IBM will take your withdrawal letter, append it to a separate letter we will send on to the SEC's Division of Corporation Finance (copying you), and state to the SEC that Jantz Management has withdrawn its IBM stockholder proposal, and as a result, IBM requests that our no-action letter request be withdrawn.

3) The SEC's Division of Corporation Finance, in turn, will process IBM's request to withdraw our no-action letter request, and, assuming that our request has not already been ruled on, will confirm in writing to both IBM and Jantz Management LLC that because the matter is moot, the Division will have no further comment.

This process typically takes at least a few days to finalize, but IBM will act promptly upon receipt of your withdrawal letter (which can be sent directly to my attention via e-mail).

Please let me know if you have any questions.

Thank you again for your assistance and attention in resolving this matter with us.

Stuart S. Moskowitz
Senior Counsel, IBM Legal Department
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PREPARED BY IBM ATTORNEY / PRIVILEGE REVIEW REQUIRED

This e-mail and its attachments, if any, may contain information that is private, confidential, or protected by attorney-client, solicitor-client or other privilege. If you received this e-mail in error, please delete it from your system without copying it and notify me of the misdirection by reply e-mail.

From: Mari Schwartzer <mari@jantzmgmt.com>
To: Stuart Moskowitz/Armonk/IBM@IBMUS
Cc: Christine Jantz <jantz@jantzmgmt.com>
Date: 01/05/2016 10:39 AM
Subject: Withdrawal request (Jantz Mgmt)

Hi Stu,
Please see the attached letter. We look forward to your reply.

Sincerely,
Mari

Mari Schwartzer
Coordinator of Shareholder Services
mari@jantzmgmt.com

Jantz Management LLC
Responsible Quantitative Value Investing TM

January 5, 2016

Stuart S. Moskowitz
Senior Counsel, IBM Legal Department
International Business Machines Corporation
1 New Orchard Road
Mail Stop 329
Armonk, NY 10504

Via email: smoskowi@us.ibm.com

Re: Withdrawal of shareholder proposal for 2016 annual meeting

Dear Mr. Moskowitz:

Jantz Management LLC withdraws its IBM stockholder proposal dated October 21, 2015 entitled Net-Zero Greenhouse Gas Emissions by 2030.

Sincerely,



Christine Jantz, CFA
President
Jantz Management LLC

Cravath, Swaine & Moore LLP

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OF COUNSEL
MICHAEL L. SCHLER

December 18, 2015

International Business Machines Corporation
Shareholder Proposal of Christine Jantz
Securities Exchange Act of 1934—Rule 14a-8

Ladies and Gentlemen:

I am writing on behalf of our client, International Business Machines Corporation, a New York corporation (the “Company” or “IBM”), in accordance with Rule 14a-8(j) of the Securities Exchange Act of 1934, as amended. The Company is seeking to exclude a shareholder proposal and supporting statement (collectively, the “Proposal”) submitted by Jantz Management LLC on behalf of Christine Jantz, President of Jantz Management LLC (the “Proponent”), from the proxy materials to be distributed by the Company in connection with its 2016 annual meeting of shareholders (the “2016 proxy materials”). For the reasons set forth below, we respectfully request that the Staff of the Division of Corporation Finance (the “Staff”) of the Securities and Exchange Commission (the “Commission”) confirm that it will not recommend enforcement action if the Company excludes the Proposal from the 2016 proxy materials. The Company has advised us as to the factual matters set forth below.

Pursuant to Rule 14a-8(j) and in accordance with *Staff Legal Bulletin 14D* (Nov. 7, 2008) (“SLB 14D”), we have:

- filed this letter with the Commission no later than eighty (80) calendar days before the Company intends to file its definitive 2016 proxy materials with the Commission; and
- concurrently sent copies of this correspondence to the Proponent by FedEx as notice of the Company’s intent to exclude the Proposal from the 2016 proxy materials.

Rule 14a-8(k) and SLB 14D provide that shareholder proponents are required to send companies a copy of any correspondence that the proponents elect to

submit to the Commission or the Staff. Accordingly, the Company is taking this opportunity to inform the Proponent that if the Proponent elects to submit additional correspondence to the Commission or the Staff with respect to the Proposal, a copy of that correspondence should be furnished concurrently to the undersigned on behalf of the Company and to Stuart Moskowitz, Senior Counsel of the Company.

THE PROPOSAL

The resolution included in the Proposal reads as follows:

“RESOLVED: Shareholders request that the Board of Directors generate a feasible plan for the Company to reach a net-zero greenhouse gas emission status by the year 2030 for all aspects of the business which are directly owned by the Company, including but not limited to manufacturing and distribution, research facilities, corporate offices, and employee travel, and to report the plan to shareholders at reasonable expense, excluding confidential information, by September 2016.”

A copy of the resolution included in the Proposal, the related supporting statement (the “Supporting Statement”) and related correspondence from the Proponent is set forth in Exhibit A.

BASES FOR EXCLUSION

On behalf of the Company, we respectfully request that the Staff concur in the Company’s view that it may exclude the Proposal from the 2016 proxy materials pursuant to:

- Rule 14a-8(i)(7) because the Proposal deals with a matter relating to the Company’s ordinary business operations; and
- Rule 14a-8(i)(10) because the Company has already substantially implemented the Proposal.

ANALYSIS

- I. The Proposal may be excluded pursuant to Rule 14a-8(i)(7) because it deals with a matter relating to the Company’s ordinary business operations.**

A. Background

Rule 14a-8(i)(7) permits a company to exclude a shareholder proposal from its proxy materials if it deals with a matter relating to the company’s ordinary business operations. In the Commission’s release accompanying the 1998 amendments to Rule 14a-8, the Commission stated that the general policy underlying Rule 14a-8(i)(7) is “to confine the resolution of ordinary business problems to management and the board of directors, since it is impracticable for shareholders to decide how to solve such problems at an annual shareholders meeting.” *SEC Release No. 34-40018 (May 21,*

1998) (the “1998 Release”). The 1998 Release stated that the ordinary business exclusion rests on two central considerations. The first consideration relates to the subject matter of the proposal. The Commission explained that, “Certain tasks are so fundamental to management’s ability to run a company on a day-to-day basis that they could not, as a practical matter, be subject to direct shareholder oversight.” *Id.* The second consideration relates “to the degree to which the proposal seeks to ‘micro-manage’ the company by probing too deeply into matters of a complex nature upon which shareholders, as a group, would not be in a position to make an informed judgment.” *Id.* The 1998 Release identified a proposal that “involves intricate detail, or seeks to impose specific time-frames or methods for implementing complex policies” as an example of a proposal that may micro-manage the company. *Id.*

In the 1998 Release, the Commission further stated that “proposals relating to [ordinary business] matters but **focusing** on sufficiently significant social policy issues ... generally would not be considered to be excludable”. *1998 Release (emphasis added)*. The Staff has noted that, “In those cases in which a proposal’s underlying subject matter transcends the day-to-day business matters of the company and raises policy issues so significant that it would be appropriate for a shareholder vote, the proposal generally will not be excludable under Rule 14a-8(i)(7) **as long as a sufficient nexus exists** between the nature of the proposal and the company.” *Staff Legal Bulletin 14E (Oct. 27, 2009) (“SLB 14E”) (emphasis added)*. “Conversely, in those cases in which a proposal’s underlying subject matter involves an ordinary business matter to the company, the proposal generally will be excludable under Rule 14a-8(i)(7).” *Id.*

As described in detail below, (1) the Proposal seeks to micro-manage the Company’s business by imposing a specific time-frame and promoting specific methodologies for implementing a complex policy involving a target emission status of “net-zero greenhouse gas emissions” (which lacks a standard definition) and operational and technology choices by the Company, (2) although the Proposal relates to a significant policy issue, the focus of the Proposal is on the Company’s specific operational choices and (3) the nexus between the nature of the Proposal and the business of the Company is not sufficient to overcome the micro-management of the Company’s business. Accordingly, the Company believes that the Proposal may be properly excluded from the 2016 proxy materials pursuant to Rule 14a-8(i)(7).

B. The Proposal imposes a specific time-frame and promotes specific methodologies for implementing a complex policy, and therefore seeks to impermissibly micro-manage the Company’s business.

The Staff has previously concurred in the exclusion of proposals that sought reports relating to the company’s choices of processes and technologies used in the preparation of a company’s products on the basis that such proposals relate to a company’s ordinary business operations. In *FirstEnergy Corp. (Mar. 8, 2013)* (“FirstEnergy 2013”), the Staff concurred that a proposal requesting a report regarding diversification of the company’s energy resources to include increased energy efficiency and renewable energy resources could be excluded, because it concerned the company’s “choice of technologies” for use in its operations. Importantly, the Proposal requests

more of the Company than merely a report on a topic similar to the report contemplated by the proposal at issue in *FirstEnergy 2013*. The Proposal would direct the board of directors to “generate a feasible plan for the Company to reach a net-zero greenhouse gas emissions status by the year 2030”. By its terms, the Proposal requires a specific calculation (“net-zero”) by a specific deadline (year 2030). The Proponent goes on to indicate in the Supporting Statement how “net-zero greenhouse gas emissions” should be defined, calculated and ultimately implemented by 2030. As in *FirstEnergy 2013*, decisions relating to the mix of resources used to source electricity, operate plants and otherwise conduct business necessarily concern the Company’s choice of processes, technologies and materials for use in its operations. For these reasons, the Proposal implicates exactly the type of day-to-day business operations that the 1998 Release indicated are too impractical and too complex to subject to direct shareholder oversight (i.e., the alteration of technology, energy source production, supply chain and other operational choices by the Company).

The Company recognizes that proposals that relate to the preparation of an action plan but leave the determination of specific targets to the discretion of management may not be excludable. In *FirstEnergy Corp. (Mar. 4, 2015)* (“*FirstEnergy 2015*”), the Staff declined to concur that a company could exclude a proposal requesting the company to “create specific, quantitative, time bound carbon dioxide reduction goals to decrease the company’s corporate carbon dioxide emissions”. Counsel for the proponents argued that the proposal did not micro-manage the company because, among other things, the proposal did not “mandate what quantitative goals should be adopted, or how the quantitative targets should be set” and “[t]he simple question of whether a company should adopt and report on greenhouse gas reduction targets is easily understood by shareholders”. *FirstEnergy 2015*. In addition, to the extent specific renewable energy targets were advanced in proposals that the Staff have found to be not excludable, such targets were typically provided in the form of a range. For example, in *Exxon Mobil Corporation (Mar. 12, 2007)* (“*Exxon Mobil (Mar. 12, 2007)*”), the Staff declined to concur that the company could exclude a proposal that requested the company to “adopt a policy of significantly increasing renewable energy sourcing globally, with recommended goals in the range of between 15%-25% of its energy sourcing by between 2015-2025”.

In contrast to the proposals in *FirstEnergy 2015* and *Exxon Mobil (Mar. 12, 2007)*, the Proposal requests that the Company adopt a “net-zero” greenhouse gas emission status by the year 2030 and, through the Supporting Statement, seeks to dictate how the Company should define “net-zero greenhouse gas emissions” and reach that goal. Moreover, the Proponent, without the benefit of any detailed knowledge of the Company’s worldwide business operations or energy requirements, requests that the plan apply “for all aspects of the business which are directly owned by the Company”. The Company is engaged in the global provision of technological services. As part of the Company’s efforts to achieve greater efficiency and responsiveness to market conditions, the Company spends billions of dollars annually through its supply chain, procuring materials and services from thousands of vendors and suppliers around the world. Energy is one of many such items. The amount and reliability of energy needed to run the Company’s business operations, meet Company production and service commitments,

and satisfy the needs of its customers includes the energy necessary to power the Company's own office environments, its manufacturing plants and the data centers its customers depend on to run their operations around the clock. As such, the broad scope of the Proposal is directly tied to, and a function of, facility-level operational decisions, which falls squarely within the parameters of micro-management of matters of a complex nature that were contemplated by the 1998 Release.

Moreover, evaluating and deploying strategies to reduce greenhouse gas emissions involves an intricate process that concerns, among other things, testing of new technologies, assessing scientific information, market analysis, budgeting, financial engineering, capital expenditures, permitting, construction and regulatory compliance. This is true for the Company as well as the clients it serves. These highly technical issues require the expertise of the Company's management and are fundamental to the operation of the Company's business in the ordinary course.

As stated by the Company in an article shared with the Proponent, "Sustainability has long been a credo of IBM, which for decades has maintained a continual, unambiguous commitment to environmental leadership." *A Quantum Leap, The Environmental Forum, 31(2), 28-33 (Mar. / Apr. 2014)* (the "Article"). A copy of the Article is set forth in Exhibit B. Moreover, the Company is a worldwide leader in developing complex solutions to enable city governments, utility companies and factories to better understand and reduce their impact on the environment. *IBM Expands Green Horizons Initiative Globally To Address Pressing Environmental and Pollution Challenges, IBM (Dec. 9, 2015)* (the "Press Release"). A copy of the Press Release is set forth in Exhibit C.

The Company has long committed to energy conservation and efficiency in its operations, and its management regularly reevaluates the Company's policies, practices and procedures relating to environmental preservation and sustainable growth opportunities. The Article provides an overview of the comprehensive, global work involving, among other things, collaboration among technical professionals across business units and staff functions that is required to develop and execute the Company's energy efficiency and conservation strategies. In addition, the Company stated in the Article that, "All [energy conservation] projects underwent financial analyses to assure they made good business sense and were approved through IBM's established financial review process." In this context, the setting of specific carbon dioxide emissions targets and the choice of implementation strategies involve complex operational decisions. For example, in pursuing its articulated energy conservation and efficiency goals, the Company has adopted a policy to avoid purchasing unbundled renewable energy certificates and/or non-energy offsets. Because certain emissions offsets involve indirect reductions through financial products and markets, purchasing such offsets is a less reliable, verifiable and transparent means of achieving reductions in overall emissions and, as a result, is less desirable and sustainable strategically and economically, both in terms of addressing climate change and generating returns to shareholders. In addition, because corporate resources are finite, any money spent on purchasing such offsets necessarily would reduce direct investment in related research and development that would not only take advantage of the Company's unique expertise and provide direct

benefit to the Company and its shareholders but, over the long term, could effect greater and more sustainable sources of greenhouse gas reductions for the Company's clients, governments and society at large. As a result, the Company firmly believes that climate change is best addressed by directly avoiding or reducing – and not generating and attempting to offset through certain negative emissions strategies – greenhouse gas emissions. The Company aims to prevent and / or reduce actual emissions reductions rather than pursue mechanisms for claiming neutrality. Furthermore, the Company does not set specific goals such as achieving “net-zero” greenhouse gas emission status for the sake of having goals without considering feasibility, market realities and business needs. As such, the Proposal is not aligned with the emission reduction strategy currently employed by the Company, and the breadth of the Proposal would require detailed analysis of the decisions, strategies and plans relating to the operations of the Company, including an examination of the decisions, strategies and plans considered and implemented at each individual business directly owned by the Company. The Proposal therefore requires exactly the sort of complex decision-making that is beyond the ability of the shareholders, as a group, to determine by means of a shareholder proposal such as the Proposal.

A commitment to a “net-zero” greenhouse gas emission status by year 2030 that is not based on a company's individual circumstances, such as its greenhouse gas footprint, and/or that it may not otherwise be required to make under existing regulations, could ultimately require management to make unnecessary or ill-advised production or investment decisions that are not in the Company's or its shareholders' long-term best interests. The Proposal clearly seeks to significantly impact the Company's business model and strategy as it relates to sources of energy. Indeed, reporting the progress toward reaching “net-zero” greenhouse gas emission status would necessarily require the very “intricate detail” referred to in the 1998 Release in this highly complex and technical calculation. In this connection, as described in a technical report prepared by an IBM distinguished engineer on the Corporate Environmental Affairs staff, a single, uniformly accepted definition of “net-zero greenhouse gas emissions” does not currently exist. *IBM Technical Report (December 17, 2015)* (the “Technical Report”). The Technical Report is attached hereto as Exhibit D.

The Proposal, if implemented, would also severely limit the Company's ability to make day-to-day energy decisions which are fundamental to operating its business effectively and efficiently. Conducting the Company's operations in a way that complies with or exceeds applicable laws and regulations, while meeting customer demands and creating shareholder value, is a complex and fundamental task that the Company's management deals with on a day-to-day basis. The requirements of the Proposal would not only burden the Company's management and divert resources and attention away from the environmental priorities that the Company's board of directors and management deem to be in the best interests of the Company and its shareholders (i.e., avoidance or reduction of greenhouse gas emissions through execution of energy conservation projects and procurement of electricity generated from renewable sources, which also may provide direct and/or longer term benefits to the Company, and not offsetting through the use of certain negative emissions strategies), but would transfer responsibility for critical operational and production decision-making from management

to the shareholders. Such micro-management of a complex matter interferes with the Company's ordinary course of business and is the sort of proposal that the 1998 Release sought to exclude.

C. Although the Proposal relates to a significant policy issue, the focus of the Proposal is on the Company's specific operational choices.

In the 1998 Release, the Commission stated that, "proposals relating to [ordinary business] matters but **focusing** on sufficiently significant social policy issues ... generally would not be considered to be excludable." *1998 Release (emphasis added)*. The Company recognizes that climate change represents a significant policy issue. However, the mere fact that a proposal relates to a significant policy issue does not mean that it focuses on such an issue. Rather, the focus of the Proposal is on the specific operational choices the Company has made and will continue to need to make without direct shareholder involvement. For example, in *FirstEnergy 2013*, the Staff concurred that the proposal requesting a report "on actions the company is taking or could take to reduce risk throughout its energy portfolio by diversifying the company's energy resources to include increased energy efficiency and renewable energy resources" could be excluded pursuant to Rule 14a-8(i)(7), even though the Proponent framed the proposal in the context of climate change as a significant policy issue. *See also Dominion Resources, Inc. (Feb. 3, 2011)* (concurring that the company could exclude a proposal requesting that it initiate a financing program for rooftop solar or wind power); *Assurant, Inc. (Mar. 17, 2009)* (concurring that the company could exclude a proposal calling for a report on the company's plans to address climate change); *Foundation Coal Holdings, Inc. (Mar. 11, 2009)* (concurring that the company could exclude a proposal calling for a report on how the company is responding to rising regulatory and public pressure to significantly reduce the social and environmental harm associated with carbon dioxide emissions from its operations and from the use of its primary products); *General Electric Co. (Jan. 9, 2009)* (concurring that the company could exclude a proposal calling for a report on the costs and benefits of divesting the company's nuclear energy investment and instead investing in renewable energy); *Centex Corporation (May 14, 2007)* (concurring that the company could exclude a proposal calling for management to assess how the company is responding to rising regulatory, competitive and public pressure to address climate change); *Ryland Group, Inc. (Feb. 13, 2006)* (concurring that the company could exclude a proposal calling for a report on the company's response to rising regulatory, competitive and public pressure to increase energy efficiency); and *American International Group, Inc. (Feb. 11, 2004)* (concurring that the company could exclude a proposal calling for a report providing a comprehensive assessment of strategies to address the impacts of climate change on the company's business).

D. The nexus between the nature of the Proposal and the business of the Company is not sufficient to overcome the micro-management of the Company's business.

The Staff has noted that, "In those cases in which a proposal's underlying subject matter transcends the day-to-day business matters of the company and raises policy issues so significant that it would be appropriate for a shareholder vote, the proposal generally will not be excludable under Rule 14a-8(i)(7) **as long as a sufficient**

nexus exists between the nature of the proposal and the company.” *SLB 14E (emphasis added)*. See *DTE Energy Co. (Jan. 26, 2015)* (“DTE Energy”) (declining to concur that the company could exclude a proposal requesting an assessment on how the company is adapting or could adapt its business model to enable increased deployment of distributed low-carbon electricity generation resources as a means to reduce greenhouse gas emissions); *Devon Energy Corp. (Mar. 19, 2014)* (“Devon Energy”) (declining to concur that the company could exclude a proposal requesting a report on the company’s goals and plans to address global concerns regarding the contribution of fossil fuel use to climate change because it focused on the significant policy issue of climate change); and *Exxon Mobil Corporation (Mar. 23, 2007)* (“Exxon Mobil (Mar. 23, 2007)”) (declining to concur that the company could exclude a proposal requesting the company to adopt quantitative goals for reducing greenhouse gas emissions). However, *DTE Energy, Devon Energy* and *Exxon Mobil (Mar. 23, 2007)* are distinguishable in that each focused on the impact of global climate change concerns on companies that operate in the energy sector (e.g., the business of producing, refining or distributing, or generating electricity from, carbon-based fossil fuels). In contrast, the Company is an information technology company whose mainline business is not to produce or sell fuel or energy.

It is clear that the Company, on one hand, and DTE Energy, Devon Energy and Exxon Mobil, on the other hand, are situated very differently in at least two respects in terms of a nexus to the climate change issue. First, DTE Energy, Devon and Exxon Mobil each are expected to have a much bigger greenhouse gas footprint than the Company and, therefore, contribute much more to climate change concerns. Second, climate change policy, regulation and concerns have, and likely will continue to have, a much greater impact on each of DTE Energy, Devon Energy and Exxon Mobil than the Company, including in respect of regulatory focus, social and political pressure and global demand for their products versus the Company’s products.

Thus, even if the Proposal relates to a significant policy issue, the nexus between the nature of the Proposal (i.e., climate change) and the business of the Company (i.e., providing information technology and solutions) is not sufficient to overcome the Proposal’s micro-management of the Company’s business with respect to this complex matter. Therefore, the Proposal is excludable under Rule 14a-8(i)(7).

II. The Proposal may be excluded pursuant to Rule 14a-8(i)(10) because the Company has already substantially implemented the Proposal.

A. Background

Rule 14a-8(i)(10) permits a company to exclude a shareholder proposal from its proxy materials if “the company has already substantially implemented the proposal”. The Commission stated in 1976 that the predecessor to Rule 14a-8(i)(10) was “designed to avoid the possibility of shareholders having to consider matters which already have been favorably acted upon by the management”. *SEC Release No. 34-12598 (Jul. 7, 1976)*. Originally, the Staff narrowly interpreted this predecessor rule and granted no-action relief only when proposals were “‘fully’ effected” by the company. *SEC Release No. 34-19135 (Oct. 14, 1982)*. By 1983, the Commission recognized that

the “previous formalistic application of [the rule] defeated its purpose” because proponents were successfully convincing the Staff to deny no-action relief by submitting proposals that differed from existing company policy by only a few words. *SEC Release No. 34-20091 (Aug. 16, 1983)*. Therefore, in 1983, the Commission adopted a revised interpretation to the rule to permit the omission of proposals that had been “substantially implemented” (*id*) and subsequently codified this revised interpretation. *SEC Release No. 34-40018 (May 21, 1998)*. The purpose of the exclusion under Rule 14a-8(i)(10) has been described as follows:

“A company may exclude a proposal if the company is already doing—or substantially doing—what the proposal seeks to achieve. In that case, there is no reason to confuse shareholders or waste corporate resources in having shareholders vote on a matter that is moot. In the [Commission’s] words, the exclusion ‘is designed to avoid the possibility of shareholders having to consider matters which have already been favorably acted upon by the management...’”.

William Morley, Editor, Shareholder Proposal Handbook, by Broc Romanek and Beth Young (Aspen Law & Business 2003 ed.), Sec. 23.01[B] at p. 23-4.

Thus, when a company can demonstrate that it has taken actions to address each element of a shareholder proposal, the Staff has concurred that the proposal has been “substantially implemented”. For example, in *The Dow Chemical Co. (Mar. 5, 2008)*, the Staff concurred in the exclusion of a proposal that requested a “global warming report” that discussed how the company’s efforts to ameliorate climate change may have affected the global climate when the company had already made various statements about its efforts related to climate change, which were scattered throughout various corporate documents and disclosures. *See also International Business Machines Corp. (Jan. 4, 2010)* (concurring in the exclusion of a proposal that requested periodic reports of the Company’s “Smarter Planet” initiative where the Company had already reported on those initiatives using a variety of different media, including the Company’s “Smarter Planet” web portal).

Additionally, a company need not implement a proposal in exactly the manner set forth by the proponent in order to exclude the proposal under Rule 14a-8(i)(10). *SEC Release No. 34-40018 and accompanying text (May 21, 1998)*. For example, in *Hewlett-Packard Co. (Steiner) (Dec. 11, 2007)*, the Staff concurred that a proposal requesting that the board permit shareholders to call special meetings was substantially implemented by a proposed bylaw amendment to permit shareholders to call a special meeting unless the board determined that the specific business to be addressed had been addressed recently or would soon be addressed at an annual meeting. Differences between a company’s actions and a shareholder proposal are permitted as long as the company’s actions satisfactorily address the proposal’s essential objectives. For example, in *Johnson & Johnson (Feb. 17, 2006)*, the Staff concurred that a proposal

requesting that the company confirm the legitimacy of all current and future U.S. employees was substantially implemented when the company had verified the legitimacy of 91% of its domestic workforce. *See also Exelon Corp. (Feb. 26, 2010)* (concurring in the exclusion of a proposal that requested a report on different aspects of the company's political contributions when the company had already adopted its own set of corporate political contribution guidelines and issued a political contributions report that, together, provided "an up-to-date view of the [c]ompany's policies and procedures with regard to political contributions") and *Masco Corp. (Mar. 29, 1999)* (concurring in the exclusion of a proposal seeking specific criteria for the company's outside directors after the company had adopted a version of the proposal that included modification and clarifications). The Staff has further explained that "a determination that the company has substantially implemented the proposal depends upon whether [the company's] particular policies, practices and procedures **compare favorably** with the guidelines of the proposal." *Texaco, Inc. (Mar. 28, 1991)* (*emphasis added*).

B. IBM has already substantially implemented the Proposal because its existing policies, practices and procedures "compare favorably with the guidelines" of the Proposal.

The Proponent has asked that the board of directors "generate a feasible plan for the Company to reach a net-zero greenhouse gas emission status by the year 2030 for all aspects of the business which are directly owned by the Company, including but not limited to manufacturing and distribution, research facilities, corporate offices, and employee travel, and to report the plan to shareholders at reasonable expense, excluding confidential information, by September 2016." The Company believes that it may exclude the Proposal because it has already substantially implemented the essential objective of the Proposal, which is to commit to a significant reduction in global greenhouse gas emissions over an accelerated time-frame.

The Company's environmental policies, practices and procedures covering the Company's operations, products and services "compare favorably with the guidelines" of the Proposal and demonstrate that the Company has carefully considered and is proactively addressing the impact of its business on climate change. Pursuant to its corporate policy on environmental affairs, the Company publicly discloses comprehensive information on its environmental programs and performance on its website at <https://www.ibm.com/ibm/environment/>. Certain of its environmental leadership activities are also highlighted in the Company's annual environmental report (the "IBM Environmental Report"), which is in its 25th year of consecutive publication. A copy of the Environmental Report is set forth in Exhibit E. The Company also prepared a presentation regarding energy and climate change for the Proponent, a copy of which is set forth in Exhibit F.

The Company is committed to addressing climate change on two fronts: by improving its own processes and by developing products and providing innovations that lead to energy alternatives and other solutions to climate change for the clients it serves. The Company's commitment to environmental sustainability and its integrated

plan and methodology to reduce greenhouse gas emissions throughout the organization and for the clients it serves are publicly disclosed and include the following:

- IBM has a goal to “achieve annual energy conservation savings equal to 3.5 percent of IBM’s total energy use.” *IBM Environmental Report*.
- IBM has a goal to “[p]rocure 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.” *IBM Environmental Report*. As set forth above, the Company firmly believes that climate change is best addressed by directly avoiding or reducing – and not generating and attempting to offset through certain negative emissions strategies – greenhouse gas emissions.
- IBM has a goal to “[r]educe CO₂ 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.” *IBM Environmental Report*.
- The IBM Environmental Report also includes a six-part strategy to reduce greenhouse gas emissions related to its operations, three tenets of which are “[d]esigning, building, updating and operating facilities, including data centers and manufacturing operations, that optimize their use of energy and materials and minimize GHG [greenhouse gas] emissions”, “[r]equiring our suppliers to maintain an environmental management system that includes energy use and GHG [greenhouse gas] emissions inventories and reduction plans” and “reducing employee commuting and business travel”. *IBM Environmental Report*. This publicly available strategy demonstrates the scope of IBM’s efforts to decrease greenhouse gas emissions for aspects of the business controlled by the Company.
- IBM recently expanded its Green Horizons initiative across four continents. As stated by the Company, “The new Green Horizons engagements apply IBM’s advanced machine learning and Internet of Things (IoT) technologies to ingest and learn from vast amounts of [b]ig [d]ata, constantly self-configuring and improving in accuracy to create some of the world’s most accurate energy and environmental forecasting systems.” *Press Release*.

The Company also tracks and publishes the benefits of certain of its products and solutions that are used by clients to lower greenhouse gas emissions and reduce energy use and costs. These public disclosures, some of which are discussed above, highlight the vast array of environmental leadership activities in which the Company is engaged and include specific time-frames for achieving measurable goals targeted at reducing greenhouse gas emissions across the organization. All of these goals, projects and procedures are aimed at the same essential objective as the Proposal—the significant reduction in global greenhouse gas emissions over an accelerated time-frame. Therefore, the Company’s existing policies, practices and procedures “compare favorably with the guidelines” of the Proposal and the Proposal is therefore excludable under Rule 14a-8(i)(10).

C. IBM has already substantially implemented the Proposal because, using reasonable assumptions, the Company had already achieved better than “net-zero” greenhouse gas emissions in 2014.

As explained above, there is no standard definition for “net-zero” greenhouse gas emissions. However, for the purpose of analyzing the Proposal, and as described in the Technical Report, the Company has reviewed the relevant literature on “net-zero” greenhouse gas emissions that has been published by the organizations referenced in the Proposal. Based on that review, the Company has determined that one acceptable means of addressing its operationally necessary greenhouse gas emissions is to develop and deliver products, solutions and services which enable its clients to avoid or reduce their own operational greenhouse gas emissions. Using reasonable assumptions based on the Company’s experience in assessing the emissions avoided or reduced by the Company and the Company’s clients from the deployment of the products and solutions the Company offers, the Company estimates that, as set out below, during 2014, greenhouse gas emissions avoided or reduced by third parties utilizing only a subset of the Company’s products and solutions exceeded the Company’s own operational emissions including those associated with employee business travel:

2014 IBM Greenhouse Gas Emissions

Emissions attributable to IBM’s operations	2.04 million metric tons (“MT”)
Emissions avoided / reduced by IBM’s technologies and solutions for third parties	<u>2.58 million MT to 4.85 million MT</u>
Amount by which IBM has achieved better than “net-zero” greenhouse gas emissions	(0.54) million MT to (2.81) million MT

See Technical Report.

As set out above, the Company had already achieved better than “net-zero” greenhouse gas emissions in 2014. Furthermore, the Company’s ongoing

environmental efforts to reduce greenhouse gas emissions, including the products and solutions offerings referenced in the Technical Report as well as the expansion of the Company's Green Horizons initiative, strongly suggest that future "net" emissions will fall even further below "net-zero" by the year 2030.

Importantly, the Technical Report provides only a summary; the calculation is highly complex and the Company necessarily used various assumptions as "net-zero" greenhouse gas emissions lacks a standard definition and monitoring and verification approach. Reporting the progress toward reaching this ill-defined goal would necessarily require intricate and highly technical detail that may not be useful to shareholders. As noted above, the Company need not implement the Proposal in exactly the manner set forth by the Proponent in order to exclude the proposal under Rule 14a-8(i)(10). Ultimately, the Proposal aims to address the complex issue of greenhouse gas emissions across the organization and over a specific time-frame. The fact that the Company does not have a specific goal to achieve "net-zero" greenhouse gas emissions by 2030 for the aforementioned reasons does not detract from the Company's current pursuit of an integrated environmental strategy, including the reduction of greenhouse gas emissions to achieve the primary objectives and address the underlying concern of the Proposal.

Since the Company has shown, using reasonable assumptions, that it had already achieved better than "net-zero" greenhouse gas emissions in 2014, it has substantially implemented the Proposal. Therefore, the Proposal is excludable under Rule 14a-8(i)(10).

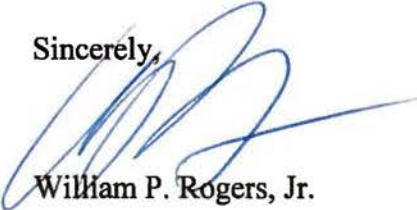
CONCLUSION

Based on the foregoing analysis, the Company respectfully requests that the Staff confirm that it will not recommend enforcement action if the Company excludes the Proposal from its 2016 proxy materials for the reasons set forth above. We would be pleased to provide the Staff with any additional information, and answer any questions that you may have regarding this letter. I can be reached at (212) 474-1270 or wrogers@cravath.com. Please copy Stephen L. Burns (sburns@cravath.com) and Stuart Moskowitz, Senior Counsel of the Company (smoskowi@us.ibm.com), on any related correspondence. Any correspondence may also be sent to us via facsimile. My fax number is (212) 474-3700 and Mr. Moskowitz's fax number is (845) 491-3203. The Proponent's fax number is (617) 273-8018.

We are sending the Proponent a copy of this submission. Rule 14a-8(k) provides that a shareholder proponent is required to send a company a copy of any correspondence that the proponent elects to submit to the Commission or the Staff. As such, the Proponent is respectfully reminded that if it elects to submit additional correspondence to the Staff with respect to this matter, a copy of that correspondence should concurrently be furnished directly to my attention and to the attention of Stuart Moskowitz, Senior Counsel of the Company, in accordance with Rule 14a-8(k). My contact information and Mr. Moskowitz's contact information is noted above.

Thank you for your attention to this matter.

Sincerely,



William P. Rogers, Jr.

Office of Chief Counsel
Division of Corporation Finance
Securities and Exchange Commission
100 F Street, NE
Washington, DC 20549

VIA FEDEX AND EMAIL: shareholderproposals@sec.gov

Encls. Copies w/encls. to:

Stuart S. Moskowitz
Senior Counsel
International Business Machines Corporation
Corporate Law Department
1 New Orchard Road, Mail Stop 301
Armonk, New York 10504

VIA FEDEX

and

Christine Jantz
President
Jantz Management LLC
470 Atlantic Avenue
FL 4
Boston, Massachusetts 02210-2241

VIA FEDEX

Exhibit A

Proposal and Related Correspondence

[see attached]

RECEIVED
OCT 22 2015

 JantzManagement

Responsible Quantitative Value Investing™

October 21, 2015

Christina M. Montgomery, Vice President and Secretary
Office of the Secretary
International Business Machines Corporation
1 New Orchard Road
Mail Drop 301
Armonk, NY 10504

Re: Shareholder Proposal for 2016 Annual Meeting

Dear Ms. Montgomery:


Jantz Management LLC is filing the enclosed shareholder proposal regarding International Business Machines Corporation's greenhouse gas emissions program on behalf of me, as an individual shareholder. Jantz Management LLC is a Boston-based investment management firm providing discretionary investment services to separately managed accounts, pensions and profit sharing plans, trusts and estates, foundations and charities, and corporations and other business entities.

As an individual shareholder, I am a beneficial owner, as defined under Rule 13(d)-3 of the General Rules and Regulations under the Securities Act of 1934 having held more than \$2,000 worth of shares of International Business Machines Corporation (IBM) common stock held for more than one year. I will continue to hold the requisite number of shares through the date of the next stockholders' annual meeting. Proof of ownership will be provided within the next 15 business days. I will send a representative to introduce the proposal.

I believe that this proposal is in the best interest of our Company and its shareholders. I look forward to discussing the matter in greater detail.

I would appreciate confirmation of receipt of this proposal by mail or email (jantz@jantzmgmt.com).

Sincerely,



Christine Jantz, CFA
President
Jantz Management LLC

Enclosure: shareholder proposal

Net-Zero Greenhouse Gas Emissions by 2030

Whereas:

It is widely reported that greenhouse gases from human activities are the most significant driver of observed climate change since the mid-20th century;

Nearly every national government has recognized the need to address climate change and agreed (under the terms of the UN Framework Convention on Climate Change) that "deep cuts in greenhouse gas (GHG) emissions are required... to hold the increase, in global average temperature below 2 degrees Celsius above pre-industrial levels...."

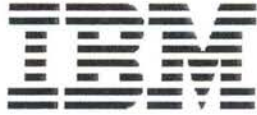
The Intergovernmental Panel on Climate Change (IPCC) states that to limit global warming to two degrees, carbon dioxide emissions need to fall to zero by between 2040 and 2070, falling "below zero" thereafter;

In 2015, The B Team, business leaders concerned about climate change, called upon world leaders to commit to a global goal of net-zero GHG emissions and business leaders to commit to bold long-term targets. They believe that committing to net-zero GHG emissions will demonstrate that we are setting the world on a low-carbon trajectory. Other businesses will respond by unleashing innovation, driving investment in clean energy, scaling-up low carbon solutions, creating jobs and supporting economic growth;

Shareholders laud International Business Machines (IBM) for its efforts in reducing GHG emissions over recent decades and for joining the American Business Act on Climate Pledge. However, shareholders believe that to secure the company's leadership on climate issues, it should set an ambitious target date for becoming net-zero GHG emissions.

Resolved: Shareholders request that the Board of Directors generate a feasible plan for the Company to reach a net-zero greenhouse gas emission status by the year 2030 for all aspects of the business which are directly owned by the Company, including but not limited to manufacturing and distribution, research facilities, corporate offices, and employee travel, and to report the plan to shareholders at reasonable expense, excluding confidential information, by September 2016.

Supporting Statement: For the purposes of this proposal, the proponent suggests that "net-zero greenhouse gas emissions" be defined as reduction of Company GHG emissions to a target annual level, and offsetting the remaining GHG emissions by negative emissions strategies which result in a documented reduction equal to or greater than the company's GHG emissions during the same year. As explained by the IPCC, these negative emissions solutions can range from tree-planting to technological solutions that draw carbon from the air. In calculating net zero GHG emissions, the positive and negative GHG impacts of different types of emissions and activities can be considered using GHG equivalencies. See, for example, <http://www.epa.gov/cleanenergy/energy-resources/calculator.html>.



Senior Counsel
IBM Corporate Law Department
Corporate and Securities Law Group
One New Orchard Road, Mail Stop 301
Armonk, NY 10504

VIA e-mail
Jantz@jantzingmt.com

Christine Jantz, CFA
President, Jantz Management LLC
P.O. Box 301090
Boston, MA 02130

October 22, 2015

Dear Ms. Jantz:

Ms. Christina Montgomery, Vice President, Assistant General Counsel and Secretary of IBM has asked me to write to you in order to acknowledge IBM's receipt on October 22, 2015 of your letter dated October 21, 2015 to which you attached a stockholder proposal entitled "Net-Zero Greenhouse Gas Emissions by 2030." In accordance with SEC Staff Legal Bulletin 14G, we consider this proposal to be timely filed as of October 21, 2015, the date it was postmarked by the USPS. Since your submission involves a matter relating to IBM's 2016 proxy statement, we are also formally sending you this letter to ensure that you understand and timely satisfy all requirements in connection with this submission, as outlined in this letter.

Please understand first that in order to be eligible to submit a proposal for consideration at our 2016 Annual Meeting, Rule 14a-8 of Regulation 14A of the United States Securities and Exchange Commission ("SEC") requires that a stockholder must have continuously held at least \$2,000 in market value, or 1% of the company's securities entitled to be voted on the proposal at the meeting for at least one year by the date you submit the proposal. The stockholder must continue to hold those securities through the date of the meeting.

The steps that a shareholder must take to verify his or her eligibility to submit a proposal depend on how the shareholder owns the securities. You may know that there are two types of security holders in the U.S., registered owners and beneficial owners. Registered owners have a direct relationship with the issuer because their ownership of shares is listed on the records maintained by the issuer or its transfer agent. If a shareholder is a registered owner, the company can independently confirm that the shareholder's holdings satisfy Rule 14a-8(b)'s eligibility requirement. The vast majority of investors in shares issued by U.S. companies, however, are beneficial owners, which means that they hold their securities in book-entry form through a securities intermediary, such as a broker or a bank. Beneficial owners are sometimes referred to as "street name" holders. Rule 14a-8(b)(2)(i) provides that a beneficial owner can provide proof of ownership to support his or her eligibility to submit a proposal by submitting a written statement "from the 'record' holder of [the] securities (usually a broker or bank)," verifying that, at the time the proposal was submitted, the shareholder held the required amount of securities continuously for at least one year.

You have stated in your letter that you are a beneficial owner of IBM stock, but you have not provided me any proof of your IBM stockholdings as required by Rule 14a-8. I nonetheless had our stockholder relations department check with Computershare, our transfer agent, on any potential IBM stockholdings that may be held of record -- either in your name or in the name of Jantz Management LLC. Computershare was unable to locate any shares held of record. Therefore, to facilitate compliance with Rule 14a-8 and confirm your eligibility thereunder, I am now formally requesting from you proper proof of your beneficial IBM stockholdings, as required under the SEC's rules and regulations, and as fully described for your reference in this letter.

If you or Jantz Management LLC is an IBM stockholder of record under an account which we have somehow missed, we apologize for not locating it in our own records. If this is the case, I will need for you

to advise me precisely how the IBM shares are listed on our records, and to provide the company with a written statement that you or Jantz Management LLC intends to continue to hold the requisite IBM securities through the date of IBM's 2016 annual meeting. However, if you are not a registered stockholder, please understand that the company does not know that you are a stockholder, or how many shares you own. In this case, you must prove eligibility to the company in one of two ways: The first way is to submit to the company a written statement from the "record" holder of his securities (usually a broker or bank) verifying that, at the time you submitted the proposal on October 21, 2015, you or Jantz Management LLC continuously held the IBM securities for at least one year. In accordance with the SEC's Staff Legal Bulletin 14G, the proof of ownership you need to provide me must cover the one-year period preceding and including the date the proposal was submitted to IBM (October 21, 2015). You must also include your own written statement that you intend to continue to hold at least \$2,000 of IBM securities through the date of the 2016 annual meeting of shareholders.

In this connection, on October 18, 2011, the staff of the Division of Corporation Finance released Staff Legal Bulletin 14F, containing a detailed discussion of the meaning of brokers and banks that constitute "record" holders under Rule 14a-8(b)(2)(i) for purposes of verifying whether a beneficial owner is eligible to submit a proposal. Attached is a link to that important staff guidance.
[Http://www.sec.gov/interps/legal/cfs14f.htm](http://www.sec.gov/interps/legal/cfs14f.htm)

In this legal bulletin, the staff explained that most large U.S. brokers and banks deposit their customers' securities with, and hold those securities through, the Depository Trust Company ("DTC"), a registered clearing agency acting as a securities depository. Such brokers and banks are often referred to as "participants" in DTC. The staff went on to note that DTC holds the deposited securities in "fungible bulk," meaning that there are no specifically identifiable shares directly owned by the DTC participants. Rather, each DTC participant holds a pro rata interest or position in the aggregate number of shares of a particular issuer held at DTC. Correspondingly, each customer of a DTC participant -- such as an individual investor -- owns a pro rata interest in the shares in which the DTC participant has a pro rata interest.

The staff then went on to explain that the names of these DTC participants, however, do not appear as the registered owners of the securities deposited with DTC on the list of shareholders maintained by the company or, more typically, by its transfer agent. Rather, DTC's nominee, Cede & Co., appears on the shareholder list as the sole registered owner of securities deposited with DTC by the DTC participants. Pointing to Exchange Act Rule 17Ad-8, the staff noted that a company can request from DTC a "securities position listing" as of a specified date, which identifies the DTC participants having a position in the company's securities and the number of securities held by each DTC participant on that date.

The staff also explained the difference between an introducing broker and a clearing broker. An introducing broker is a broker that engages in sales and other activities involving customer contact, such as opening customer accounts and accepting customer orders, but is not permitted to maintain custody of customer funds and securities. Instead, an introducing broker engages another broker, known as a "clearing broker," to hold custody of client funds and securities, to clear and execute customer trades, and to handle other functions such as issuing confirmations of customer trades and customer account statements. Clearing brokers generally are DTC participants; introducing brokers generally are not.

In clarifying what types of brokers and banks should be considered "record" holders under Rule 14a-8(b)(2)(i), the staff noted that because of the transparency of DTC participants' positions in a company's securities, for Rule 14a-8(b)(2)(i) purposes, only DTC participants are viewed as "record" holders of securities that are deposited at DTC. As introducing brokers generally are not DTC participants, and therefore typically do not appear on DTC's securities position listing, merely sending in a letter from an introducing broker who is not a DTC participant, standing alone, cannot satisfy the proof of beneficial ownership requirements under Rule 14a-8, as unlike the positions of registered owners and brokers and banks that are DTC participants, the company is unable to verify the positions of such introducing broker against its own or its transfer agent's records or against DTC's securities position listing.

Given the foregoing, and with this information in hand, for any shares of IBM that are held by you or Jantz Management LLC in street name, the staff has provided specific guidance which you will need to follow in order to satisfy the 14a-8 proof of ownership requirements in connection with your submission. That guidance is as follows:

How can a shareholder determine whether his or her broker or bank is a DTC participant?

Shareholders and companies can confirm whether a particular broker or bank is a DTC participant by checking DTC's participant list, which is currently available on the Internet at <http://www.dtcc.com/~media/Files/Downloads/client-center/DTC/alpha.ashx>

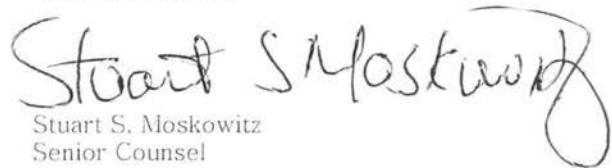
What if a shareholder's broker or bank is not on DTC's participant list?

The shareholder will need to obtain proof of ownership from the DTC participant through which the securities are held. The shareholder should be able to find out who this DTC participant is by asking the shareholder's broker or bank. The staff has also clarified that in accordance with the Net Capital Rule, Release No. 34-31511 (Nov. 24, 1992) [57 FR 56973] ("Net Capital Rule Release"), at Section II.C.(iii), if the shareholder's broker is an introducing broker, the shareholder's account statements should include the clearing broker's identity and telephone number. The clearing broker will generally be a DTC participant.

If the DTC participant knows the shareholder's broker or bank's holdings, but does not know the shareholder's holdings, a shareholder could satisfy Rule 14a-8(b)(2)(i) by obtaining and submitting two proof of ownership statements verifying that, at the time the proposal was submitted, the required amount of securities were continuously held for at least one year - one from the shareholder's broker or bank confirming the shareholder's ownership, and the other from the DTC participant confirming the broker or bank's ownership.

I have provided you with this letter detailing the specific staff guidance and related information required under Rule 14a-8 in order to afford you with an opportunity to obtain and furnish me with the proper proof of ownership required on a timely basis. Please note that all of the information I've requested in this letter must be sent directly to my attention at the address set forth above within 14 calendar days of the date you receive this request, and that the Company reserves the right to omit this proposal under the applicable provisions of Regulation 14A. Thank you for your continuing interest in IBM and this matter.

Very truly yours,


Stuart S. Moskowitz
Senior Counsel



IBM
Stuart Moskowitz to: jantz

10/22/2015 03:44 PM

image2015-10-22-151546.pdf removed & duplicate added to MyAttachments Repository V3.8 (📎)
on 21 November 2015 by Stuart Moskowitz. Original attachment record is here (📎).

October 28, 2015

Christina M. Montgomery, Vice President and Secretary
Office of the Secretary
International Business Machines Corporation
1 New Orchard Road
Mail Drop 301
Armonk, NY 10504

Re: Shareholder Proposal for 2016 Annual Meeting

Dear Ms. Montgomery:

This letter is regarding a shareholder proposal that Jantz Management LLC filed on my behalf, on October 21, 2015, regarding IBM's greenhouse gas emissions program. Enclosed, please find a letter from my brokerage, Foliofn (a DTC participant), verifying that I, Christine Jantz as an individual shareholder of Jantz Management LLC, have held the requisite amount of stock in IBM for more than one year prior to filing the shareholder proposal. As previously stated, I intend to continue to hold these shares through the next shareholder meeting.

Please note that I am submitting this proof of ownership on a timely basis consistent with Rule 14a-8. In the event that you find any defect in this documentation, I request that you notify me promptly of any concerns or deficiencies.

Should you need anything further, do not hesitate to contact me at jantz@jantzmgmt.com or at my mailing address, below.

Thank you in advance for your attention to this matter.

Sincerely,



Christine Jantz, CFA
President
Jantz Management LLC

Enclosure: proof of ownership



FOLIO Investments, Inc.
8180 Greensboro Drive
8th Floor
McLean, VA 22102

p 703-245-4000
f 703-245-4800
folioinvesting.com

October 22, 2015

Christina M. Montgomery, Vice President and Secretary
Office of the Secretary
International Business Machines Corporation
1 New Orchard Road
Mail Drop 301
Armonk, NY 10504

Dear Ms. Montgomery:

Folio Investments, Inc. ("Folio"), a DTC participant, acts as the custodian for Jantz Management LLC. Christine Jantz, an individual shareholder of Jantz Management LLC, currently holds shares of International Business Machines Corporation common stock, and has held shares valued in excess of \$2,000 continuously since October 21, 2014.

Sincerely,

A handwritten signature in black ink, appearing to read "Jason Strickland", written over a horizontal line.

Jason Strickland
Chief Compliance Officer



December 1 Conference Call with IBM and Jantz Management LLC -
Stockholder Proposal on Greenhouse Gas Emissions
Stuart Moskowitz to: jantz, mari

11/13/2015 12:23 PM

Dear Christine and Mari:

Following my telephone call with Mari, I am now pleased to be able to confirm our scheduled our teleconference discussion for **Tuesday, December 1, from 12:30 p.m. to 1:30 p.m.**

The following IBM employees will discuss what our company does in this area, and our rationale for what we are doing.

- **Mr. Wayne Balta**, Vice President, Corporate Environmental Affairs and Product Safety
- **Ms. Edan Dionne**, Director, Corporate Environmental Affairs
- **Mr. Jay Dietrich**, Distinguished Engineer, Energy and Climate Stewardship

Teleconference Information:

Toll-Free Dial in: 1-888-426-6840
Participant Code: 56174490

Edan Dionne will activate the call, and I will also be on the call.

We look forward to our discussion with you on December 1.

Thank you.

Stuart S. Moskowitz
Senior Counsel, IBM Legal Department
1 New Orchard Road, MS 329
Armonk, NY 10504
smoskowi@us.ibm.com
914-499-6148 (tel)

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Re: December 1 Conference Call with IBM and Jantz Management LLC -
Stockholder Proposal on Greenhouse Gas Emissions

Christine Jantz to: Stuart Moskowitz

11/13/2015 01:18 PM

Cc: Mari Schwartzer

History: This message has been forwarded.

Great. Looking forward to it.

Thank you.

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On Nov 13, 2015 12:23 PM, "Stuart Moskowitz" <smoskowi@us.ibm.com> wrote:

Dear Christine and Mari:

Following my telephone call with Mari, I am now pleased to be able to confirm our scheduled our teleconference discussion for **Tuesday, December 1, from 12:30 p.m. to 1:30 p.m.**

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Thank you.

Stuart S. Moskowitz
Senior Counsel, IBM Legal Department
1 New Orchard Road, MS 329
Armonk, NY 10504
smoskowi@us.ibm.com

[914-499-6148](tel:914-499-6148) (tel)

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Re: December 1 Conference Call with IBM and Jantz Management LLC -
Stockholder Proposal on Greenhouse Gas Emissions

Mari Schwartzer to: Stuart Moskowitz

11/16/2015 01:42 PM

Cc: Christine Jantz

History: This message has been forwarded.

Thanks Stu! We look forward to speaking with you and your team.

- Mari

Mari Schwartzer

Coordinator of Shareholder Services

mari@jantzmgmt.com

Jantz Management LLC

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On Fri, Nov 13, 2015 at 12:23 PM, Stuart Moskowitz <smoskowi@us.ibm.com> wrote:

Dear Christine and Mari:

Following my telephone call with Mari, I am now pleased to be able to confirm our scheduled our teleconference discussion for **Tuesday, December 1, from 12:30 p.m. to 1:30 p.m.**

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Teleconference Information:

Toll-Free Dial in: [1-888-426-6840](tel:1-888-426-6840)

Participant Code: 56174490

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We look forward to our discussion with you on December 1.

Thank you.

Stuart S. Moskowitz

Senior Counsel, IBM Legal Department

1 New Orchard Road, MS 329

Armonk, NY 10504

smoskowi@us.ibm.com

914-499-6148 (tel)

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IBM PDF presentation for Today's 12:30 p.m. Conference Call relating to the Stockholder Proposal on Greenhouse Gas Emissions
Stuart Moskowitz to: jantz, mari

12/01/2015 12:16 PM

Hi, Chris and Mari:

As discussed, here is IBM's PDF presentation for today's conference call, together with the necessary dial-in information. The IBM presenters are listed below in my 11/13 e-mail.

We look forward to talking with you @ 12:30 p.m.



IBM's Leadership Regarding Energy and Climate Change - December 1 2015.pdf

Teleconference Information:

Toll-Free Dial in: 1-888-426-6840

Participant Code: 56174490

Edan Dionne will activate the call.

Stuart S. Moskowitz
Senior Counsel, IBM Legal Department
1 New Orchard Road, MS 329
Armonk, NY 10504
smoskowi@us.ibm.com
914-499-6148 (tel)

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----- Forwarded by Stuart Moskowitz/Armonk/IBM on 12/01/2015 09:57 AM -----

From: Stuart Moskowitz/Armonk/IBM
To: jantz@jantzmgmt.com, mari@jantzmgmt.com
Date: 11/13/2015 12:23 PM
Subject: December 1 Conference Call with IBM and Jantz Management LLC - Stockholder Proposal on Greenhouse Gas Emissions

Dear Christine and Mari:

Following my telephone call with Mari, I am now pleased to be able to confirm our scheduled our teleconference discussion for **Tuesday, December 1, from 12:30 p.m. to 1:30 p.m.**

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Teleconference Information:

Toll-Free Dial in: 1-888-426-6840

Participant Code: 56174490

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We look forward to our discussion with you on December 1.

Thank you.

Stuart S. Moskowitz
Senior Counsel, IBM Legal Department
1 New Orchard Road, MS 329
Armonk, NY 10504
smoskowi@us.ibm.com
914-499-6148 (tel)

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FORUM - March/April 2014 Final PDF
Stuart Moskowitz to: jantz, mari

12/01/2015 02:15 PM

Hi Chris and Mari,

Attached is the article that was mentioned on the conference call today.

We very much appreciate your participation on the call, and remain hopeful that you will see fit to withdraw your stockholder proposal and continue the productive dialogue on this matter.

Thank you for your consideration.

Stuart S. Moskowitz
Senior Counsel, IBM Legal Department
1 New Orchard Road, MS 329
Armonk, NY 10504
smoskowi@us.ibm.com
914-499-6148 (tel)

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Dietrich_Dionne_Balta_Forum_March-April 2014.pdf



Re: FORUM - March/April 2014 Final PDF
Christine Jantz to: Stuart Moskowitz
Cc: Mari Schwartzer

12/03/2015 11:01 AM

History: This message has been forwarded.

Dear Mr. Moskowitz:

Thank you for taking the time to discuss the proposal.

I would like to share this comment from my lawyer who defends many of these proposals, namely that Jantz Management is on solid ground on this proposal. As a proposal focusing on climate change, it is solidly on the safe side of ordinary business, not excludable. Asking for a goal of net zero is clearly not micromanagement. It would be a waste of time and money for all concerned for IBM to challenge the proposal.

Sincerely,

Christine Jantz
President
Jantz Management LLC
470 Atlantic Avenue, 4th Floor
Boston, MA 02210
O: 617.273.8018

*** FISMA & OMB Memorandum M-07-16 ***

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On Tue, Dec 1, 2015 at 2:15 PM, Stuart Moskowitz <smoskowi@us.ibm.com> wrote:

Hi Chris and Mari,

Attached is the article that was mentioned on the conference call today.

We very much appreciate your participation on the call, and remain hopeful that you will see fit to withdraw your stockholder proposal and continue the productive dialogue on this matter.

Thank you for your consideration.

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Pages 33 through 40 redacted for the following reasons:

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Exhibit C

Press Release

[see attached]



News room News releases

IBM Expands Green Horizons Initiative Globally To Address Pressing Environmental and Pollution Challenges

- Programs to Benefit Citizens in Beijing, New Delhi, Johannesburg and Other Cities
- Machine Learning and IoT Technologies Improve Accuracy of Environmental Forecasting

Select a topic or year

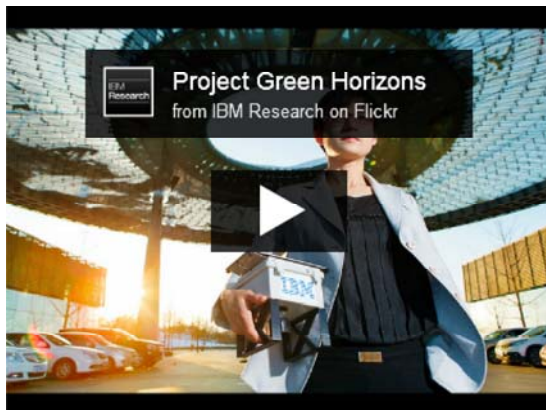
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Beijing, China and Armonk, NY, USA - 09 Dec 2015: IBM Research (NYSE: [IBM](#)) today announced that it will expand its Green Horizons initiative globally to enable city governments, utility companies and factories to better understand and improve their relationships with the environment and to help tackle pressing issues related to air pollution and climate change.



Today's announcement builds on a successful year-long collaboration with the Beijing Environmental Protection Bureau (EPB), expanding to include over a dozen commercial deals and research engagements on four continents. IBM's China Research lab is working with the Beijing EPB to provide one of the world's most advanced air quality forecasting and decision support systems, able to generate high-resolution 1km-by-1km pollution forecasts 72 hours in advance and pollution trend predictions up to 10 days into the future. It models and predicts the effects of weather on the flow and dispersal of pollutants as well as the airborne chemical reactions between weather and pollutant particles. In the first three quarters of this year, the Beijing government was able to achieve a 20 percent reduction in ultra-fine Particulate Matter, bringing it closer to its goal of reducing PM 2.5 by 25 percent by 2017.

The new Green Horizons engagements apply IBM's advanced machine learning and Internet of Things (IoT) technologies to ingest and learn from vast amounts of Big Data, constantly self-configuring and improving in accuracy to create some of the world's most accurate energy and environmental forecasting systems. They include:

An agreement with the Delhi Dialogue Commission to understand the correlation between traffic patterns and air pollution in India's capital and provide the government with 'what if' scenario modelling to support more informed decision-making for cleaner air.

A pilot program with the City of Johannesburg and South Africa's Council of Scientific and Industrial Research to model air pollution trends and quantify the effectiveness of the city's intervention programs in support of Johannesburg's air quality targets and long-term sustainable development.

Additional clean air projects in China with the Environmental Protection Bureau in Baoding (one of China's most polluted cities) to support the city's environmental transformation; the city of Zhangjiakou (host to the 2022 Winter Olympics) to improve air quality for the outdoor sporting event; and Xinjiang Province in north-west China.

In addition, the program is delivering on its promise to help increase contributions of wind, solar and other renewable energy sources in to national grids. New customer engagements include:

UK energy giant SSE is piloting IBM technology to help forecast power generation at its wind farms in Great Britain. The system is able to forecast energy for individual turbines and includes visualization tools to show expected performance several days ahead.

In Japan, IBM is working with the Toyo Engineering Corporation and renewable energy company Setouchi Future Creations LLC on the Setouchi solar project – one of the largest in the country. IBM's monitoring systems will help Setouchi manage and control energy from the plant's 890,000 solar panels.

Through the United States Department of Energy's SunShot initiative, IBM is making renewable energy forecasting technology available to government agencies, utilities and grid operators across the United States to support supply and demand planning.

IBM is working with China's largest wind power solution provider - Xinjiang Goldwind Science & Technology Co., Ltd to use IoT, cloud computing, big data analytics and other advanced technologies to drive innovation and transform Goldwind's business and technological models. Also in China, Shenyang Keywind Renewable Company is using cognitive forecasting technologies to help integrate more energy into the grid.

The Zhangbei Demonstration Project, managed by China's State Grid Jibei Electricity Power Company, is tapping the power of Green Horizons renewable energy forecasting technology to integrate 10 percent more alternative energy into the national grid, enough to power more than 14,000 homes.

"Even as society is looking to address some of the biggest challenges of our generation -- environmental degradation and climate change -- two game-changing technologies have emerged that are completely transforming our understanding of the world in which we live," said Arvind Krishna, senior vice president and director, IBM Research. "With Green Horizons, we are applying the most advanced cognitive computing and IoT technologies, combined with world-class analytics, to enable forward-looking government and business leaders in their efforts to make better decisions that can help safeguard the health of citizens today while helping to protect the long-term health of the planet."

"Air pollution and climate change are global challenges that require stronger action by government and business," said Bob Perciasepe, president of the Center for Climate and Energy Solutions (C2ES). "To get to a clean energy future, we need accurate data about emissions, air quality and power generation. Advanced technologies can provide crucial insights about our impacts on the environment -- today and in the future."

New Initiatives Build on Success of IBM Clean Air Partnership in Beijing

IBM's Green Horizons initiative is based on innovations from the company's Research Laboratory in Beijing, with contributions from leading environmental experts across IBM's global network of research labs. To help address the issue of air pollution -- considered to be the greatest environmental threat to human health -- IBM has developed next-generation pollution forecasting and management systems which draw on vast amounts of Big Data from environmental monitoring stations, weather stations, traffic cameras as well as meteorological and environmental satellites. Cognitive technologies understand this data, and use it to tune a predictive model that shows where the pollution is coming from, where it will likely go, and what will be its potential effect, allowing more informed decisions about how to improve air quality. Machine learning technologies ensure that the system automatically adjusts the predictive models to different seasons and topographies.

"In the past two decades China has been at the center of global manufacturing and economic growth," said Dr. Xiaowei Shen, Director, IBM Research - China. "However, this great progress has come at a cost and today the Chinese government has placed air pollution and climate change high on the national agenda. With Chinese investments into green innovation worth billions of dollars and with a new budding generation of environmental scientists coming to the fore, China is the natural starting point for IBM's Green Horizons initiative which is now being exported to other parts of the world."

To support China's clean air action plan, IBM has entered a number of collaborations across the country. Building on their existing relationship, IBM and the Beijing Environmental Protection Bureau are launching a new Joint Environmental Innovation Center that will provide decision support capabilities to the Beijing government. Using scenario modelling, the government will be able to optimize its emission reduction strategy and achieve a balance between clean air and continued economic growth. Measures include short term limitations on urban traffic and construction activity as well as long term improvements to industrial production and power generation - such as switching to cleaner energy sources and installing filtering systems. The Beijing EPB also uses a colored alert system to warn citizens when harmful levels of pollution are forecast for the coming days. Selective, temporary reductions in industrial activity are also considered for large scale events such as the 2022 Winter Olympics.

"Our environmental engineers are working on a daily basis to tackle Beijing's complex and challenging pollution problem and protect the health of citizens," said Dawei Zhang, Director of Beijing's Environmental Monitoring Center, a department of the BEPB. "Through our collaboration with IBM Research -- China, we are delivering on our environmental commitments with the help of some of the most advanced technologies available. Over the past year we made good progress and the joint innovation with IBM is one of the key driving forces behind it."

Building on these results, IBM is also working in the Chinese city of Baoding with the local Environmental Protection Bureau and environmental service provider Encanwell to improve the air quality in one of China's most polluted cities. Pollution source tracking analyzes current emissions and prevailing weather patterns to identify the likely origin of pollution - a powerful tool for environmental law enforcement at industrial parks, factories and power stations.

"Our aim is to reduce PM2.5 by 33 percent over the next two years - IBM's pollution analytics and forecasting technologies will help us to achieve this," said Jimin Zhao, Lead Researcher at Baoding City Environmental Protection Bureau. "Using Green Horizons to track the source of pollution, we can take rapid, targeted action to reduce emissions. For example, we can require that heavily polluting enterprises install filtering systems, use smokeless fuels or we can even consider closing or relocating factories and power plants in the long term."

About IBM Research

Now in its 70th year, IBM Research continues to define the future of information technology with more than 3,000 researchers in 12 labs located across six continents. Scientists from IBM Research have produced six Nobel Laureates, 10 U.S. National Medals of Technology, five U.S. National Medals of

Science, six Turing Awards, 19 inductees in the National Academy of Sciences and 14 inductees into the U.S. National Inventors Hall of Fame – the most of any company.

For more information on IBM Research, please visit: www.research.ibm.com

For Green Horizon photos, please visit: https://www.flickr.com/photos/ibm_research_zurich/sets/72157644613083040

For Green Horizons B-roll, please visit: <https://share.agencyroad.com/message/xuooqZcoZpNifmQJyf1hmP>

For more info about the Green Horizons initiative and a film about the work in China, please visit: <http://www.research.ibm.com/green-horizons/>

For Green Horizons B-roll, please visit: <http://ibm.newsmarket.com/Global/ibm/s/e865d5fa-67b8-4cd3-a991-469a2a4afd73>

Contact(s) information

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jonathanb@uk.ibm.com

Jim Lin
 IBM China
 +86-10-63616888
ijlinbj@cn.ibm.com

Related resources

Site links

- [Green Horizons](#)
- [Emerging Technologies Play Role in Combating Environmental Challenges](#)

Images

- [IBM Expands Green Horizons Initiative Globally](#)

Dr. Jin Yan Shao showcases a prototype of a mobile and compact environmental unit, at the IBM Research Lab in China. IBM is announcing that it will expand its Green Horizons initiative globally to enable city governments, utility companies and factories to better understand and improve their relationships with the environment and to help tackle pressing issues related to air pollution and climate change (Credit: IBM)

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Exhibit D

Technical Report

[see attached]



Office of Jay M. Dietrich
Distinguished Engineer: Energy and Climate Stewardship
Corporate Environmental Affairs
International Business Machines Corporation
1000 River Street
Essex Junction, VT 05452-4299
jdietric@us.ibm.com

TECHNICAL REPORT

Assessment of Third Party Greenhouse Gas Emissions Avoidance and/or Reduction Enabled by IBM Products and Solutions

I. Introduction

IBM has been a leader in climate protection by reducing the impact of its own operations on the environment as well as developing solutions to help its clients and society-at-large reduce their impacts on the environment. With respect to the IBM's solutions used by clients and others to reduce emissions and other impacts, and upon assessing the available information on strategies to achieve "net-zero" greenhouse gas ("GHG") emissions, it is appropriate and logical to include emissions reduction achieved by IBM's clients utilizing IBM's products, services and solutions when evaluating IBM's status toward achieving "net-zero" emissions. This report shows that during 2014 and based only on a subset of the products and solutions IBM offered, GHG emissions avoided or reduced by third parties utilizing IBM's products and solutions exceeded IBM's own operational emissions, including those associated with employee business travel. The quantity of emissions avoided or reduced by our clients will increase as IBM expands and adds to its products and solutions offerings to drive client operational efficiency.

II. "Net-zero" Definition and Methodologies

A. Achieving "Net-zero" at a Global (Planetary) Level

There is currently not a single, uniformly accepted definition of what constitutes "net-zero" GHG emissions for the Earth as a whole or how global society is supposed to achieve that. A review of the literature reveals different ideas and points-of-view among people in government, academia, civil society, and business^{1,2}. In general, discussions about achieving "net-zero" emissions at a global level involve ideas to reduce existing emissions, prevent further

¹ Briefing: The 15 options for "net-zero" emissions in the Paris climate text; CarbonBrief website; <http://www.carbonbrief.org/briefing-the-15-options-for-net-zero-emissions-in-the-paris-climate-text>; visited December 10, 2015.

² <http://www.onlyzerocarbon.org/definition.html>; visited December 17, 2015.

emissions, and offset the remainder through a wide variety of natural and/or technological systems. Achieving “net-zero” emissions at a global level is a journey of multiple decades as indicated by the Intergovernmental Panel on Climate Change and others.

B. Achieving “Net-zero” at a Company Level

Having discussed the idea of “net-zero” GHG emissions at a global (planetary) level, we turn our attention to the idea of “net-zero” at the level of an individual company. Individual companies such as IBM may apply their resources to projects and activities which offer an appropriate return on their investment and which represent a sustainable approach to reduce, prevent, and / or offset emissions across society toward the vision of “net-zero.” The Proponent refers to the B Team in its Proposal³. The B Team states "Business will respond by embedding bold climate action into their strategies -- unleashing innovation, driving investment in clean energy, scaling-up low carbon solutions, creating jobs and supporting economic growth."⁴ The B Team's website identifies some companies which are pursuing "net zero" GHG emission strategies. These companies are investing in technologies which reduce or prevent the GHG emissions of other entities as part of their "net zero" approaches⁵, and accordingly, count the emissions avoided or reduced by their clients or investment projects in determining their net emissions.

In general, then, an individual company's options include but are not limited to:

1. Reducing operational GHG emissions through energy conservation.
2. Purchasing renewable electricity to power company operations.
3. Investing in and/or deploying technologies, products and solutions which enable other entities to reduce or prevent their operational GHG emissions.
4. Investing in renewable energy projects to enable other entities to increase their use of renewable electricity.
5. Investing in negative emissions projects and technologies to prevent and / or capture atmospheric GHG emissions.

IBM utilizes three of the five options listed (1, 2 and 3) toward achieving “net-zero”: reducing GHG emissions associated with its own operations through energy conservation; using renewable electricity in its operations; and researching, developing, and deploying products and solutions which enable other entities to reduce the GHG emissions associated with their operations. By pursuing this latter work, IBM is leveraging its core competency in information technology.

³ The B Team: Heading for Net Zero by 2050; <http://bteam.org/planb/#restore-nature>; visited December 10, 2015.

⁴ <http://bteam.org/the-b-team/business-leaders-call-for-net-zero-greenhouse-gas-emissions-by-2050/>; visited December 17, 2015.

⁵ Unilever news page: <https://www.unilever.com/news/news-and-features/2015/Unilever-to-become-carbon-positive-by-2030.html>; visited December 17, 2015.

III. Analysis

A. IBM's 2014 Emissions

The shareholder proposal seeks to have IBM address emissions “for all aspects of the business which are directly owned by the Company [IBM], including but not limited to manufacturing and distribution, research facilities, corporate offices, and employee travel”.

During 2014, IBM's GHG emissions in the categories described in the shareholder proposal totaled 2,040,000 metric tons (“MT”) of CO₂. This number is comprised of the following:

- CO₂ emissions from business directly owned by IBM were 1,537,000 MT. This value excludes the semiconductor manufacturing operations that IBM divested on July 1, 2015.
- CO₂ emissions associated with business travel involving IBM employees and other owned activities were 503,000 MT.

B. Emissions Avoidance Enabled by Products and Solutions that IBM Put on Market

IBM has developed a range of products and solutions which enable its clients to reduce the GHG emissions associated with their operations or activities. IBM's products and solutions also enable increased deployment and productivity of renewable electricity generation assets which in turn reduce society's reliance on fossil fuel generated electricity and associated GHG emissions. The products and solutions IBM offers include the following:

1. Management of intermittent energy generation using information technology (“IT”) based monitoring and analytics systems: IBM has developed and deployed systems that enhance and improve electricity grid management. These systems enable increased deployment of renewable electricity generation assets (e.g., solar and wind), energy storage systems and demand management systems. Overall, the solutions balance and stabilize electricity grids and assure reliable power delivery while increasing the ability of the grid to support increased intermittent, renewable generation capacity. IBM continues to enhance the monitoring and analytics systems it offers.
2. Server and storage products which deliver more work per unit of energy consumed: IBM has developed hardware and software capabilities which enable servers to manage multiple workloads on a single server product, virtualizing workloads and utilizing up to 85% of the server capacity for work. Similar hardware and software capabilities enable storage systems to minimize the absolute volume of data to be stored through capacity optimization methods such as deduplication, compression and storage tiering, achieving

utilization of the storage media up to 95% of capacity. When these products are deployed to replace previous generation products, they can support the same level of application workload or data storage while reducing energy consumption by 20% to 80%.

3. IBM Building Management Center: IBM offers a suite of IT based monitoring and management capabilities for buildings and large campuses. The suite of solutions enables building owners to optimize building system operations and maintain a desired level of performance through real-time monitoring of system performance and reporting of anomalies. Application of the systems enables companies to reduce building energy consumption by up to 10% and beyond.
4. Traffic Management systems: IBM offers analytics based monitoring and management system to analyze traffic flows and provide alternate routing information or implement congestion based charges which reduce traffic or increase the use of public transit and car-pooling options. These systems can result in a net reduction in trips, travel times, fuel use and GHG emissions.

Based on certain assumptions, we have estimated that the net, annual avoidance / reduction of GHG emissions achieved by IBM's clients during 2014 from the deployment of a subset of products and solutions IBM offered ranged between 2.58 million MT and 4.85 million MT. Refer to Table 1 for details.

IV. Conclusion

As previously stated, there is currently not a single accepted definition of what constitutes "net-zero" GHG emissions. We have conducted a review of the relevant literature published by the organizations referenced in the shareholder proposal and supporting statement. Using reasonable assumptions based on our experience in assessing the emissions reduced or avoided by IBM and IBM's clients from the deployment of the products and solutions IBM offers, we estimate that during 2014, the GHG emissions avoided or reduced by third parties utilizing only a subset of IBM's products and solutions exceeded IBM's own operational emissions including those associated with employee business travel:

- Emissions attributable to IBM's operations: 2.04 million MT.
- Emissions avoided / reduced by IBM's technologies and solutions for third parties: 2.58 million MT – 4.85 million MT.

In sum, this analysis demonstrates that IBM has already achieved better than "net-zero" greenhouse gas emissions in 2014.

The products, services and solutions discussed in this report are core to IBM's business expertise where IBM has long invested its financial and human resources in their research, development and deployment at a global scale. We expect IBM will expand and add to these offerings, enabling our clients to further improve their operational efficiency and avoid / reduce the GHG emission as we move forward in time and continuing to more than offset IBM's own GHG emissions.

Technical Report Prepared by:

Jay M. Dietrich

December 17, 2015

Jay M. Dietrich
Distinguished Engineer
Energy and Climate Stewardship
Corporate Environmental Affairs
IBM Corporation

Date

Table 1

Summary of Emissions Avoidance from Select Completed IBM Client Projects (2014)

<u>(1) Improved Renewables Utilization from IBM Grid Management solutions including work on integration of energy storage and demand management capabilities:</u>								
Managed renewable resources to improve their utilization where they represent 20% or less of the total generation resources.							Est. Avoidance (MT CO2/year)	
							at 5% improved renewables production	at 10% improved renewables production
China Demonstration project:							59,000	200,000
Vestas Wind Turbine Siting Capability:							108,000	360,000
RED Electrica Grid Management Solution:							450,000	1,500,000
DONG Energy Grid Management Solution:							26,000	85,000
Infinis Grid Management Solution							1,700	5,500
Hydro One Quebec Grid Management Solution							2,000	6,600
<u>(2) Server and Storage Consolidation Projects:</u>								
							Est. Avoidance (MT CO2/year)	
							Assuming 50% of sales deliver consolidation	Assuming 75% of sales deliver consolidation
Server Consolidation Projects (Power Systems)							600,000	900,000
Storage Consolidation Projects (Mid-range Enterprise systems)							900,000	1,350,000
<u>(3) Smarter Building and City Projects:</u>								
							Est. Avoidance (MT CO2/year)	
U.S. Government Services Administration Smarter Building project covering 88 buildings							54,000	54,000
Japan University Smarter Building Project							2,000	2,000
Carnegie Mellon University Smarter Building Project							7,000	7,900
<u>(4) Traffic Management Systems:</u>								
							Est. Avoidance (MT CO2/year)	
Estimated CO2 avoidance achieved by the Stockholm Traffic Management System:							370,000	370,000
StreetLine Parking Solution							2,000	4,000
TOTAL AVOIDANCE FROM ABOVE IBM SOLUTION ENABLED PROJECTS DURING 2014							2,581,700	4,845,000

Exhibit E

IBM Environmental Report

[see attached]

2014 IBM and the Environment Report

ibm.com/environment



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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 (CO₂) 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 CO₂ 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 CO₂ 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 (CO₂) 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 (CO₂)-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 CO₂ 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 CO₂ 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 CO₂ emissions avoidance from these conservation actions is actually greater than this simple summation of the annual results.

Electricity and fuel use and related CO₂ emissions

Scope 1 and Scope 2 CO₂ emissions

	Electricity and fuel use (1,000 MMBtu)	CO ₂ emissions (estimated) metric tons x 1,000	
		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 CO₂ emissions.

Between 1990 and 2014, IBM saved 6.8 million MWh of electricity consumption, avoided 4.2 million metric tons of CO₂ emissions (equal to 61 percent of the company’s 1990 global CO₂ 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 CO₂ 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 0.4°C in 2014 and 2.0°C for the period 2011-14, with work continuing to further raise temperatures toward an average of 24°C.
- 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 CO₂ 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 CO₂ 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 CO₂ 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 CO₂ emissions management

IBM's operational CO₂ 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 CO₂ emissions of 1.8 percent.
- The average CO₂ emissions factors associated with our grid-supplied electricity were reduced by 0.01 metric tons of CO₂ 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 CO₂ emissions.
- A reduction in our fuel use of 36,000 MMBtu resulted in a 0.3 percent decrease in our CO₂ emissions.

The shift to greater use of renewable electricity during 2014, discussed above, resulted in a 1.4 percent reduction in our CO₂ emissions.

New third-generation CO₂ 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 CO₂ emissions — an amount equal to 40 percent of its 1990 emissions. We then exceeded our second-generation CO₂ emissions reduction goal to reduce operational CO₂ emissions by 12 percent from 2005 to 2012, achieving a further reduction in CO₂ emissions of 15.7 percent. Building on this accomplishment, IBM established a third-

6.1%

IBM's operational CO₂ 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 CO₂ reduction goal is to reduce emissions by 35 percent below 2005 levels by 2020.

generation CO₂ reduction goal in February 2015 to reduce CO₂ 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.

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 CO₂ emissions were already more than 25 percent below the 2005 baseline.

IBM's new CO₂ 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 (CO₂e), 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 (C₂F₆) to octafluorocyclobutane (C₄F₈) on selected chamber cleaning processes, reducing the CO₂ emissions associated with chamber clean operations by 40 percent. Because C₄F₈ has a much higher utilization rate and much lower global warming potential than C₂F₆, 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 CO₂ 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 CO₂ 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 CO₂ 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 CO₂ 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 CO₂ 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.

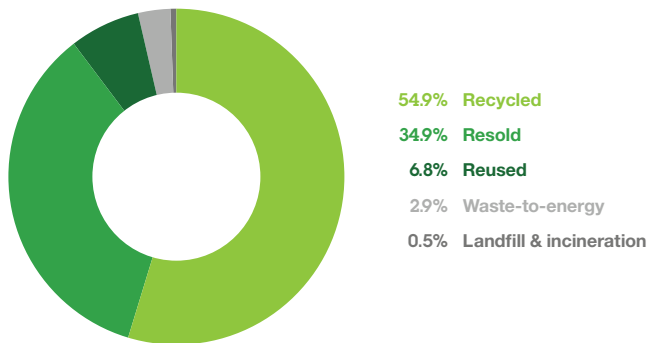
In 2014, the total weight of end-of-life products and product waste processed by these operations was approximately 32,000 metric tons (70.5 million pounds). This represents 76 percent of the estimated 42,000 metric tons of new IBM IT equipment put on the market in 2014.

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 through 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.

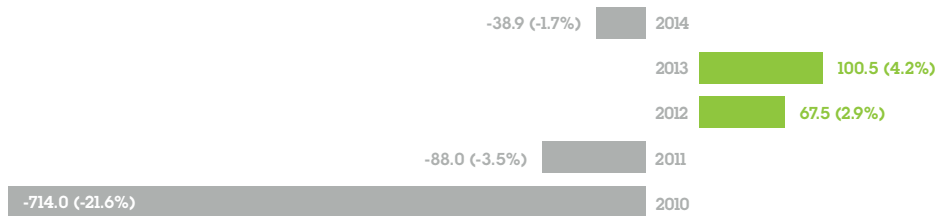
The goal is to achieve a year-to-year reduction in hazardous waste generation from IBM's manufacturing processes, indexed to output. The metric is measured at IBM's three microelectronics manufacturing locations that generate the majority of IBM's hazardous waste that is attributable to manufacturing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



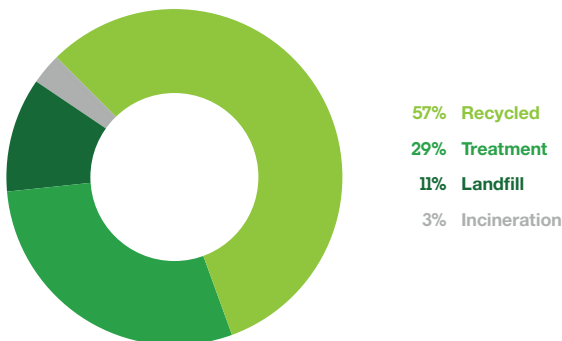
classified as hazardous waste from one of our microelectronics manufacturing locations, resulting from the delisting of the waste stream as “hazardous” in 2013. This IWTP sludge is now used as an alternative daily cover for a landfill.

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%

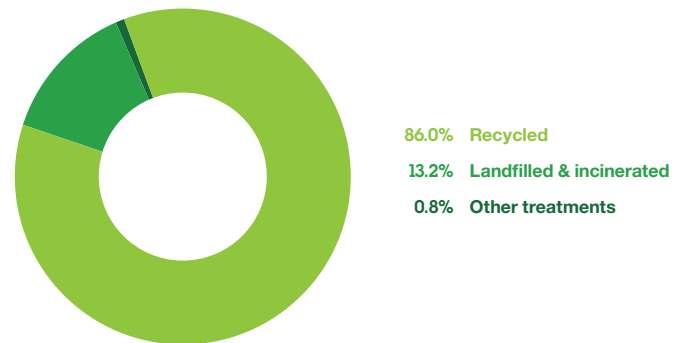
**IBM's goal is to send 75% for recycling.*

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

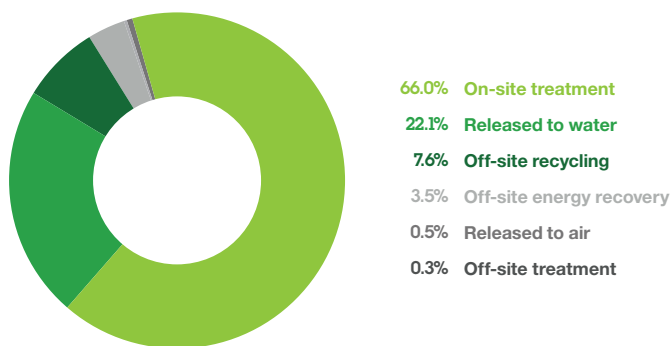
Under Section 313 of the US Emergency Planning and Community Right-to-Know Act (EPCRA), companies are required to file an annual inventory of reportable quantities of more than 600 chemicals that were manufactured, processed or otherwise used in quantities exceeding the reporting threshold of 10,000 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

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

(Metric tons x 1,000)



*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.

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%

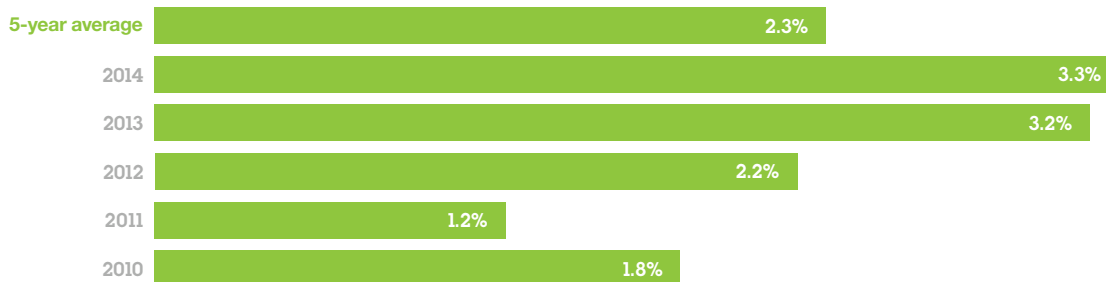
IBM's microelectronics manufacturing operations achieved a 2.3 percent average annual water savings over five years, based on previous years' usage — surpassing our goal of 2 percent.

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.

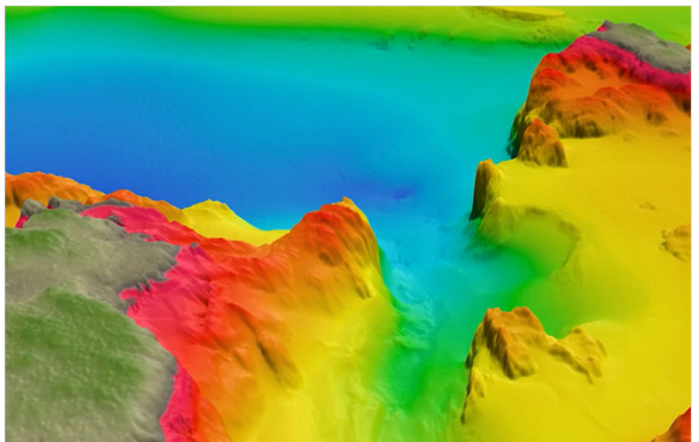
Preliminary models of the lake's circulation and runoff, developed with data from existing bathymetry and a 30-year study of Lake George, will be refined and enhanced with the new high-resolution bathymetric and topographic survey data. In addition, a combination of shore-based weather stations and lake-based 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.

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.

Project Green Horizon

IBM Research helps China deliver on ambitious energy and environmental goals

Urban Air Quality Management

IBM partnering with the city of Beijing to apply cognitive computing so authorities can pinpoint type, source and level of emissions to predict air quality in the city—and help Beijing deliver on its target of **reducing harmful particulate matter by 25% by 2017.**

25% particulate matter reduction

Click to view the full infographic on Project Green Horizon.

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.

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](#).



Smarter Building Management

Enterprises need buildings to deliver optimum performance at lower cost.

Buildings are essential tools for every business and enterprise, and they must perform optimally for an enterprise to deliver on its mission. But when it comes to buildings, often you don't know what you don't.

Click to view the full infographic on Smarter Building Management.

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 wide-spread use of these testing techniques.

Read more about this project at [IBM Research](#).

Sequencing the Food Supply Chain

IBM Research and Mars launch new consortium to drive advances in global food safety



[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 NOV's 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	\$71

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 (CO₂) 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.



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Please Recycle

Exhibit F

IBM Presentation to Proponent

[see attached]



IBM's Leadership Regarding Energy and Climate Change



IBM Corporate Environmental Affairs Staff
December 1, 2015

Overview

- IBM's Energy and Climate Protection Programs
 - Areas of Focus and Investment
 - IBM's Operational Goals
 - Results
- IBM's Point of View Regarding "Carbon Neutral"
- Summary

Areas of Focus and Investment

- Energy conservation and reduction of greenhouse gas emissions
 - The best kilowatt-hour for climate change is the kilowatt-hour that never had to be produced and consumed
- Procurement of renewable electricity for IBM's consumption
- Research, development, and deployment of innovative solutions at a global scale
 - Helping the world at large to reduce energy consumption and greenhouse gas emissions
 - Core to IBM's business expertise
 - IBM's technology and solutions have enabled reductions in emissions and energy savings that far exceed IBM's own emissions and energy use

IBM's Operational Goals

- Reduce or avoid global energy consumption each year equal to 3.5% of IBM's current year consumption
- Procure 20% of IBM's global electricity from renewable sources by 2020
- Reduce operational CO₂ emissions 35% by year-end 2020 against a 2005 baseline on a global basis

IBM's Operational Goals: Our Approach

- IBM sets goals to drive specific, desired outcomes
- Goals are oriented towards current accountability versus being merely aspirational
 - Biased towards near term action
 - Underscored with documented plans and commitments by line business units
 - Present-day expectations are clear, both internally and externally
 - Consistent with global leadership
- Horizon is typically 5 to 8 years, recognizing:
 - Dynamic nature of IBM's business
 - Rapidly evolving information technology and energy industries
- Sustainability matters
 - Goals which meet both environmental protection and business objectives ensure performance and results can be sustained over time

Results: Energy Conservation and Reduction of Greenhouse Gas Emissions

- Program in place since 1974; goal in place since 1996
 - From 1990-2014 IBM conserved 6.8 billion kwh of energy, avoided 4.2 million tons of CO₂ emissions, and saved \$550 million

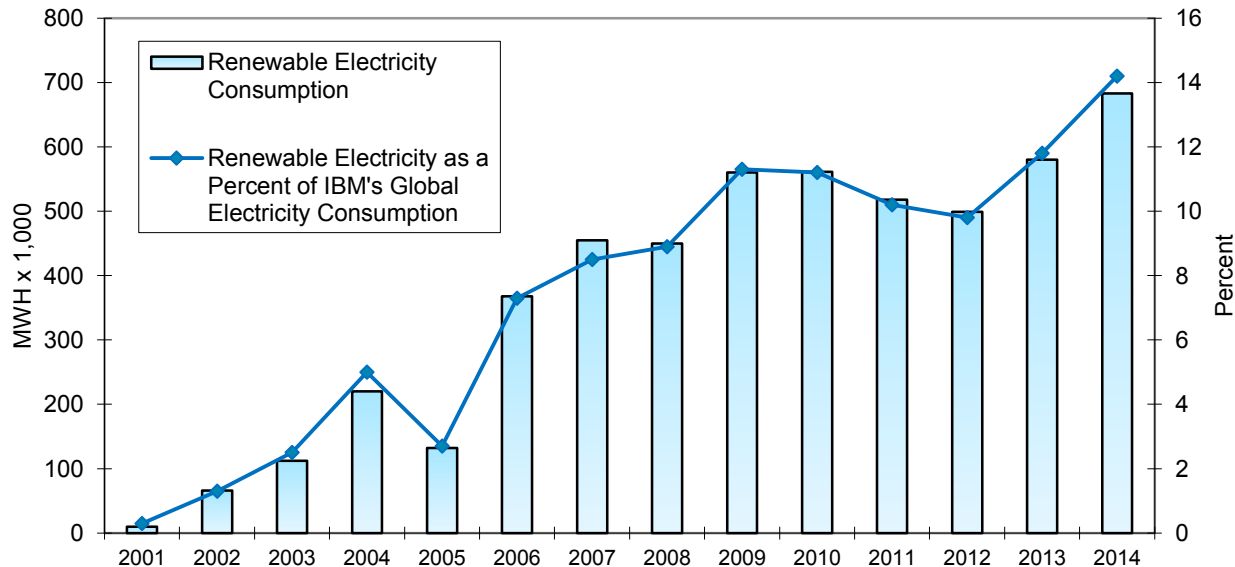
- Significant investments and results every year
 - For example, over the last 4 years IBM invested over \$100 million in energy conservation and achieved a 6.9% average annual reduction in energy use
 - IBM performs substantially better than its peers, most of whom are at 2% conservation or less per year (based upon publically available data)
 - From 2005 through 2014, IBM has already reduced CO₂ emissions by over 25%, on top of very substantial reductions prior to 2005

Results: Energy Conservation and Reduction of Greenhouse Gas Emissions (continued)

- Results are driven in three key areas
 - Deployment of analytics-based management systems across offices, labs, and data centers
 - Consolidation of server, storage and network equipment to achieve more work with less power and space
 - Continued upgrades to physical plants and core building systems

Results: Procurement of Renewable Electricity

- Early and sustained leadership (measuring and disclosing results for 15 years)
- 2014 purchases (excluding divested semiconductor operations): 645,000 MWH or 17.1% of IBM's global electricity consumption (not including what routinely comes via grid power)
- To meet our 2020 goal, IBM will need to procure 800,000 MWH of renewable electricity
 - This amount of renewable electricity is about equal to the total annual amount of electricity consumed by each of several other I/T companies from all sources



Results: Research, Development, and Deployment of Innovative Solutions

- IBM's Green Horizon project includes a renewable energy forecasting system which can help enable more wind and solar power to get onto electric grids
- IBM's micro-cooling technology is helping to make solar systems more feasible by enabling 80% of sunlight to be converted to useful energy when combined with solar concentrator technology
- IBM's Measurement and Management Technology visualizes the thermal profile in a data center and analyzes corresponding cooling patterns. This allows operators to make air conditioning more efficient and reduce energy consumption by 15%.
- IBM's Traffic Prediction Tool is powering solutions for traffic management which reduce congestion, travel times, fuel use, and emissions.
- IBM's energy efficient server and storage products can achieve up to 95% system utilization and reduce energy use by 20 to 80% compared to prior technologies

IBM's Point of View Regarding "Carbon Neutral"

- The direct acquisition of 100% renewable energy to power the global operations of a large organization across broad geographies is not feasible now or in the foreseeable future
 - Therefore, to assert a claim of being carbon neutral requires the purchase of unbundled renewable energy certificates (RECs) and/or non-energy offsets (e.g., tree planting)
- IBM does not plan to purchase unbundled RECs or non-energy offsets for the purpose of claiming that IBM is carbon neutral. There are numerous inherent flaws:
 - Purchasing offsets does not provide direct business value to IBM
 - IBM has demonstrably better uses for available money (reduction versus offset; research & development for global solutions)
 - The purchase of offsets to assert and remain "carbon neutral" is of dubious sustainability and perpetuity
 - The quality and veracity of offsets is uncertain in many cases
 - Offsets are purely a financial product

Unbundled Renewable Energy Certificates (RECs)

- Unbundled RECs separate electricity generation from electricity consumption.
 - What we want is for utilities to offer renewable energy in the places where we are located. Purchasing unbundled RECs does not promote that.

- Using unbundled RECs to assert that an organization's operations and/or products are 100% powered by renewable energy would be disingenuous.
 - If an organization wants to use discretionary money to financially subsidize renewables, just say that's what you're choosing to do.
 - Don't contemporaneously announce that you're "carbon neutral."
 - This properly separates an organization's financial decision to subsidize renewables from its actual use of energy and its actual carbon status
 - It also strips away "public relations" as a motivation

- IBM matches its renewable electricity purchases to the grid regions where it consumes electricity. IBM directs available funds to reducing its energy consumption and developing innovative solutions to help others do likewise.

Non-energy Offsets

- The quantity and timing of emissions reductions created by non-energy offsets are rather uncertain
- The quality is widely variable
 - One must ensure they are credible, additional, and sold only once
 - The costs to verify this are a significant part of the overall expenditure, lessening their appeal
- They provide no direct business benefit and are of dubious sustainability over the long term

Claims of being “carbon neutral”

- Claims of being “carbon neutral” as a consequence of purchasing offsets can lack transparency
- The general public could believe it is easy or easier to procure and use renewable energy than it really is
- This could lead to unhelpful skepticism regarding financial products that are directly linked to public relations activities, and it may hurt support for action on climate change more than it helps
- The use of unbundled RECs and non-energy offsets for claims of being “carbon neutral” or “powered by renewables” should always be completely transparent. PR can get in the way

Summary

- IBM has sustained a demonstrable commitment to environmental leadership with documented results for well over four decades
 - We published IBM's 25th annual Corporate Environmental Report in 2015

- IBM invests its available money in reducing GHG emissions via:
 - energy conservation
 - purchasing renewable electricity for IBM's actual consumption
 - developing products and solutions that enable the world at large to further reduce GHG emissions

Recognized Leadership

Energy Management and Climate Protection Awards A sampling from 1992 - 2015

