

The following narrative is being submitted in accordance with the Boulder Building Performance Ordinance (Ordinance No. 8071), Section 10-7.7-8. – Large Industrial Campus.

ISO 14001 and ISO 50001 Certified

IBM has a long history of driving energy conservation and sustainability through all parts of our business and has been recognized by numerous outside organizations for achieving significant results. IBM's Global Energy Management Program is integrated within its global Environmental Management System (EMS). IBM takes pride in its world class Global Energy Management Program and regards responsible energy management and investments in energy efficiency as part of our corporate mission. IBM has maintained a single global registration against the [ISO 14001 EMS standard](#) since 1997. In 2012, IBM successfully certified its Global EMS against the [ISO 50001 standard](#) on Energy Management. Under IBM's global registration, the company's largest sites - including the Boulder location - have achieved certification against ISO 50001 standard. The ISO 50001 standard is one of the most rigorous energy management process certifications, requiring companies to have well documented and managed energy management processes, understand their significant energy uses and maintain and execute a commitment to effective energy management across the organization and its operations.

IBM's [Corporate Environmental Policy](#) (Policy) calls for the responsible use of energy throughout our entire business, including conserving energy, improving energy efficiency, and giving preference to renewable over non-renewable energy sources where it makes business sense. The Policy also requires the company to meet or exceed all applicable government requirements and voluntary requirements to which IBM subscribes.

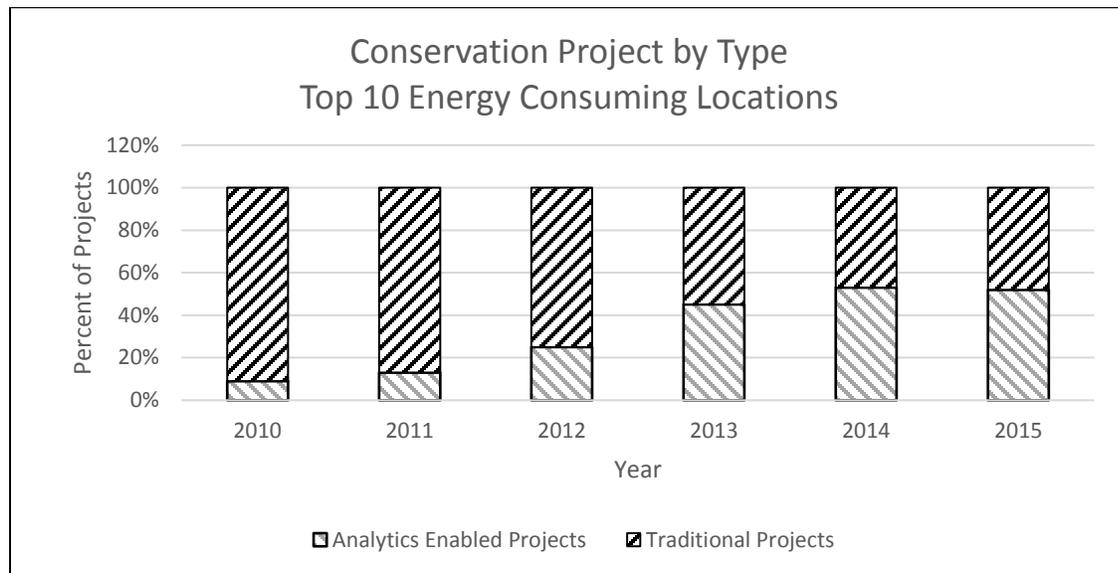
IBM's Energy Goals & Objectives

ISO 50001 requires the organization to create and maintain a set of "Energy Objectives, Energy Targets, and Energy Management Action Plans." IBM has maintained a corporate-wide goal to achieve annual energy conservation savings since 1996. The current target is to achieve annual energy conservation savings equal to 3.5% of IBM's total energy consumption. IBM Boulder maintains a very aggressive local energy goal of achieving 5% energy conservation year-on-year, which is in excess of the corporate-level goal. IBM's Boulder campus achieved this ambitious goal in 2015 and is currently on track to do the same in 2016.

In March, 2015 IBM [announced two new goals](#): (1) to procure 20% of its annual electricity consumption from renewable sources by 2020, and (2) to reduce CO2 emissions associated with energy consumption by 35% by year-end 2020 using 2005 as a baseline. In measuring against this goal, IBM does not consider the utility-provided renewable mix toward achieving its renewable electricity procurement goal. In addition, any Renewable Energy Certificates (RECs) that are counted toward this goal are to be retired. We have established an internal roadmap to meet these two goals and are currently working toward attainment.

Data Analytics Driven Energy Management – IBM’s Transformation

IBM formalized its energy conservation and management program in 1974 and has continually improved the program since that time. In recent years, IBM has seen the source of its energy savings shifting from traditional industry best practices (e.g. installing variable speed drives on motors, lighting and lighting control upgrades, HVAC retro-commissioning) to savings that leverage data analytics and cognitive computing-enabled optimization. The chart below demonstrates this shift to analytics-based systems which enable optimization and minimization of energy use across our energy using infrastructure.



At IBM’s Boulder campus, we use [TRIRIGA Real Estate Environmental Sustainability Manager \(TREES\) Impact Manager](#), a part of [IBM’s Building Management Center solution](#) to continuously monitor hundreds of air handling units simultaneously for failed controls that may be wasting energy. This technology is often called Fault Detection and Diagnostics (FDD), or monitoring-based commissioning (MBCx). The technology has been fruitful at IBM’s Boulder campus for identifying opportunities to improve the energy efficiency of IBM [and its clients’](#) energy-consuming systems.

IBM’s Boulder campus uses chilled water plants to cool its data center space and buildings in general. The Boulder site’s largest source of energy savings in 2015 came from optimizing the way these plants operate. Colorado’s arid climate is uniquely suited for evaporative cooling, and the IBM Boulder site engineering team is continually working to maximize the amount of “free” evaporative cooling we capture in the chilled water plants. Further, we [use third-party optimization tools](#) to continuously ensure the chilled water plant’s pressures, flows, temperatures and equipment staging are at optimal efficiency.

In terms of its data center IT loads, IBM’s Boulder campus uses data-driven solutions to manage energy consumption. IBM’s largest source of savings in data centers has been server consolidation, where the work load from individual servers are consolidated onto a single server or mainframe like an [IBM System Z](#). This results in tremendous energy savings, because hundreds of individual servers can be consolidated onto a single machine, resulting in more efficient computing and less heat for our chilled water plants to process. Additionally, IBM has installed thousands of temperature sensors in its data centers, using

sophisticated [IBM-developed software tools](#) to manage and visualize the data from these sensors. This tool is used to help make informed decisions while managing equipment, temperature controls and airflow in the data centers.

At IBM we take [environmental stewardship](#) seriously, maintaining a local focus with a global perspective. More detail on IBM's environmental programs can be found in the [IBM Environmental web pages and the IBM and Environment Annual Report](#).