New York City Uses Benchmarking to Drive Building Energy Efficiency
Plan targets city’s largest buildings

Buildings in the United States are a significant source of greenhouse gas emissions. Together, commercial and residential buildings are responsible for 39 percent of all U.S. greenhouse gas emissions and 8 percent of global greenhouse gas emissions.\textsuperscript{1,2} They also represent USD 500 billion in annual energy costs.\textsuperscript{3}

In cities such as New York, buildings account for an even higher share of total greenhouse gas emissions. In 2010, 75 percent of greenhouse gas emissions in New York City were attributed to energy use in buildings.\textsuperscript{4} (Figure 1).

In 2007, Mayor Michael Bloomberg unveiled PlaNYC, a sweeping set of proposals for making New York a more sustainable and livable city. The plan set a goal of reducing emissions by 30 percent from 2005 levels by 2030. In 2009, the city officially launched a cornerstone of this effort, the Greater, Greener Buildings Plan, which aims to reduce greenhouse gas emissions by about 5 percent by 2030.

**Figure 1: New York City CO\textsubscript{2} Emissions by Source in 2010**

\textbf{Source:} City of New York.
MEASURE GAUGES EFFICIENCY, MANDATES UPGRADES

The Greater, Greener Buildings Plan consists of four laws aimed at improving energy efficiency in New York’s largest buildings. The most important is the energy efficiency benchmarking law, which requires all buildings exceeding 50,000 square feet to gauge their energy and water consumption every year. Although buildings of this size represent only 2 percent of all properties in New York, they account for more than 50 percent of the city’s square footage and 45 percent of city greenhouse gas emissions. Property owners who fail to measure the energy and water consumption of their buildings face a small fine that increases if non-compliance continues.

To measure the energy and water consumption of their buildings, property owners use an online tool created by the U.S. Environmental Protection Agency called the Energy Star Portfolio Manager. This tool allows users to track and assess energy and water use information for their properties and ranks building efficiency against similar buildings across the country to determine an Energy Star Rating.

Property owners enter building data into the interactive web-based application to produce a series of metrics that rate a building’s energy efficiency, such as greenhouse gas emissions per square foot and water use per square foot. The Energy Star Portfolio Manager rates each building’s overall efficiency on a percentile scale of one to 100, compared to buildings of similar size and function. To ensure that the ratings accurately reflect the national situation — not just the subset of buildings that have used the online tool — they are based on a national survey conducted every four years by the U.S. Department of Energy’s Energy Information Administration, which assesses energy use from thousands of buildings across the United States.

New York City’s Greater, Greener Buildings Plan requires building owners to submit annual compliance reports of their energy and water consumption measurements and makes the ratings publicly available, allowing both property owners and tenants to better incorporate environmental information into their decisions.

The Energy Star Portfolio Manager encourages property managers to invest in energy-efficiency measures to reduce costs and improve performance, and can help prospective tenants find buildings that have lower monthly energy bills and a smaller carbon footprint.

Three other mandates in the Greater, Greener Buildings Plan support the benchmarking law:

• All building renovations must meet updated energy-conservation standards.
• All large buildings must undergo a full energy audit and retro-commissioning every ten years.
• Owners of large buildings must upgrade lighting and install sub-meters to track individual tenants’ energy consumption. The lighting upgrades require all non-residential areas to meet the New York City Energy Conservation Code by 2025. The sub-meters allow tenants to see their individual share of energy consumption and property owners to bill tenants for the exact amount of energy consumed.

PLAN REDUCES ENERGY USE, GREENHOUSE GAS EMISSIONS

Together, the Greater, Greener Buildings Plan and the Environmental Protection Agency’s Energy Star Portfolio Manager are changing the trajectory of building emissions. The Energy Star Portfolio Manager, first launched in 2000, is now used by more than 40,000 property owners in all 50 U.S. states. More than 250,000 commercial buildings, including schools, offices and retail outlets, use it to measure, track, assess and report on energy and water use. In New York City, 12,565 properties are covered by the Greater, Greener Buildings Plan and must use the tool. The Energy Star Management Portfolio plays a central role in helping these
properties reduce their energy use, and the city is on a path to reduce annual greenhouse gas emissions by 2.72 million tons of CO$_2$-equivalent by 2030.$^9$

The first benchmarking period under the Greener, Greater Buildings Plan ended on December 31, 2011. In August 2012, the city released its first annual report on energy efficiency in the city’s largest buildings, allowing property managers, city officials and tenants to better incorporate energy-efficiency information into their decisions. The report produced several interesting results and suggests that energy efficiency can be improved significantly without major costs.

One of the most important findings was the variation between the most- and least-energy-efficient buildings in the plan. The data show that the least-efficient buildings of a given type use three to five times as much energy as the most-efficient buildings of the same type. In some categories, such as retail buildings, the least-efficient properties were almost eight times as energy intensive as the most-efficient buildings.$^{10}$ (Figure 2).

**Figure 2: Variation in Energy Use Intensity within Five Building Sectors**

![Bar chart showing energy use intensity](chart.png)

- Lowest performing multi-family and office buildings use about 4.5 times more energy per square foot than highest performing buildings
- Lowest performing retail buildings use nearly eight times more energy per square foot than highest performing buildings
- Lowest performing hotels and educational buildings use more than three times more energy per square foot than highest performing buildings

*Source:* City of New York.

The report also showed which sectors had the greatest potential for improving energy efficiency. The office sector, which comprised the fewest properties covered by the plan but had the second-highest emissions, was identified as a target for energy efficiency projects due to its consolidated nature.

Overall, the plan and its energy and water consumption measurements provide valuable information to help New Yorkers identify the most effective ways to improve energy efficiency and foster a market environment that values energy efficiency. If less-efficient buildings brought their performance up to the current median level (64 out of 100), energy use in New York’s large buildings would decrease by 18 percent and citywide greenhouse gas emissions would decline by 9 percent. If all buildings improved to the 75th percentile, energy use in large buildings would decrease by 33 percent and citywide greenhouse gas emissions would drop by 15 percent.$^1$

Besides greenhouse gas reductions, the Greater, Greener Buildings Plan is expected to save USD 7 billion in energy costs and create 17,800 green jobs.$^{12}$
These figures include only mandatory actions under the plan and do not consider any improvements spurred by the increased information. If property owners make improvements as a result of their energy and water consumption scores, the plan’s benefits will be even greater. New York’s benchmarking strategy has attracted widespread interest and is now being replicated in other U.S. cities, such as San Francisco, Philadelphia, and Washington, D.C.

REFERENCES


1 U.S. Department of Energy, March 2012. “Buildings Energy Data Book.” Web. August 2012. <http://buildingsdatabook.eren.doe.gov/ChapterIntro1.aspx> Note that all greenhouse gas emission figures in this report include both direct and indirect emissions associated with providing energy for buildings. These figures include both on-site sources, such as boilers, and off-site emissions from power sources.


3 Ibid.


5 City of New York, 2012, op cit. (endnote #2)

6 Ibid.


8 City of New York, 2012, op cit. (endnote #2)


10 Ibid.

11 Ibid.

12 Ibid.

13 Ibid.

Figure References

Figure 1: New York CO$_2$ Emissions by Source in 2010.

Figure 2: Variation in Energy Use Intensity within Five Building Sectors