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NEW YORK CITY LOCAL LAW 84 BENCHMARKING REPORT

AUGUST 2012

A GREENER, GREATER NEW YORK

The City of New York
Mayor Michael R. Bloomberg

Cover Photo: Downtown Brooklyn
Credit: Associated Press

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Credit: New York CityEconomic Development Corporation

Acknowledgements

Most of the analytical work in this report was completed by Dr. David Hsu, Assistant Professor in the Department of City and Regional Planning at the University of Pennsylvania, and by Dr. Constantine Kontokosta, Deputy Director of the NYU Center for Urban Science and Progress (CUSP) and Founding Director of the NYU Schack Institute's Center for the Sustainable Built Environment. This report is possible because of their insight, creativity, and hard work.

The Mayor's Office was guided in this study by Adam Hinge, Managing Director at Sustainable Energy Partnerships, and Alexandra Sullivan, Program Engineer with the U.S. Environmental Protection Agency's (EPA) ENERGY STAR Program. Leslie Cook, the ENERGY STAR Public Sector Manager, provided invaluable guidance, along with other staff at EPA. In addition, Marc Zuluaga,VP, PE, and Jason Block from Steven Winter Associates, and Cary Hirschstein, Principal at HR&A Advisors, provided ideas for additional analysis for the multifamily sector.

New York City's high compliance rates, which made the richness of this report possible, were due in part to extensive outreach and education campaigns conducted with the financial and material assistance of numerous partners. The New York State Energy Research and Development Authority (NYSERDA) and Consolidated Edison, Inc. provided funding for an outreach effort to the real estate industry that was organized and managed by the Urban Green Council (UGC, New York Chapter of the U.S. Green Building Council) under its Executive Director, Russell Unger. This outreach was informed by pro-bono research directed by Candace Damon, Vice Chairman of HR&A Advisors. In addition, UGC worked with Charlotte Matthews, Vice President of Sustainability for the Related Companies, to create a benchmarking checklist. NYSERDA also subsidized benchmarking training classes, which were delivered by the New York Association for Energy Affordability under the leadership of Director David Hepinstall, and funded a Benchmarking Help Center, which was staffed by City University of New York (CUNY) students under the direction of Michael Bobker, Director of CUNY's Building Performance Lab. The New York Chapter of the Association of Energy Engineers also hosted an "Additional Benchmarking Resources" document on their website, with outreach resources and a list of service providers.

The high compliance rates are also an indication of the high level of involvement of the associations who represent the real estate industry in New York City, in particular, the Real Estate Board of New York (REBNY) and the New York chapter of the Building Owners and Managers Association (BOMA). The leadership and professionalism of those organizations contributed to this effort.

Three New York City agencies were instrumental in assisting with this report: the Department of Finance, which generated the list of covered properties, the Department of Buildings, which refined the data, and the Department of Information Technology and Telecommunications, which helped link the benchmarking data with other New York City data sets to enable a richer analysis.

Finally, the Mayor's Office owes special thanks to the Institute for Market Transformation (IMT) and its staff, particularly Cliff Majersik, Executive Director, and Andrew Burr, Director of the Building Rating Program. IMT has been a tireless supporter of benchmarking and disclosure ordinances nationally, and has assisted the City countless times in its efforts. We are particularly grateful to IMT and the Kresge Foundation, which secured and provided funds, respectively, for staff to assist the City in implementing the Greener, Greater Buildings Plan.

The primary authors of this report are Laurie Kerr, Hilary Beber, and Donna Hope of the New York City Mayor's Office of Long-Term Planning and Sustainability (OLTPS), with support from Sergej Mahnovski, David Bragdon, and Adam Freed. The report was designed by Siena Chiang, with support from Aaron Koch, Levan Nadibaidze, Stacy Lee and Justine Shapiro-Kline.


Credit: Payton Chung at Flickr (flickr.com/people/paytonc)

Executive Summary

The energy used in America's buildings is responsible for almost 8 percent of global carbon emissions and costs Americans more than $500 billion every year. Despite this enormous impact and expense, much about this energy use remains mysterious. Unlike our general awareness of the mileage per gallon performance when we buy or operate a car, most building owners and managers do not know whether their buildings are efficient. Tenants are usually even less aware. But all this is about to change quickly because of policies like New York City's benchmarking ordinance, which requires all large buildings in the city to annually measure and publically disclose their energy consumption. We are on the cusp of an information revolution about how energy is used in our existing building stock, which will ultimately help transform our energy economy into an information economy.

This report is the first analysis of New York City benchmarking data collected as part of Local Law 84 of 2009 (LL84), which requires all privately-owned properties with individual buildings over 50,000 square feet (sq ft) or with multiple buildings with a combined square footage over 100,000 sq ft to annually measure and report their energy and water use. Similar reports will be produced on the benchmarking data compiled in each of the coming two years. Data reported for calendar year 2010 encompasses nearly 1.7 billion sq ft of built space—equal to the built areas of Boston and San Francisco combined. This constitutes the largest collection of benchmarking data gathered for a single jurisdiction and documents the current state of energy consumption and performance in large buildings in New York City.

This report provides the first, fascinating glimpse into how New York City's buildings use energy. We have analyzed the energy used by different sectors and we can see how specific sectors, such as multifamily buildings and office buildings, dominate New York City's energy profile. The data reveals a tremendous range of use in each sector. Using this revelation, we have been able to estimate the potential for cost-effective citywide energy reductions. And we have started to analyze how various parameters, such as age, fuel type, or location, impact energy use in our building stock, information that will be instrumental in propelling efficiency gains.

But this is just the beginning. Next year, New York City's benchmarking analysis will contain two years' data, so we can start to track trends and ask other questions. In the next few years, we will merge this energy use data from benchmarking with information about building energy systems collected through the City's mandatory audit and retro-commissioning law, and with other databases containing information about the predicted and actual performance of retrofits. We are also partnering with the U.S. Department of Energy to house this information in a national energy efficiency data system, which will enable us to compare our data with that of other cities and states that are also starting to require benchmarking. We hope that this national data (in aggregate form and with proper privacy protocols in place) can be open to all users—building owners, policy makers, financial and energy experts, academics, etc.—who will ask an ever increasing array of important questions about energy use. Ultimately, the purpose of compiling this information is to enable the private sector to apply this information when choosing the highest impact investments to gain more efficiencies.

Key Findings

Property owners in New York City could achieve significant reductions in energy and greenhouse gas emissions by making cost effective improvements to the most energy intensive buildings.

- Energy use varies widely within the same category of building type (e.g., multifamily, office, industrial, and others), indicating the potential to achieve relatively large savings by bringing the poorest performers up to the current median of their peer group. In most sectors, the most energy intensive buildings use three to five times the energy used by the least energy intensive buildings.
- If all comparatively inefficient large buildings were brought up to the median EUI in their category, New York City consumers could reduce energy consumption in large buildings by roughly 18% and GHG emissions by 20%. If all large buildings could improve to the 75th percentile, the theoretical savings potential grows to roughly 31% for energy and 33% for GHG emissions. Since large buildings are responsible for 45% of all citywide carbon emissions, this translates into a citywide GHG emissions reduction of 9% and 15% respectively. Much of this improvement could be achieved very cost-effectively through improved operations and maintenance.

On average, buildings in New York City are in line with Northeast averages but use less energy than the national averages, perhaps due to the high quality of the region's older building stock.

- New York City's buildings perform significantly better than the national average, having a median ENERGY STAR score of 64 out of 100, according to EPA comparisons, although the weather-normalized energy use intensity for New York's buildings is comparable to the rest of the Northeast. This suggests that city's high scores could be attributable in part to the age of the city's building stock, which is similar to the rest of the region. Older buildings tend to have higher ENERGY STAR scores than newer buildings for a variety of reasons to be further explored, including less extensive ventilation systems, better thermal envelopes, and/or less dense or energy intensive tenant occupations.
- Though many factors are at play, newer office buildings in New York City tend to use more energy per square foot than older ones. This trend is generally true for buildings dating back to the early 1900s, with each 20-year group using more energy per square foot than the prior group. However, measurement per square foot does not necessarily reflect efficiency in terms of energy per unit of economic activity happening in buildings.
- Larger office buildings tend to be more energy intensive than smaller ones, whereas smaller multifamily buildings tend to be more energy intensive than larger ones.
- Multifamily properties were the predominant property type covered by LL84 and in the benchmarking data by number, square footage, energy use, and GHG emissions; followed by commercial office properties. All other uses (including industrial, hospitals, retail, and hospitality) constituted a relatively small portion of the data. Multifamily properties constituted 80% of the number of properties benchmarked, with offices constituting another 11%. The multifamily sector accounts for half the energy use, followed by the offices at one third, and all remaining uses at one sixth.
- Asthma rates in neighborhoods correlate with median Source Energy Use Intensity (EUI), a measurement of kBtu per square foot per year, in multifamily buildings. Neighborhoods with higher median EUIs, and thus less efficient buildings, have higher asthma rates in general. This correlation deserves more analysis.

Compliance with LL84 was relatively high, and government and industry can take steps to improve the benchmarking process and data accuracy.

- Compliance with LL84 was relatively high, particularly for a new program. Approximately 75% of covered properties complied with the benchmarking requirement by the extended deadline of December 31, 2011, indicating that an extensive outreach and education effort was successful in increasing property owners' awareness of this new law. We expect that familiarity with the program and enforcement will drive compliance higher in future years as the program becomes a more routine part of doing business. High participation also suggests that benchmarking will start having its ultimate intended effect: engaging property owners to evaluate the efficiency of their buildings.
- Of the 2.6 billion square feet subject to the benchmarking law, approximately 1 billion square feet is on properties with multiple buildings. These buildings are not typically individually metered, and therefore lack the monthly energy data at the building level that would enable building owners to benchmark those buildings individually.
- Analysis of the first round of benchmarking data revealed some confusion or difficulty on the part of participants, most of whom were benchmarking for the first time. As a result, common errors compromised the accuracy of about 15-25% of the data. These inaccuracies appear to be the result of either difficulties in obtaining accurate information, or a lack of familiarity with Portfolio Manager, the online reporting mechanism developed by the EPA, and the filing process, not deliberate misrepresentation. Data identified as the result of common errors was "cleaned" for the analysis in this report.

Recommendations

Benchmarking and disclosure will form the foundation of a national energy efficiency database, which will enable the creation of an information economy based on existing buildings. We are partnering with the U.S. Department of Energy and others to include information from audits and retro-commissioning along with the benchmarking data in the database. We strongly encourage other cities and states to adopt benchmarking and disclosure ordinances, to provide robust information on the national scale.

As with any new policy or program, the first year has provided experience that can be used to improve benchmarking going forward. The City will implement five actions to improve the quality of energy benchmarking in New York City and the ease of compliance for building owners:

- The City will work with private utilities, state regulators, and technology companies to enable building owners to automatically upload whole building energy data. This will streamline the process of acquiring energy data and improve its accuracy. Automatic uploading is already in practice for one public utility: in 2012, the New York City Department of Environmental Protection (which serves as the city's water utility) began automatically uploading water data for buildings subject to LL84.
- The City will work with private energy providers and state regulators to identify incentives to help offset the cost of providing building level sub-meters for properties with multiple buildings. These properties represent approximately 40% of the square feet subject to the benchmarking law.

Mayor Bloomberg and Speaker Quinn announce the Greener, Greater Buildings Plan at Rockefeller Center on April 22, 2009.

- The City will explore the use of Light Detection and Ranging (LIDAR) data to calculate the above-grade square footage of LL84 properties to improve accuracy and reduce costs for building owners.
- The City will work with the City Council to clarify the benchmarking law and remove data gathering requirements which have become unnecessary.
- The City will seek funding to maintain the Benchmarking Help Center for an additional three years.

About the Greener, Greater Buildings Plan

Local Law 84 of 2009 (LL84) is part of a comprehensive effort called the Greener, Greater Buildings Plan (GGBP), which targets energy efficiency in large existing buildings. The GGBP is an internationally recognized, industry-transforming program that is leading the nation in energy efficiency policy. The program is designed to ensure that energy information is provided to decision-makers and that the most cost-effective energy efficiency measures are pursued.

The GGBP consists of four regulatory pieces supported by extensive jobs training and a financing entity called the New York City Energy Efficiency Corporation (NYCEEC). It includes the requirement that large buildings annually benchmark their energy performance (LL84); that a local energy code be adopted (Local Law 85 of 2009); that every 10 years these buildings conduct an energy audit and retro-commissioning (Local Law 87 of 2009); and that by 2025, the lighting in non-residential spaces be upgraded to meet code and large commercial tenants be provided with sub-meters (Local Law 88 of 2009).

These laws are estimated to reduce citywide GHG emissions by roughly 5%, result in a net savings of $7 billion, and create roughly 17,800 jobs by 2030. These estimates do not include improvements that will be induced by the laws but are not mandated, such as operational improvements triggered by low benchmarking scores, or energy retrofits installed because of information from an audit. Consequently these estimated savings are far less than the potential 9% citywide GHG reduction that would be achieved by bringing all large buildings up to the median or the 15% reduction by bringing them all up to the 75th percentile (see Fig. 15).

Background and Context

Benchmarking and its Benefits

Benchmarking provides a gauge of a building's energy performance, establishing a metric for the comparative energy efficiency of buildings. This metric is similar to a miles per gallon (MPG) rating for the fuel efficiency of automobiles. But benchmarking is even more useful than a standard MPG rating, which applies broadly to a "make" of car, because benchmarking can reveal that even buildings of an identical type consume energy in very different ways depending on intensity of use and operating and maintenance practices.

The U.S. Environmental Protection Agency (EPA) created, and continues to refine, an online tool called the ENERGY STAR Portfolio Manager (Portfolio Manager), which allows property owners to analyze the energy and water consumption of buildings, and provides a comparative metric of their energy efficiency. While there are other building benchmarking tools, the term "benchmarking" as used in this report and in New York City's program refers to Portfolio Manager. In Portfolio Manager, a building owner enters information about a property, such as gross square footage, types of uses, number of workers, and hours of operation, along with the building's monthly energy and water consumption data. Portfolio Manager uses those inputs to calculate several useful metrics:

Site Energy Use Intensity (EUI), which equals the amount of energy consumed at the site (in kBTU, per year per gross square foot). Portfolio Manager also generates a weather-normalized Site EUI, which facilitates comparison between different parts of the country or between years. When site EUI is weather-normalized, it is identified as such in this report.

Source EUI, which equals the amount of energy needed to create all the energy consumed on the site, per square foot. This figure takes into account, for example, energy lost due to the generation and transmission of electricity. The Source EUI can also be weather-normalized. When not otherwise specified, Source EUI in this report refers to weather-normalized Source EUI.

Greenhouse gas (GHG) emissions per sq ft, with the carbon coefficient based on New York City's EPA Emissions & Generation Resource Integrated Database (eGRID) subregion, which includes Westchester. (Note that the coefficient used in EPA calculations differs slightly from the coefficient used in the annual New York City Greenhouse Gas Emissions Inventory, which applies solely to New York City).

Water use per sq ft, which gives a measure of how efficiently a building uses water.

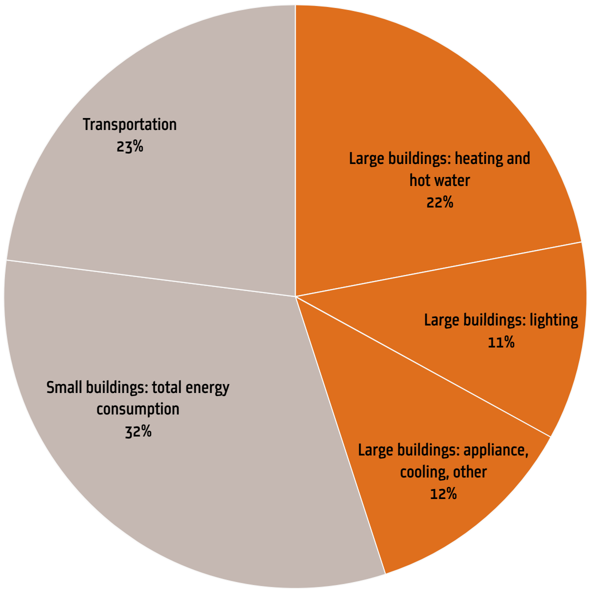
ENERGY STAR score, which is a 1-to-100 percentile ranking for specified building types, such as offices, hospitals, and retail, with 100 being the best score and 50 being the median. It compares the energy performance of a building against the Commercial Buildings Energy Consumption Survey (CBECS), a national database, and independent industry surveys for that building type. This ENERGY STAR score is normalized for weather and building attributes in order to obtain a measure of efficiency.

In New York City, 75% of greenhouse gas (GHG) emissions come from energy used in buildings. This is almost double the proportion in the U.S. as a whole, where energy used in buildings constitutes 39% of GHG emissions. While reducing building energy use is often the most cost-effective way to reduce energy consumption and GHG emissions, building energy efficiency improvements are not yet happening at sufficient scale to achieve the City's overall GHG emissions reduction goal of a 30% reduction by the year 2030 (compared to a 2005 baseline).

A key reason for this delay in progress is the opacity of energy use in buildings. Benchmarking makes energy consumption in buildings quantifiable and transparent, enabling building owners and operators to prioritize their energy investments, reduce their consumption and save money. In short, benchmarking is the first logical step toward understanding and improving the energy performance of existing buildings.

Figure 1: Breakdown of Energy Consumption Citywide

Large buildings account for 45% of New York City's energy use.



Source: NYC Mayor's Office

Requiring building owners to benchmark, through law or municipal code, has many benefits. Existing databases, such as the EPA's, have been generated from voluntary benchmarking, which is unrepresentative because it is self-selecting. In contrast, mandated benchmarking provides data from all buildings in whatever category the law or code requires, offering a more accurate picture of the existing building stock. This report shows that the data from New York City's mandatory benchmarking is very rich, affording new insights that can lead to transformative, citywide change.

Public disclosure of the results increases these benefits because it provides an incentive for owners to improve their buildings' performance. Public disclosure also provides transparent information about energy consumption to interested parties, such as current or prospective tenants and banks and other financing parties, allowing them to make more informed decisions that positively influence the market for energy efficiency. In short, public disclosure helps the market work better.

PlaNYC, the Greener, Greater Buildings Plan, and Benchmarking

On Earth Day in 2007, Mayor Bloomberg launched PlaNYC, a comprehensive plan for the sustainable growth of New York City through 2030. PlaNYC established ten long-term goals, including achieving the cleanest air quality of any big city in the U.S., ensuring that all New Yorkers live within a 10-minute walk of a park, improving the reliability of our energy system, decreasing water pollution in our waterways, and reducing citywide GHG emissions 30% by 2030 from a 2005 baseline.

In December 2009, the City Council passed and Mayor Bloomberg signed into law the Greener, Greater Buildings Plan (GGBP), a suite of four laws that constitutes the most comprehensive policy addressing energy efficiency in existing buildings that has been enacted in the U.S. In addition to the legislative components of the GGBP, which require mandatory benchmarking for large buildings, the plan also includes programs to finance energy efficiency retrofits and to provide workers with the skills needed to implement the GGBP.

The GGBP mandated the creation of the New York City Energy Code (Local Law 85 of 2009), which removed a loophole in the New York State energy code that had exempted most renovations from being required to meet code. The three other GGBP laws cover only the city's largest properties: those with a single building larger than 50,000 square feet (sq ft) or with multiple buildings on a lot totaling over 100,000 sq ft, and City-owned buildings over 10,000 sq ft. The large properties covered by the plan are responsible for 45% of the energy used in NYC, even including the energy used by the transportation sector (see Fig. 1).

The GGBP laws impacting large existing buildings focus on transparency and information about building energy use. They include five provisions, three of which ensure that information about energy use gets to people who can act on that information to improve energy efficiency: benchmarking and disclosure (Local Law 84 of 2009), auditing (Local Law 87 of 2009), and sub-metering (Local Law 88 of 2009). The remaining two provisions require physical and operational improvements: retro-commissioning (Local Law 87 of 2009), and lighting upgrades (Local Law 88 of 2009).

In addition to reducing GHG emissions by nearly 5% by 2030, the GGBP is projected to reduce citywide energy costs by more than $1 billion annually, with cumulative net benefit exceeding $7 billion. Over the same period, the GGBP is expected to create or preserve at least 17,800 local skilled jobs.

Benchmarking and public disclosure are the cornerstone of the GGBP. The law requires the annual benchmarking of all properties covered by the GGBP, the eventual posting of the scores on a public website, and the production of an annual report on the benchmarking process and data for the first three years. Benchmarking for City-owned buildings began in 2010 for 2009 data, and mandatory benchmarking for large residential and non-residential properties began in 2011 for 2010 data. Benchmarking scores will be publicly disclosed after the second year of benchmarking for non-residential buildings (2012) and after the third year of benchmarking for residential buildings (2013).

Major Features of NYC's Benchmarking Law

- Annual benchmarking enables building owners to compare year-to-year performance and assess which strategies are working. It also allows the City to track the impact of its policies.
- Public disclosure ensures that energy efficiency joins other publically available data regarding a building's management and finances, and should incentivize all buildings to consider the most cost effective improvements, such as improving operations.
- The largest properties were targeted because comparatively few large buildings account for much of New York City's built area: the roughly 15,000 private and public sector properties over 50,000 square feet constitute less than 2% of the number of properties, but contain half of the city's total square footage. Also, these large buildings tend to have sophisticated management structures, and access to expertise and information through industry organizations.
- All property types, including multifamily buildings, were included. This is important because multifamily buildings are responsible for almost half the energy and 60% of the carbon emissions from large buildings in New York City.
- Benchmarking of water use, along with energy use, is required by LL84 once automatic meter reading equipment has been installed.

Baseline Criteria for LL84

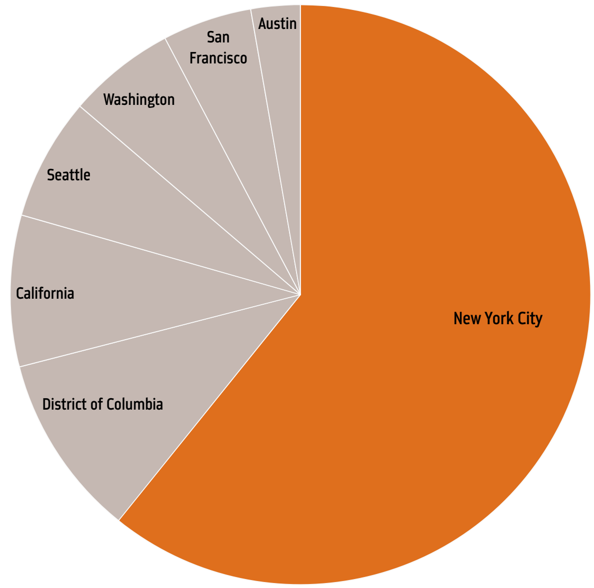
City Government Buildings. Municipal buildings are held to a more stringent standard than private sector buildings. All City properties larger than 10,000 sq ft are required to annually benchmark. The City began benchmarking its buildings in 2010 for 2009 data, a year ahead of the private sector. The law also required the City to publish a report and to publicly disclose its 2010 data, which it did in September 2011 (http://www.nyc.gov/html/dem/downloads/pdf/Benchmarking%20Report%2011-23-11.pdf).

The City annually benchmarks 2,730 City properties, constituting 260 million sq ft of space. A second report on benchmarking results of City-owned properties will be released in September 2012.

Private Sector Buildings. A private property is required to benchmark annually if it is a lot containing one building that is larger than 50,000 sq ft, or if it is a lot with multiple buildings and

Figure 2: Square Footage Impacted by Benchmarking Regulation

Local Law 84 accounts for 61% of the built area captured by benchmarking ordinances around the nation.



Source: Institute for Market Transformation

square footage totaling more than 100,000 sq ft. Private buildings were first required to benchmark in 2011 for 2010 data. Approximately 12,600 private sector lots (around 24,000 buildings) are covered by the law, constituting 2.6 billion square feet of space—an area roughly twice that of the built square footage of San Francisco or Boston. The results of private sector benchmarking will also be publically posted, beginning next year with the 2011 data for non-residential properties, and the following year with the 2012 data for residential ones. The individual building data to be publicly disclosed includes the Site EUI, Weather-normalized Source EUI, scores for ratable building types with a few exceptions, GHG per sq ft and water per sq ft, once the latter is available. In addition to the posting of individual building data, a report on aggregate data and trends, of which this is the first, will be developed and made public for the first three years of benchmarking.

Annual Compliance Date. The benchmarking due date for all covered buildings is May 1 of each year. The deadline was extended solely in the first year to provide building owners more time to understand the process. For 2010 data, the first due date was delayed until August 1, 2011, with an extension to December 31, 2011. After this date, non-complying property owners were fined. Except for the Compliance Chapter, this report analyzes only the data that was collected through the August 1 deadline.

More information on LL84, including the text of the law and information on how to comply, can be found at: www.nyc.gov/ggbp.

The data captured by the City's benchmarking requirement is the largest collection of energy data for privately owned buildings for a single jurisdiction in the U.S. When all of the nation's current benchmarking policies are added together, New York City's accounts for over half the square footage and almost half the buildings captured by them (see Fig. 2).

Characteristics of Covered Properties

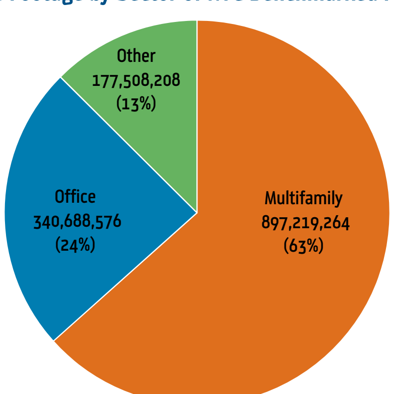
New York City's benchmarking ordinance applies to lots, known as Borough- Block-and-Lots (or BBLs), not to individual buildings. Lots with a single building with a gross floor area greater than 50,000 sq ft and lots with more than one building and a gross floor area of more than 100,000 sq ft are required to annually benchmark. These properties are called "covered buildings" in the law, but for clarity, they are referred to as "covered properties" in this report.

To conduct a more robust analysis, the information submitted for LL84 was merged with building data from the New York City Department of City Planning's Primary Land Use Tax Lot Output (PLUTO) database. This database provides a variety of building characteristics that proved useful in understanding trends in energy consumption by building type or among buildings with similar characteristics (e.g., age, type of construction, etc.). Except for the analysis on compliance rates and where otherwise noted, this report describes the characteristics of covered properties that submitted benchmarking results by the first compliance date of August 1, 2011.

Breakdown by Building Type

64% of covered buildings were benchmarked by the August 1 deadline, resulting in data on 1.7 of the 2.6 billion sq ft of private property covered by the ordinance. After this data was cleaned to eliminate obvious errors, over 1.4 billion sq ft of space remained in the database for this analysis. Multifamily buildings dominate this data set, comprising 63% of the total square footage benchmarked, with office buildings comprising another 24%, and the remaining 13% representing industrial, hospitals, retail, hospitality, and a variety of other use types (see Fig. 3). Note that in this dataset, multifamily and office buildings are somewhat over-represented when compared to all of these other uses because of their higher compliance rates with the benchmarking ordinance (see Fig. 32).

Figure 3: Square Footage by Sector of NYC Benchmarked Properties*



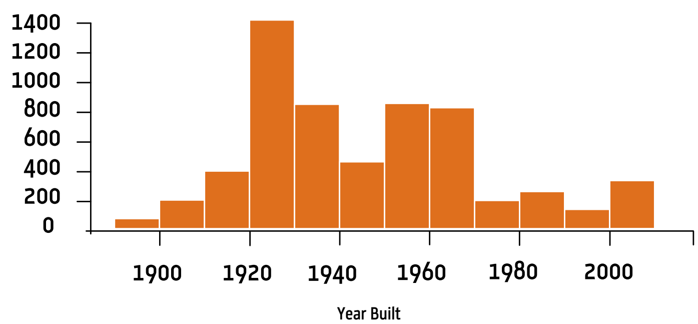
*Based on August 1 submittals

Source: New York University

Breakdown by Age

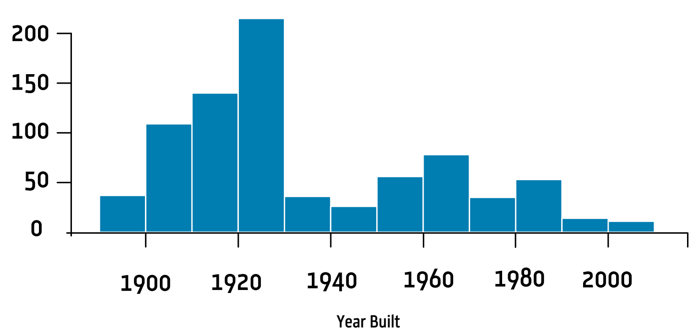
The year a building was built can have an impact on how it uses energy because of the design strategies and engineering systems that were common during that era. Most of New York City's large buildings were built during the 1920's and 1930's, or the 1950's and 1960's. The major boom for office buildings started at the turn of the 20th century and continued until the crash of 1929. Multifamily buildings experienced more prolonged growth from 1910 through 1970, with clear peaks in the 1920's and 1930's, and the 1950's and 1960's (Fig. 4).

Figure 4: Multifamily and Office Properties by Age (Number of Properties)



Multifamily Properties

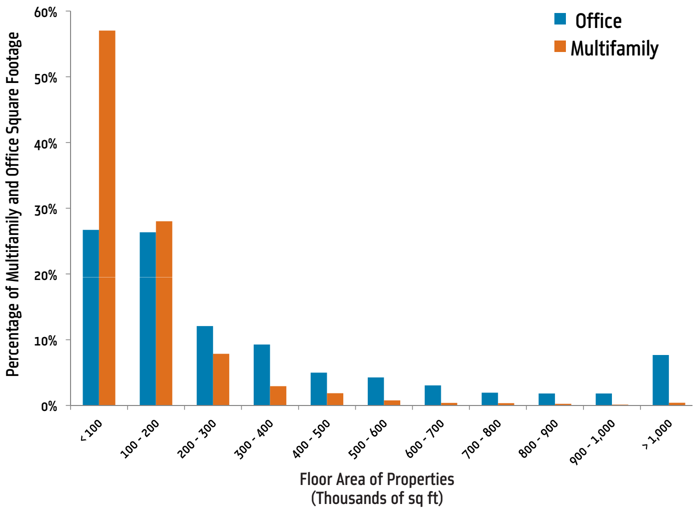
Source: University of Pennsylvania



Office Properties

Source: University of Pennsylvania

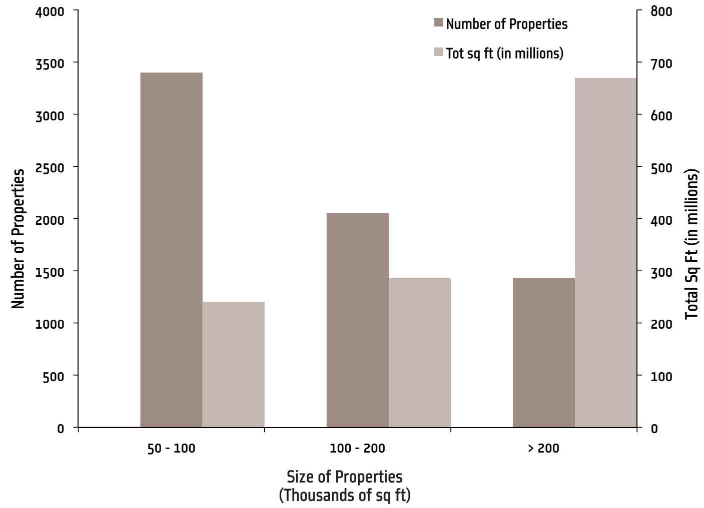
Figure 5: Percent of Multifamily and Office Square Footage by Property Size



Source: University of Pennsylvania

Figure 6: Property Size Distribution*

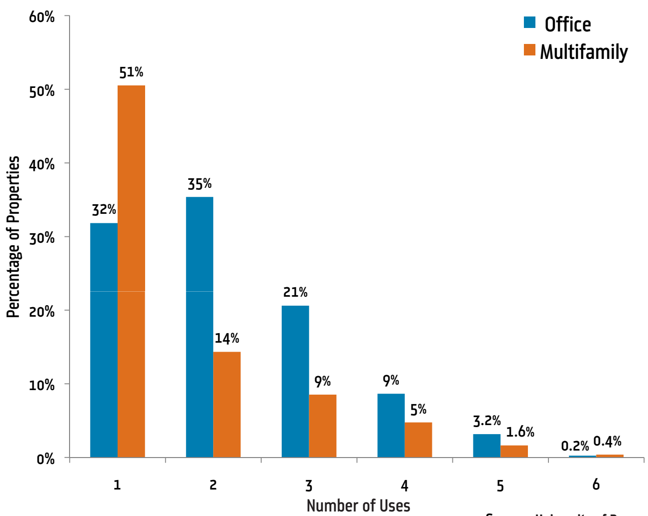
Whereas almost half of the covered properties are between 50,000 and 100,000 sq ft, almost half the square footage is in properties larger than 200,000 sq ft.



*This chart only includes properties in UPenn's "cleaned" data set.

Source: University of Pennsylvania

Figure 7: Number of Uses Within Multifamily and Office Properties



Source: University of Pennsylvania

Figure 8: Largest Multifamily Properties by Sq Ft

All of the ten largest multifamily properties in New York City contain more than one building on the lot.

LOT	MILLION SQ FT	# BUILDINGS	FLOORS
1	7.7	14	20
2	3.3	45	9
3	2.9	39	9
4	2.5	31	9
5	1.9	5	20
6	1.5	5	44
7	1.5	4	27
8	1.4	7	25
9	1.4	6	34
10	1.4	3	24

Source: University of Pennsylvania

Alterations, which also impact energy usage, show a somewhat different pattern. Two booms occurred in the 1920's and 30's, and the 1950's and 60's, but an additional peak of alterations occurred in the 1980's, and a smaller one in the first decade of the 21st century.

Breakdown by Property Size and Lots with Multiple Buildings

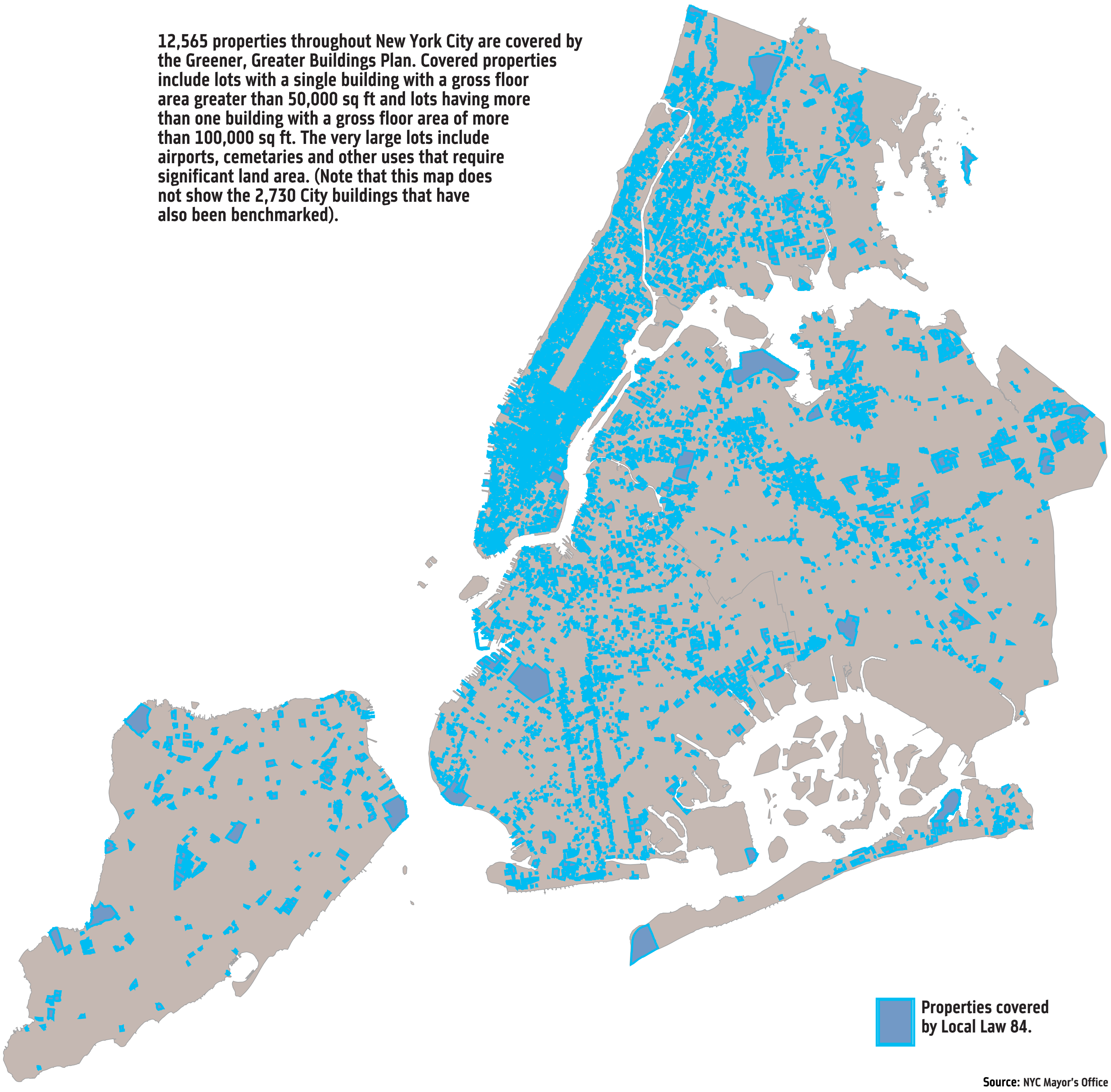
While smaller properties make up the majority of covered properties by number, large properties constitute the majority of the square footage benchmarked. Almost half of the covered properties are between 50,000 sq ft and 100,000 sq ft, whereas almost half the square footage is in properties over 200,000 square feet (Fig. 6). There are some properties that are less than 50,000 sq ft because some smaller buildings on lots with multiple buildings were benchmarked separately.

Lots containing more than one building are very important because they can contain so much built area. Such lots comprise only 11% of the covered properties, but represent more than half of the number of buildings and 40% of the square footage, for a total of over one billion sq ft. In fact, every one of the ten largest multifamily properties benchmarked are lots with multiple buildings, ranging from 3 buildings to 45 (see Fig. 8). Benchmarking such properties can be challenging, because many of these buildings share energy systems and meters that make it very difficult to determine how much energy is consumed at the individual building level.

Mixed Uses within Buildings

EPA's Portfolio Manager collects data on the different uses within covered properties, which can greatly impact energy use (see Fig. 7). In general, office buildings have more mixed uses than multifamily properties do. Slightly more than half of the multifamily buildings are single use, containing only housing units and no retail, parking, or office space. More than two-thirds of office buildings have at least two uses and many have three or four. A second indicator of the relative complexity of office properties is the percentage of overall area devoted to other uses. In office buildings, secondary uses comprise almost 9% of the total area, with retail and banks accounting for nearly half of this, compared to 4.5% for the multifamily buildings. These secondary uses impact energy profiles in ways which warrant further study.

Figure 9: Map of Covered Properties



Source: NYC Mayor's Office

Year One Benchmarking Results

Several patterns emerged in the analysis of 2010 data, suggesting different ways of assessing the citywide savings potential from energy efficiency. These big picture results exclude properties under 50,000 sq ft and all City-owned buildings.

Variation in Energy Use Intensity

One of the most striking findings is the wide variation between the most and least efficient buildings. The range of energy consumption by New York City's buildings indicates a high potential for immediate, very cost-effective energy efficiency improvements. For a range of building types, a comparison of Source EUI between efficient buildings at the 95th percentile versus inefficient buildings at the 5th percentile shows that the least efficient buildings in each category typically use three to five times the energy as the most efficient buildings that house similar activities with similar levels of lighting, heating, and so on (Fig. 10). (The variability can be even greater in some categories, such as retail, where the highest energy intensive spaces use almost eight times the energy as the least intensive ones.)

Sector Impacts

Sector-by-sector analysis suggests the most promising targets for efficiency improvements. Multifamily buildings make up the majority of both number of properties and area, comprising 80% and 65%. Their proportional energy use is not as pronounced (slightly less than 50% of all consumption) because multifamily buildings are not nearly as energy intensive as office buildings and other space types, such as hospitals or retail. Their portion of GHG emissions, however, is significantly higher (58%) than their proportional energy use because most multifamily buildings use fossil fuels for heat and hot water, which accounts for the majority of their energy consumption (see Fig. 12).

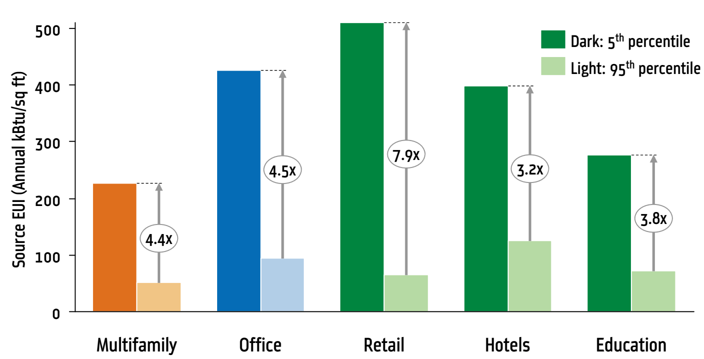
Office buildings are the second largest sector. Because they are large and energy intensive, they account for just 11% of the number of benchmarked properties, but almost a quarter of square footage and over a third of building energy use. In terms of GHG emissions, office buildings contribute 27%, because the predominant fuel type used is electricity, which is less GHG-intensive than the fossil fuels in which dominate the multifamily buildings. All the other sectors combined (including industrial buildings, schools, hotels and retail, etc.) comprise a smaller square footage and energy impact than either the office or multifamily sectors (Fig. 12).

Targeting the office sector for energy reductions makes strategic sense, because so much energy is used in relatively few buildings. Achieving more efficiency in the residential sector will be more challenging because the buildings are so numerous, but their impact is far too large to ignore, specifically regarding GHG emissions. The "other" category includes some buildings which are very energy intensive, particularly hospitals, which are excellent targets for energy reduction efforts (Fig. 13).

Overall Energy Efficiency

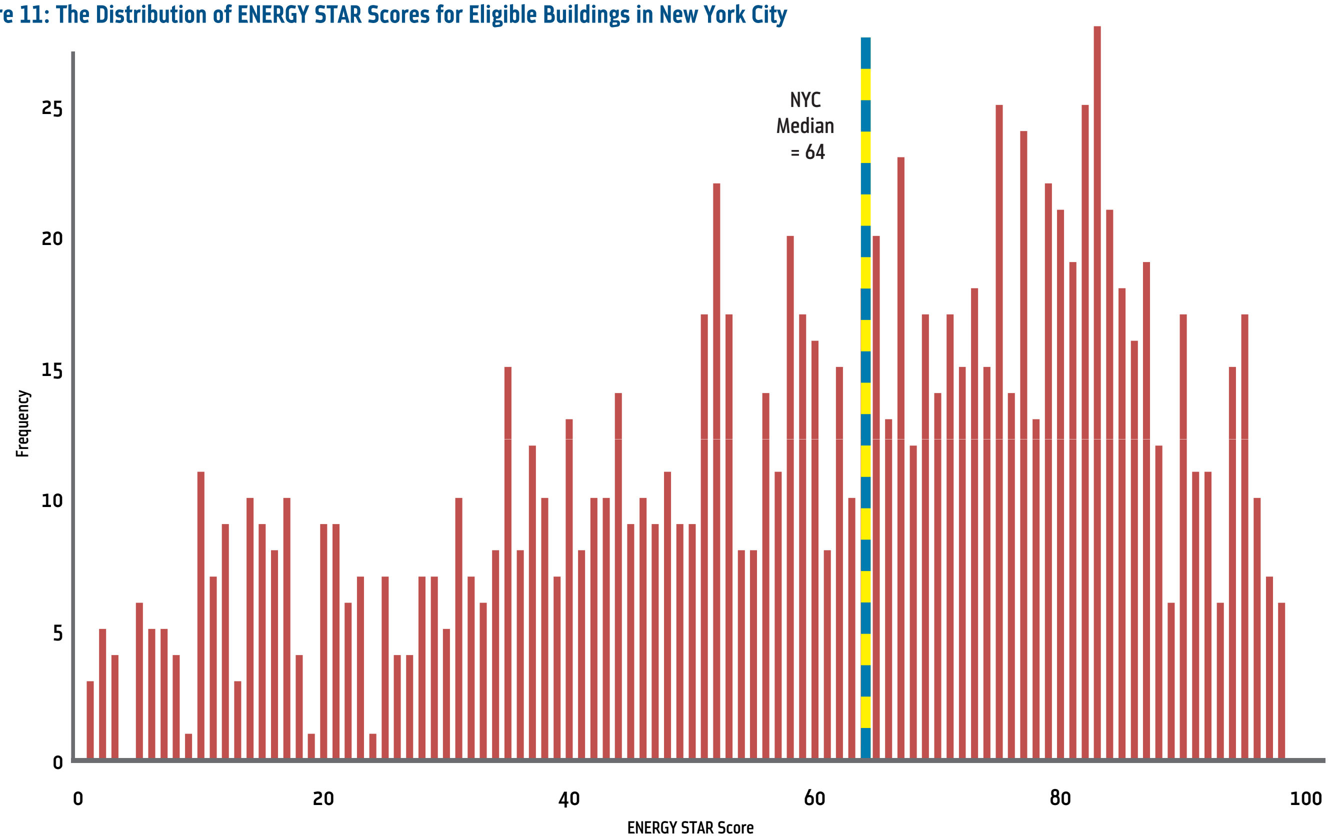
The total energy and GHG emissions associated with each quartile of three sectors (multifamily, office, and other) show once again that multifamily buildings dominate in terms of both energy and GHG emissions (Fig. 14). However, the worst quartiles in the office and other categories emerge as particularly compelling targets for energy efficiency, and the worst quartile of the multifamily properties emerges as the best candidate for GHG emissions reduction. In fact, this multifamily quartile is responsible for 20% of GHG emissions from all large buildings in the city.

Figure 10:Variation in Source Energy Use Intensity (EUI) Within Five Sectors



Source: NYC Mayor's Office

Figure 11: The Distribution of ENERGY STAR Scores for Eligible Buildings in New York City



Source: University of Pennsylvania

The Distribution of ENERGY STAR Scores

Portfolio Manager creates a percentile rating, called the ENERGY STAR score, for 15 building types, excluding multifamily residential. For 11 of these 15 building types, the score compares a building with data from similar buildings in the U.S. Department of Energy's Commercial Buildings Energy Consumption Survey (CBECS) to create a percentile score, normalized to factor out weather, worker density, and the provision of certain amenities, such as swimming pools, in order to create a measure of energy efficiency. The ENERGY STAR scores for the remaining four building types are based on independent industry surveys.

Only 1,479 of the roughly 12,600 properties that submitted benchmarking reports were ratable using the Portfolio Manager ENERGY STAR score methodology, because multifamily buildings, certain other building types, and highly mixed-use properties are presently not rated under ENERGY STAR.

The data indicates that New York City's covered properties are performing better on average than buildings nationwide. The distribution of ENERGY STAR scores shows a significant skew toward high scores and a median score of 64 as compared to the national average of 50, indicating greater efficiency (Fig. 11). Other indicators also support this trend, including benchmarking analysis of City government buildings, which shows over 54% performing better than the national average, with a median score of 59.

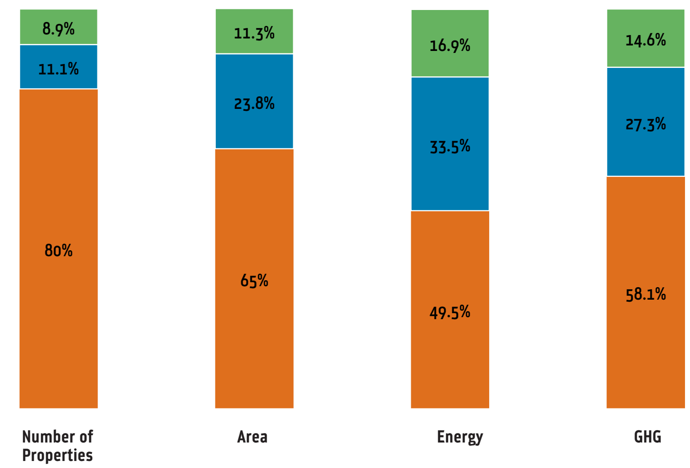
However, further analysis is needed before drawing final conclusions about the relative efficiency of New York City's buildings. The average Source EUIs for New York City's multifamily and office buildings (see Figs. 17 and 18), are very close to the averages for the Northeast in national databases. For the multifamily properties the median New York City EUI is 132.2, compared to 130 from the Residential Energy Consumption Survey (RECS) 2005 database. For offices, the median New York City EUI is 213.3, compared to 210 from the 2003 CBECS database. Furthermore, the distribution of EUIs for both sectors fall into classic bell-shaped curves. Together, these indicate that New York City's benchmarking data is of reasonable quality and well aligned with regional norms.

The fact that New York City's ENERGY STAR scores are higher than the national average, while the EUIs are in line with data from the Northeast, may in part be due to the relative age of buildings in the Northeast, including New York, when compared to the rest of the country. Older office buildings (see Fig. 24) tend to use less energy per square foot than new ones because of a variety of factors, including less extensive ventilation, better insulated envelopes, and lower intensity of use that characterize older office buildings. Another factor is that EUIs constitute "raw data," while ENERGY STAR scores are normalized for weather, hours of use, and density of workers. New York City's buildings may be receiving higher scores because they are much more intensively used, both in terms of density of workers and hours of use.

To be eligible for an ENERGY STAR certification, a building must achieve an ENERGY STAR score of 75 or greater and meet additional criteria. Almost 400 of New York City's ratable properties achieved an ENERGY STAR score of 75 or greater, but only about 85 buildings met the additional criteria.

Some property owners are concerned about how accurately the ENERGY STAR score accounts for high-density uses such as trading floors, which is currently under review. Until this issue is resolved, New York City's benchmarking law exempts properties from the public posting of their scores if they have a combined area of trading floor, television studio, and/or data center constituting more than 10% of the gross area.

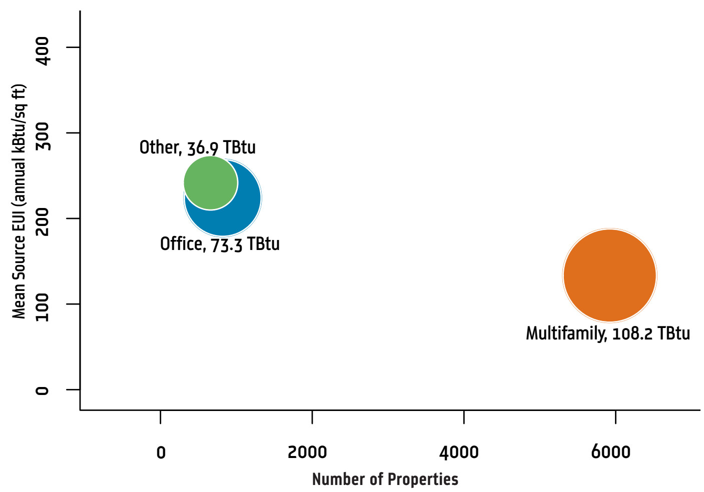
Figure 12: Proportional Impact of Multifamily, Office and Other Properties*



*Based on properties that complied by August 1.

Source: University of Pennsylvania

Figure 13: Mean EUI, Number of Properties and Total Energy Per Sector*



*The size of each circle corresponds to the energy used in the sector.

Source: University of Pennsylvania

Estimating New York City's Energy Savings Potential: Two Methodologies

This data suggests that New York City's greatest opportunities for energy savings are through strategies that improve the efficiency of the worst performers. Two different analytic methods are presented to estimate the citywide potential for such cost-effective energy improvements: an absolute method (Fig. 15) and a proportional method (Fig. 16). Both methods have a low end scenario, where only the most cost-effective improvements are pursued, and a high end scenario, which assumes deeper cuts.

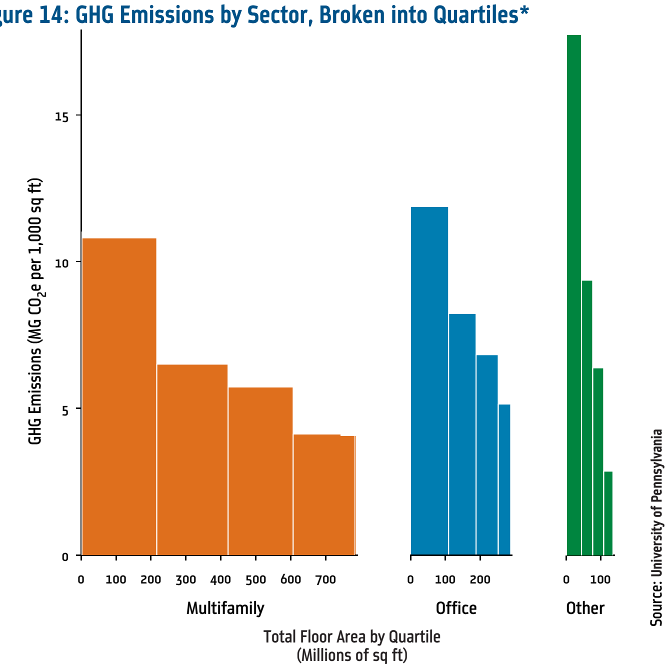
Method 1, the "absolute" method, analyzes how much energy would be saved if all buildings reached the current average level, and if all buildings reached the 75th percentile. The multifamily and office sectors are broken into ten percentile ranges (deciles), with the vertical axis representing median Source EUI for each decile and the horizontal axis representing the gross square footage of each decile. The area of each column is the total energy used in each decile. For each sector, the top dashed line represents the median energy use, and the lower dashed line represents the 75th percentile. Method 1 shows that if all buildings became at least as efficient as the current average, energy consumption would be reduced by 18%; if all buildings reach the 75th percentile, energy consumption would be reduced by 31%.

Method 2, the "proportional" method, is based on buildings reducing usage by descending percentages relative to decile, on the assumption that the worst performers are capable of the greatest reductions. At the low end, Method 2 assumes that buildings in the 1st decile can reduce by 30% on average, the 2nd decile by 25%, and so forth. The high end estimates that the 1st decile can reduce by 40% on average, the 2nd decile by 35% and so forth. When all of these savings are added together, Scenario 2 results in overall energy reductions of 16% for the low-end and 25% for the high end.

Methods 1 and 2 are alternative conceptual methodologies that could ultimately evolve into proposed policies or strategies. Both point to a significant potential impact: New York City's energy use in large buildings could be reduced by 15% to 30% across the board through relatively simple energy efficiency strategies. The characteristics of the top performers are generally replicable, since the buildings in today's top quartile are simply less likely to utilize inefficient and antiquated equipment, and the equipment they do have is likely to be well-operated and tuned up. Improving operations and maintenance can be cost-effective, so a strategy to improve the poorest performers could accomplish an extraordinary amount without costing very much. For example, many high energy buildings are found to have equipment that is running 24/7 when it is not needed or to have sensors and controls that are seriously out of calibration.

These mathematical models give a good sense of the potential savings through cost effective improvements, but they are just estimates and are not based on a detailed analysis of the actual savings potential in specific buildings. In a few years' time, the City will have that data too, as the information from mandatory audits and retro-commissioning (a second requirement of the Greener, Greater Buildings Plan) starts to be collected in 2013. At that point, the City and the industry will be able to make more accurate assessments of the citywide energy savings potential and at what cost.

Figure 14: GHG Emissions by Sector, Broken into Quartiles*



*The area of each bar corresponds to the GHG emissions from the sector quartile.

Potential Energy Savings from New York City Properties

The bars in the charts below show the total energy used by each decile for New York City's multifamily and office buildings. The light areas show the energy that would be saved in low end scenarios, and the medium toned areas show the additional energy cuts that could be saved in high end scenarios.

Figure 15: Method 1 (Absolute): Low End and High End Scenarios

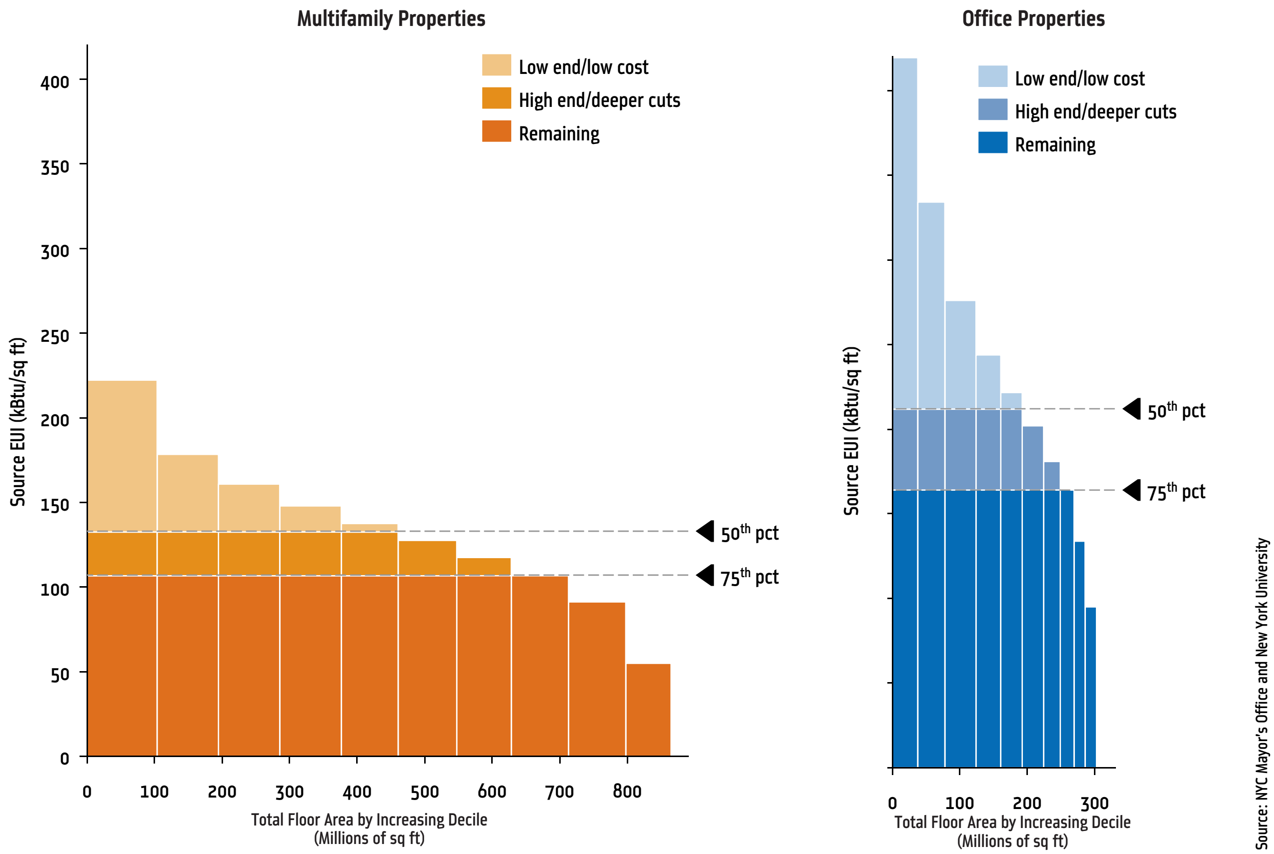
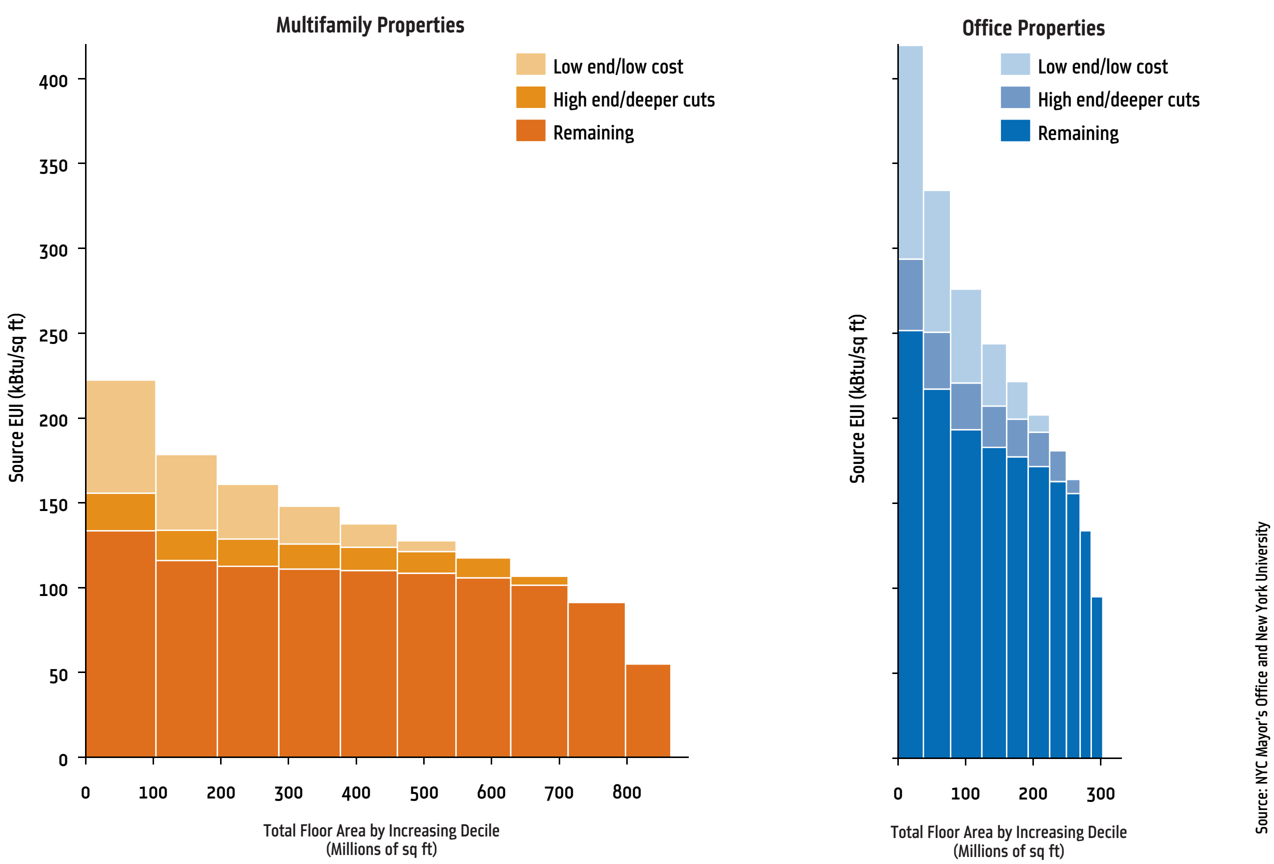


Figure 16: Method 2 (Proportional): Low End and High End Scenarios



Factors that Contribute to Energy Consumption

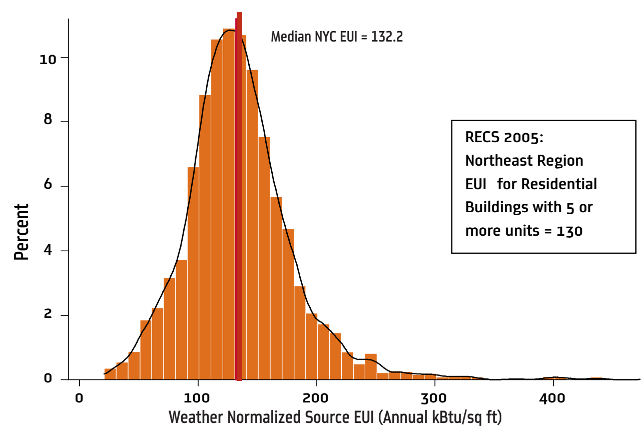
A better understanding of the factors that contribute to consumption can be gained through a closer examination of buildings by property type, age of construction, geographic distribution, the use of space within the property, and fuel source.

Of interest is the relative tightness of the distribution of EUIs for multifamily buildings when compared to office buildings (Figs. 17 and 18). This greater variability of EUIs for offices may be due to the greater percentage of mixed-use space in office buildings and/or the variability in energy use among different types of commercial tenants. In addition, the office EUI distribution exhibits a second peak at the high end, which may be due to very high density office uses, such as trading floors. The variability of EUI in office space and the peak at the high end both deserve further investigation. For example, the question of how accurately Portfolio Manager accounts for trading floors and other high density office spaces has been a concern for New York City's real estate community, and is currently under review.

Another way to analyze energy use distributions is by dwelling unit for multifamily buildings and by occupant for office buildings. For multifamily buildings, the distribution per unit is relatively tight. For offices, the distribution per occupant is even broader than the distribution based on gross sq ft, but exhibits a similar hump at the high end. There are many potential reasons for this broad distribution, including the range of mixed use in commercial buildings or difficulties in measuring the occupancy in offices. But it does indicate that density of occupancy alone may not be a very strong indicator of energy use in office buildings.

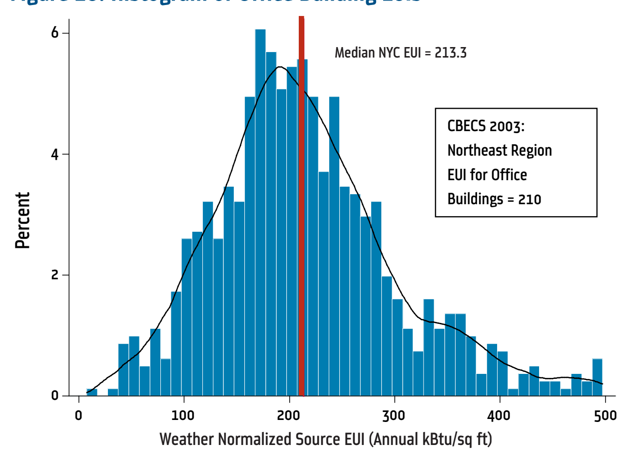
The annual GHG emissions per sq ft for office and multifamily buildings look more similar, with a peak in both groups (see Fig. 19). This is because the onsite fuels used by the multifamily properties for heat and hot water result in relatively higher GHG emissions per BTU than electricity does, which is the most common energy type used by office buildings. The office distribution is still broader, with a long tail of high emitters and a secondary peak at the high end.

Figure 17: Histogram of Multifamily EUIs



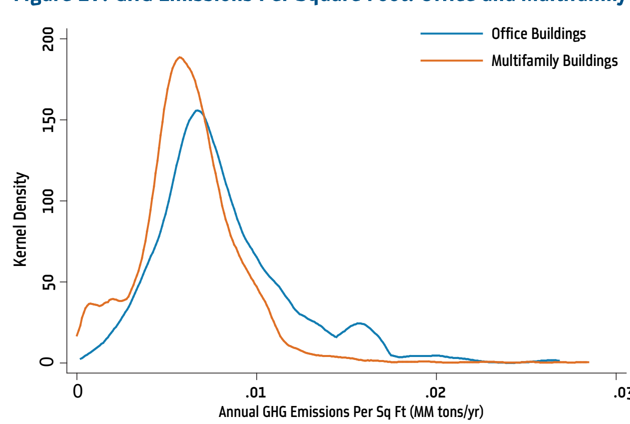
Source: New York University

Figure 18: Histogram of Office Building EUIs



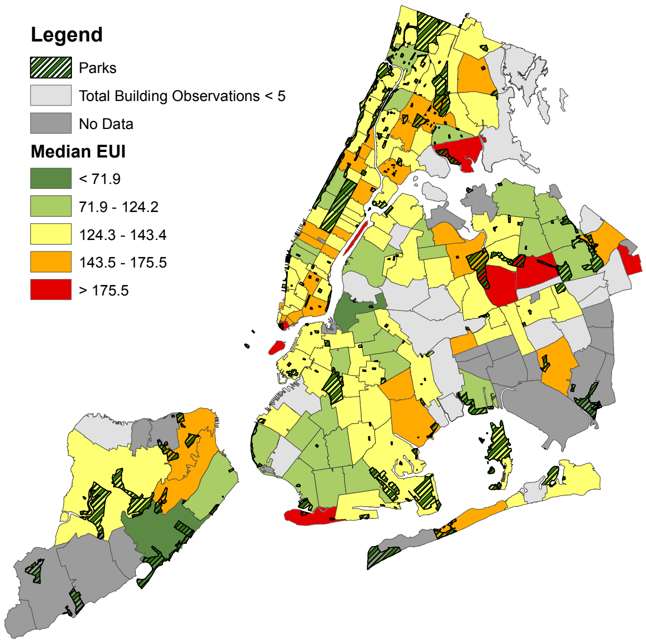
Source: New York University

Figure 19: GHG Emissions Per Square Foot: Office and Multifamily



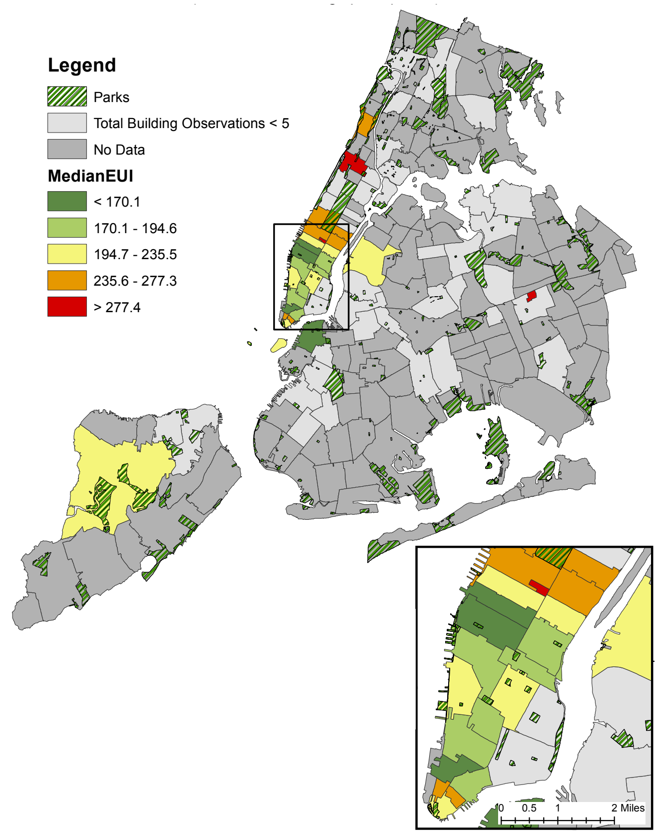
Source: New York University

Figure 20: Median EUI by Zip Code, Multifamily (min. 5 properties per zip code)



Source: New York University

Figure 21: Median EUI by Zip Code, Office (min. 5 properties per zip code)



Source: New York University

Geographic Distribution

The geographic location of a property vis-à-vis its borough was analyzed, but borough location does not seem to be a strong indicator of energy use per sq ft.

Multifamily buildings show very little variability by borough, with Brooklyn showing a slightly lower average EUI than the other boroughs. Since there are a large number of large multifamily buildings in all boroughs but Staten Island, this relatively uniform trend across the boroughs for multifamily buildings is statistically significant. On the other hand, office buildings appear to show much more variability, with the office buildings in Brooklyn and the Bronx showing up with lower EUIs, and Staten Island with the highest EUIs. However this may not be statistically significant, given the relatively few office buildings in Staten Island and the Bronx.

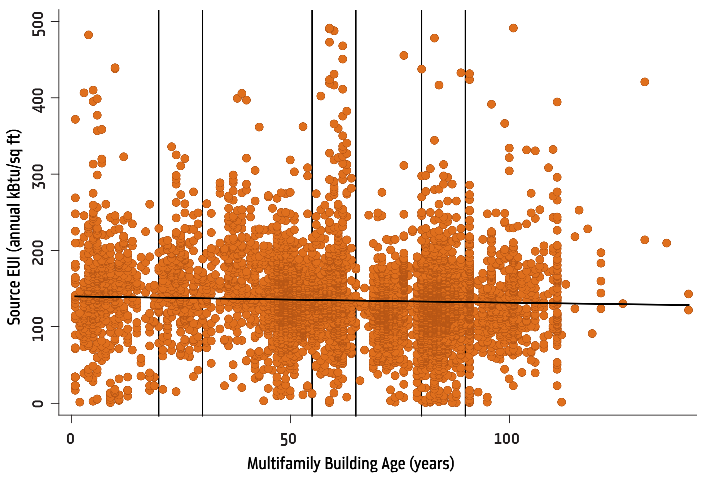
Viewed at the zip code level, a more interesting story emerges. In the multifamily sector, every borough contains zip codes with very high and very low average EUIs, with the buildings in the most energy intensive zip codes using more than twice the energy per sq ft on average than the least energy intensive ones (Fig. 20). This suggests that an approach targeting the worst performing neighborhoods could be very effective. In addition, it would be useful to understand what is driving high residential energy use in certain neighborhoods, whether it is the physical attributes of the building stock, income levels, and/or other factors.

Analysis of the data showed that the most energy intensive multifamily buildings are located in the poorest and wealthiest neighborhoods, based on median household income.

The office sector is highly concentrated into a few zip codes, primarily in midtown and downtown Manhattan (Fig. 21). There are only two zip codes outside of Manhattan with more than five covered office properties that submitted benchmarking data by August 1. This is not surprising, since almost 70% of the total office space in New York State is in Manhattan, and of that, 98% is in midtown or downtown. Not surprisingly, the 10 city zip codes with the highest total energy use are the zip codes in midtown and downtown Manhattan with large concentrations of office buildings.

Here, again, the average EUI for the office buildings varies significantly between zip codes, although not as dramatically as the multifamily buildings. The office buildings in the most energy intensive zip codes use on average more than 60% more energy per sq ft than the buildings in the least energy intensive zip codes. Again, this suggests that a strategy targeting the most energy intensive zip codes could yield dramatic savings, and that a better understanding of what is driving the variability, whether they are the physical attributes of the buildings, the types of tenants, or other factors, is necessary.

Figure 22: Scatter Plot of Multifamily Building EUI Versus Age



Source: New York University

Figure 23: Scatter Plot of Office Building EUI Versus Age

Source: New York University

Age and Energy Use

How does energy use vary with building age in New York City, given how dramatically architectural styles, patterns of space use and energy systems have changed over time?

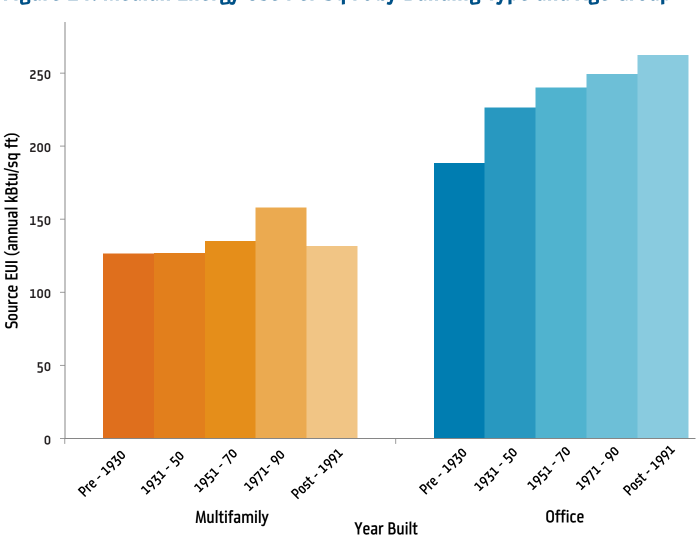
Of particular note is the immense variability in EUI for the buildings built in any year, as evidenced in the scatter plots of EUIs versus the age of New York City buildings (Figs. 22 and 23); clearly there are a lot of other factors other than age that are influencing energy use. The scatter plot for the multifamily properties and the one for offices have a line indicating the "best fit" for the median EUI over time, with both increasing over time. While the upward trend in EUI for office buildings is clear from the scatter plot, many factors other than age are impacting energy use. The scatter plots also show areas of density that reflect the city's buildings booms. The vertical lines on the multifamily chart show three building booms in housing: the 1920s and 1930s, the 1950s and the 1980s.

When viewed in twenty year increments, a clear picture seems to emerge for the office sector: over the last hundred years, the median EUI for office buildings has steadily risen by almost 40% from a median EUI of 188.3 for offices built before 1930, to 262.1 for offices built since 1990, with the median EUI for the buildings of each 20 year period being higher than the preceding one (Fig. 24). That pattern recurs in the ENERGY STAR ratings, which decline on average from a high for office buildings built before 1930, are fairly flat from 1931 to 1990, and decline again for buildings built after 1990 (Fig. 25). Since ENERGY STAR normalizes for intensity of use (hours of occupancy and density), the apparent trend is that, on average, the oldest office buildings are performing the best.

Multifamily properties have maintained relatively consistent EUIs regardless of the age of a building, with the exception of a significant increase (17%) in median EUI for buildings built between 1971 and 1990, which could have resulted from any number of factors, including the significant changes to the NYC building code in 1968.

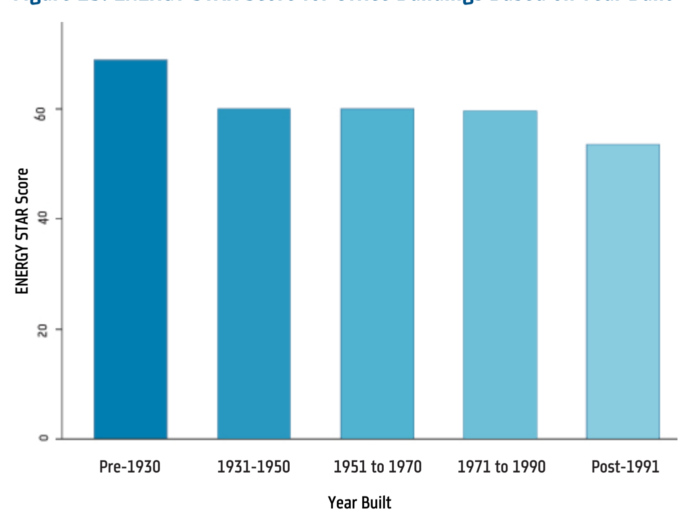
When viewed in five-year increments, the office sector shows considerable fluctuation, but still exhibits a strong underlying upward trend. The multifamily properties seem to grow on average steadily more efficient from 1900 to 1940 and become steadily less efficient between 1945 and 1975, after which they exhibit more volatility.

Figure 24: Median Energy Use Per Sq Ft by Building Type and Age Group



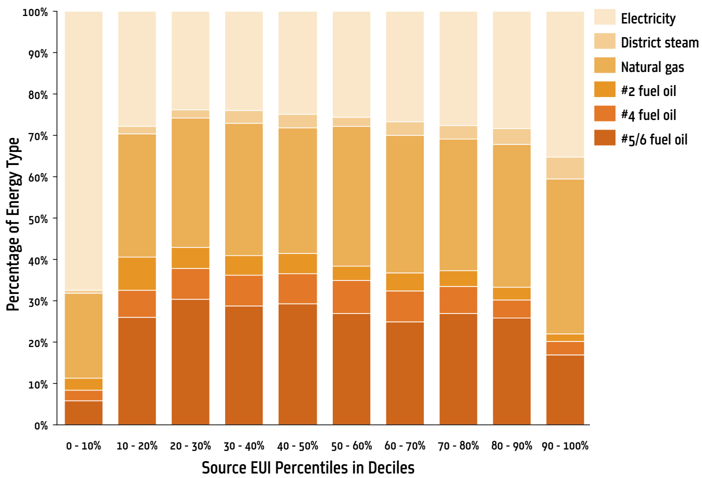
Source: New York University

Figure 25: ENERGY STAR Score for Office Buildings Based on Year Built



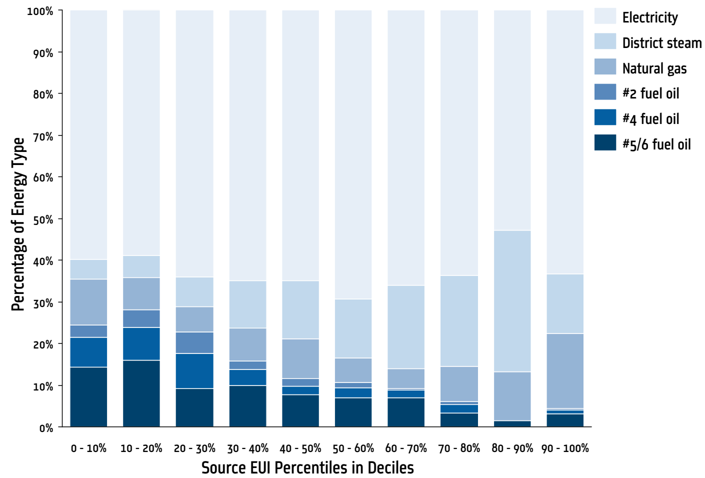
Source: New York University

Figure 26: Energy Mix for Multifamily Buildings in Deciles



Source: New York University

Figure 27: Energy Mix for Office Properties in Deciles



Source: New York University

Age and Fuel Mix

In general, the proportion of electrical use is much higher for office buildings than multifamily buildings, averaging close to 65% as opposed to 30% (Fig. 26). Within multifamily properties, the proportion of electrical use has risen fairly steadily over the past 120 or so years. (A puzzling exception is the high proportion of electrical use in multifamily buildings dating from the 19th century.) Steam use is negligible except for multifamily buildings dating from 1960 to 1990, when it was somewhat more common. Onsite fuel use, natural gas and the dirty, residual oils (Number 4 and 6 heating oil, which are being phased out through City regulation) are used almost equally for multifamily buildings built between 1900 through 1970, before they were gradually replaced with natural gas, which became the almost exclusive fuel of buildings after 1990. Number 2 heating oil is rarely used in multifamily buildings, with the exception of a small peak between 1900 and 1910.

For the office sector, the proportion of electrical use remains somewhat steadily near 65% through 1980, with buildings from the 1980s exhibiting a peak of 80% electrical use, which then tapers back down near 70% (Fig. 27). Steam use rises in buildings from the 1930s to the 1970s, then declines to a small percentage by 2000, as it is replaced by natural gas. Again, the dirty residual oils are more common in older buildings, constituting an important part of the fuel mix for buildings predating the 1930s. As with the multifamily properties, Number 2 heating oil is rare.

Does fuel mix correlate to energy use intensity? For the multifamily properties, the impacts are clear only at the ends of the spectrum, with the worst 10% of performers using a large proportion of electricity (e.g., electric heat and hot water) and the best 10% of performers generally using more natural gas and less dirty fuel. For office buildings, the trends are more continuous throughout the distribution, with an increasingly high proportion of dirty fuels generally correlating with higher EUIs, and an increasing proportion of steam correlating strongly with lower EUIs.

Towards a Rating for Multifamily Buildings

As has been discussed elsewhere, Portfolio Manager does not yet generate ENERGY STAR scores for multifamily buildings. The process of creating a national score is underway, but could take several years. In the meantime, since thousands of multifamily buildings were benchmarked in New York City, there is more than enough data to create preliminary quartile ratings which can enable multifamily building owners, operators and tenants to see how their building compares with others.

By August 1, 2011, almost 6,600 multifamily properties had been benchmarked. Once this data had been cleaned of obvious errors, a data set of approximately 6,000 remained in the database. Based on this sample size, we can create the following working grades for the industry in New York City to use until there is a national standard:

Working Grades for Multifamily Buildings

MULTIFAMILY WORKING GRADES	QUARTILE	SOURCE EUI RANGE
A	TOP QTL	EUI ≤ 109
B	2ND QTL	109 < EUI ≤ 132
C	3RD QTL	132 < EUI ≤ 157
D	BOTTOM QTL	157 < EUI

Source: NYC Mayor's Office

Note that this is not a robust scoring system since it is only normalized for weather, but not for other energy drivers such as laundry facilities or dishwashers. Also it only reflects one year of self-reported data, which needs to be validated. Nonetheless, it can be used to give building owners some sense of the potential for improvements within their building.

Almost 75% of the multifamily properties covered by the GGBP are classified as "market-rate," with the other quarter split among "affordable" and "mixed-income." Buildings defined as "affordable" have all units subsidized for occupancy by low-income households. The affordable buildings are on average more energy intensive, with an average EUI score 8 points higher than market-rate and mixed-income properties.

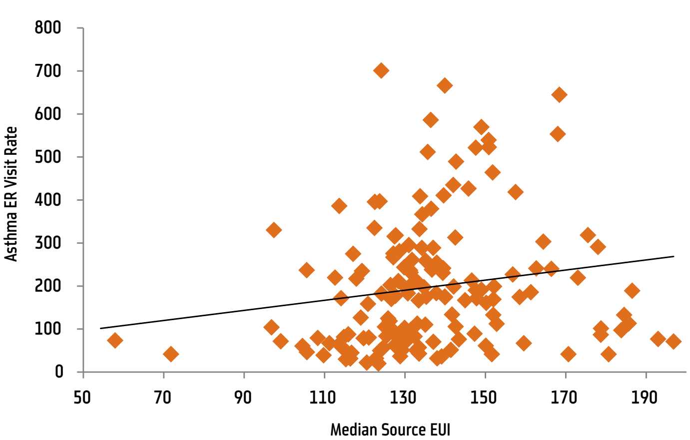
Correlations with Energy Consumption

Office Properties. Several factors influence the EUI of office buildings. Building age is negatively correlated with EUI, which means that older buildings tend to use less energy than newer ones. Buildings over 80 years old have an almost 30 percent lower EUI than the average EUI for the entire sample. Also, buildings between 41 and 60 years old that have been altered tend to have significantly lower EUIs as well, controlling for other variables. Other correlations with higher EUIs include larger size, increased worker density, longer operating hours, and increased amounts of mixed uses. Correlations with lower EUIs include location in historic districts and location on an inside lot with fewer exposed walls.

Multifamily Properties. The age of multifamily buildings is negatively correlated with EUI, particularly for buildings more than 60 years old. The building group that uses the least energy are those more than 80 years old. The exception is for buildings built between 1970 and 1990, which are less efficient than newer ones. The size of multifamily buildings is also negatively correlated with EUI, which means that larger buildings tend to have lower EUIs. This is in contrast to office buildings, which exhibit the opposite tendency, and may result from office buildings being cooling dominated, while multifamily properties are heating dominated. Other correlations include higher EUIs with more mixed use, and lower EUIs with historic districts and location on an inside lot.

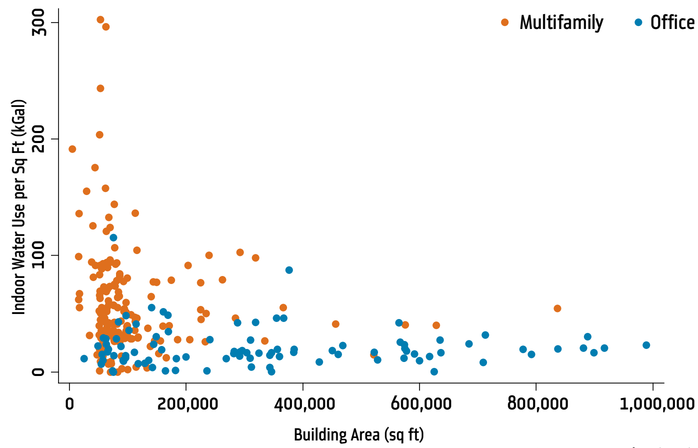
Asthma Rates and Multifamily Energy Consumption. New York City neighborhoods that have comparatively high energy use in residential buildings appear to have higher asthma rates. In a scatter plot by zip code of median EUIs plotted against childhood asthma emergency room visit rates, the best-fit line has a positive slope (Fig. 28). This indicates a correlation between higher energy usage in neighborhoods and higher asthma rates, perhaps due to air quality issues in those neighborhoods. Note that this result does not control for other variables that may affect asthma rates.

Figure 28: Scatter Plot of Asthma ER Visit Rate Versus Multifamily EUI



Source: New York University

Figure 29: Scatter Plot of Water Usage for Multifamily and Office Buildings



Source: New York University

Water. LL84 requires that water usage be benchmarked, but only after a property has been equipped with automatic meter reading (AMR) equipment by the Department of Environmental Protection (DEP) for the entire calendar year being benchmarked. Once such equipment is in place for a property, LL84 requires DEP to automatically upload the property's water data into the benchmarking tool upon request. DEP has been rapidly installing AMRs across the city, but fewer than a quarter of covered properties had equipment installed for the entire 2010 calendar year. Therefore the benchmarking of water was not required for 2010 benchmarking. To date, DEP has installed 810,000 AMR devices throughout the city. The vast majority of property owners covered under LL84 have an AMR device and will be able to benchmark their water consumption for calendar year 2012.

Nonetheless, a number of buildings have voluntarily input 2010 water data into Portfolio Manager, with a few patterns emerging from the results (Fig. 29). Since this data was reported by a small group of self-selected building owners, these patterns should not be accepted as universal without further analysis. A scatter plot of the water data collected shows the relatively high use of water in multifamily properties when compared to office buildings, on a per sq ft basis. It also shows a tremendous variability in water use within both sectors, but particularly within multifamily properties. The shape of the scatter plot for multifamily buildings shows very high water use intensity for a number of small properties, tapering off as building size increases, which is a shape that would be characteristic of leaks. As the benchmarking of water usage becomes more commonplace over the next few years, these benchmarking results will provide owners with a useful tool to detect leaks and save money.

The 2011 benchmarking should produce significantly more water data because many more buildings had AMR equipment installed throughout the entire calendar year and DEP began providing the automatic uploading of water data into Portfolio Manager, becoming the first of New York City's utilities to provide data automatically and as well as the first in the nation to automatically upload water data.

Compliance with Local Law 84

The square footage listed in the Department of Finance's records was used to determine the covered properties (properties required to comply with the LL84 benchmarking mandate and the other legislative components of the Greener, Greater Buildings Plan). In December of 2010, the City mailed notifications to owners of covered properties informing them of their obligation to benchmark, along with their subsequent requirements for Local Law 87 of 2009 (Audits and Retro-commissioning) and Local Law 88 of 2009 (Lighting Upgrades and Sub-metering).

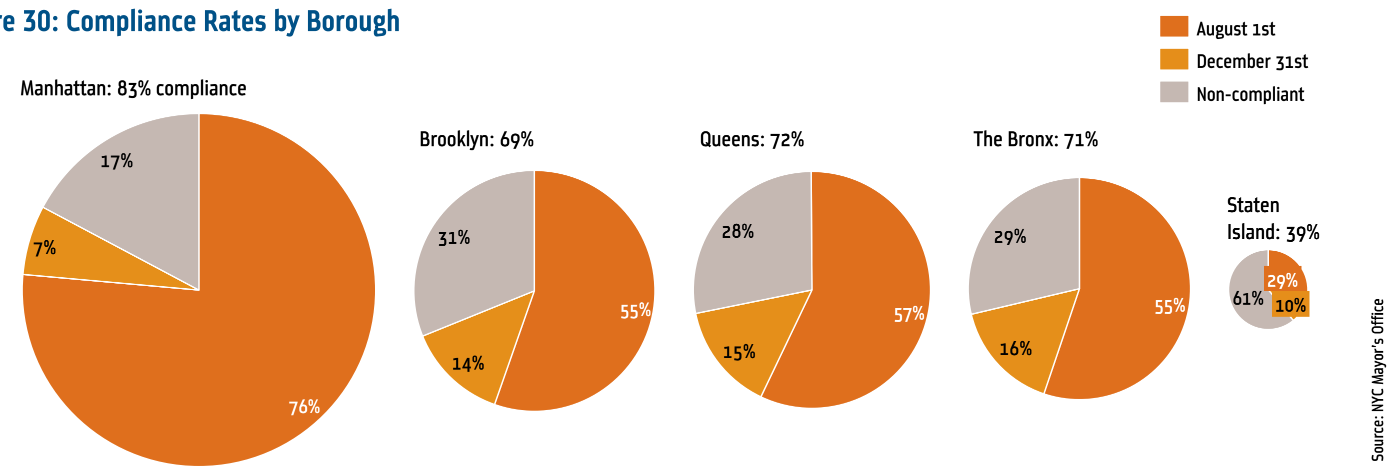
LL84 requires covered properties to be benchmarked by May 1 of each year. Because the ordinance was new, the City decided that the first four months of 2011 was not enough time for many owners to learn about the requirement and comply. Therefore the New York City Department of Buildings delayed the first deadline by three months to August 1st, 2011. During the three month period, the City continued its aggressive outreach efforts in partnership with the City University of New York (CUNY) and the real estate industry. The City also decided not to fine those properties that had not benchmarked by August 1, 2011, but to send a warning instead. The Department of Buildings sent out approximately 5,200 warning letters notifying the non-complying owners that they must benchmark their properties by December 31, 2011, after which they would receive a violation and a $500 fine. December 31, 2011 was the final deadline for benchmarking 2010 data.

New York City achieved a high compliance rate for the first year: 64% complied by August 1 and 75% complied by December 31. As awareness of the benchmarking regulation among the building industry increases, compliance rates are likely to rise. Five factors contributed to our high compliance rate: enforcement, outreach and training, the focus on large buildings, communications and technical support from the utilities, and the role of consultants.

LL84 includes potential violations and fines of $500 for each quarter that a building fails to comply, up to a maximum of $2,000 per year. For the first year LL84 was in effect, the City first used warning letters followed by fines to motivate compliance. In future years, the deadlines will not be extended and quarterly fines up to $500 could be imposed. In addition to letters, the City worked with a number of partners to provide resources to the real estate community, including general outreach to building owners and managers, a benchmarking checklist, half-day classes on how to benchmark and comply with the ordinance, a Benchmarking Help Center to field calls with questions, and a web page with up to date information on benchmarking issues. Our outreach was aided by LL84's focus on buildings over 50,000 sq ft. These buildings tend to belong to citywide organizations, which facilitates communication, and also have access to resources and sophisticated management. Support from utility providers was also vital.

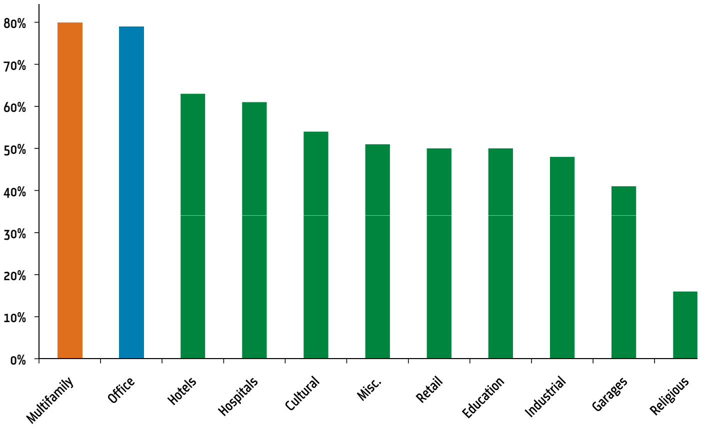
COMPLIANCE DATE	NUMBER OF COVERED BBLS	PERCENT OF COVERED BBLS
August 1st	8,036	64%
August - December 31st	1,412	11%
Non-compliance by December 31st	3,117	25%
Total Covered BBLs	12,565	

Figure 30: Compliance Rates by Borough



Percentages of compliant properties in each borough; size of each pie chart is proportional to the total number of covered properties in each borough.

Figure 31: Compliance Rates by Sector



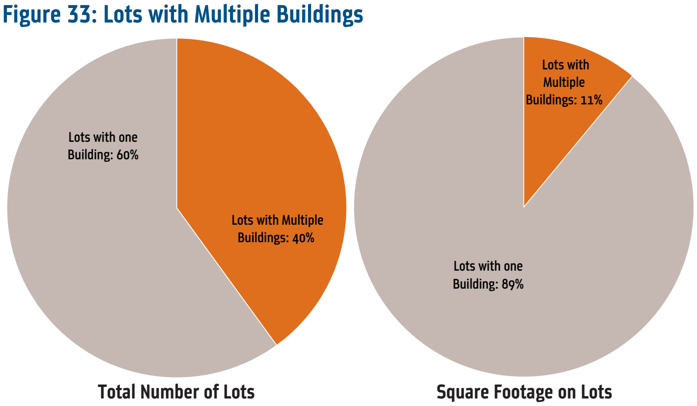
Source: NYC Mayor's Office

The most critical information needed for accurate benchmarking is monthly whole building utility data, which is difficult to collect in multi-tenant buildings where tenants are separately metered. The City worked with state regulators to require the city's largest utility, Consolidated Edison, Inc. (Con Edison), to provide building owners with aggregated whole building data, and to charge a fee to recover its costs. The second major gas utility in New York City, National Grid, agreed to provide aggregated energy data to customers upon request free of charge. Lastly, most of the benchmarking was performed by third-party service providers. In expanding their businesses, these service providers helped the City achieve high compliance rates by informing owners about the requirements.

Compliance by Borough and Sector

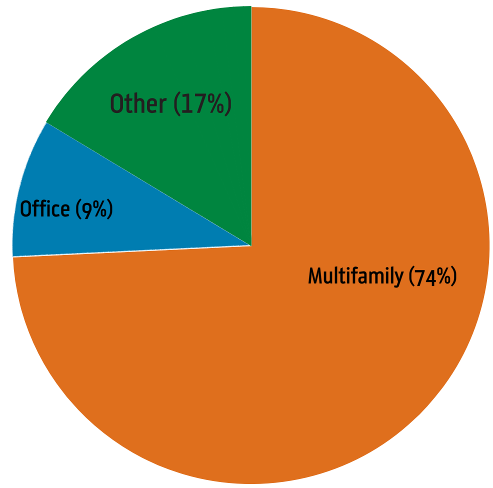
Compliance rates by borough correlated with the number of covered properties; the boroughs with the highest number of covered properties had the highest compliance rates (see Fig. 30). Over 40% of the properties required to comply with LL84 are located in Manhattan, which had the highest compliance rate. The Bronx, Brooklyn and Queens each contain between 17% and 20% of the covered properties, and all had similar compliance rates. Staten Island, with the smallest number of covered properties at 2%, had the lowest compliance rates. This suggests that centralized communication channels facilitated compliance, and that more outreach is needed outside of Manhattan.

Figure 33: Lots with Multiple Buildings



Source: NYC Mayor's Office

Figure 32: Percentage of Covered Properties by Type*



*This graph represents all covered properties. Figure 3 only included those buildings that provided benchmarking data by the August 1 deadline. "Other" includes Industrial (5%), Hospitals (2%), Hotels (2%), Education (2%), Retail (2%), Religious (1%), Garages (1%), Cultural (1%) and Miscellaneous (1%).

Source: NYC Mayor's Office

Compliance rates also varied by sector, or building type (Fig. 31). The multifamily properties had the highest compliance rate at 80%, followed by 79% for office buildings. The other sectors had compliance rates in the 41% to 63% range, with the exception of the religious sector, which had a compliance rate of only 16%. Clearly more outreach to the religious sector is necessary, and to the industrial sector, which is the third largest building sector in the city, but which had a compliance rate of just 48%

Multifamily properties, comprising 74% of the buildings required to benchmark in 2011, dominate New York City's largest buildings, followed by offices at 9% and industrial buildings at 5% (Fig. 32). The remaining eight categories each represent just one or two percent of the covered buildings. Again, the highest compliance rates were in the sectors with the largest number of buildings.

Compliance for Lots With Multiple Buildings

The number of buildings on a lot also seems to impact compliance. Properties containing a single building achieved a 76% compliance rate, while properties with multiple buildings achieved only 67%. This lower compliance rate had a big impact on overall compliance, since lots with multiple buildings often have many large buildings and a disproportionately larger square footage. While only 11% of the covered properties were lots with multiple buildings, these lots accounted for a little more than half of the total number of buildings and over a billion sq ft of space, or 40% of the total privately-owned square footage covered by LL84 (Fig. 33).

Some of this under-compliance may have been due to the complexity of these lots, where buildings often share utility meters and energy systems, making it difficult to ascribe energy use to individual buildings. The rule created two optional paths for such lots: to benchmark all buildings on the lot as a whole if the systems could not be separated, or to benchmark as individual buildings where energy use could be separately ascribed. However, these options may not have been understood by some owners.

Policy Recommendations

The commencement of any major new program is an opportunity to learn from experience for improvement in future years. One purpose of this report, in addition to analyzing the data, is to recommend appropriate changes and improvements.

Changes to the City's Local Law and Rule

Several changes to LL84 and the City's rule governing its implementation should be made. The Mayor's Office will work with City Council to refine LL84 and seek to amend the rule in several ways.

Due Date. The law currently requires annual benchmarking to be submitted by May 1 of the following year, but much of the data is not available until mid-February. We suggest moving the annual deadline back by two weeks to May 15th. Giving property owners that additional time will improve compliance rates and accuracy.

Tenant Letter. When LL84 was initially signed into law, Con Edison and National Grid were not providing aggregated whole building energy data. Therefore, the law included a provision requiring owners to request this information from separately metered commercial tenants. However, since LL84 went into effect, both companies have made aggregated whole building data available. Consequently, sending the letter to tenants is now an unnecessary burden. We will work with City Council to remove this requirement from the law.

Multiple Buildings on Multiple Tax Lots. According to the City's rule for LL84, buildings on multiple lots that share systems are required to be benchmarked individually for any energy type for which they are separately metered or submetered. For any energy type that is not separately metered or submetered for a particular building, the prorated share of that energy type based on the square footage of the building must be assigned to the building. This part of the rule goes against standard Portfolio Manager methodology, which allows buildings that share systems to be benchmarked together. We will seek to amend the rule to allow building owners to benchmark multiple buildings on multiple lots in a manner more in line with the Portfolio Manager methodology.

Covered Buildings. The law is ambiguous, implying that all buildings over 50,000 sq ft, including ones that are on lots with multiple buildings totaling more than 100,000 sq ft in floor area, must be individually benchmarked. This is not the intended meaning, and the Mayor's Office will work with City Council to clarify the language.

Improving Access to Accurate Information

Automatic Uploading for All Utilities. Benchmarking would be streamlined if the utilities were to automatically upload electrical, gas, steam, and water data into Portfolio Manager. Automatic uploading would reduce the burden on building owners and improve accuracy. The New York City Department of Environmental Protection (DEP) is already leading the way, uploading water data into Portfolio Manager for buildings with automatic meter readers since April 2012.

Con Edison and National Grid have facilitated benchmarking by providing building owners with aggregated whole building electric, gas, and steam data, and Con Edison has recently upgraded its system so that old accounts remain in the system. This is enormously helpful to building owners who have multiple tenants with separate accounts but who need whole building data to benchmark. The process will be even smoother when this data can also be automatically uploaded. The City will work with Con Edison, National Grid, and state regulators to assess what it would take to institute automatic uploading of whole building data.

Multiple Service Addresses. In many New York City buildings, utility accounts are billed to a variety of addresses, called service addresses, which have been associated with the parcel over time. In larger buildings, identifying all the service addresses can be tricky, but it is necessary in order to ensure that all of the energy use has been counted. Automatic uploading will have to include a sign-off from the building owner that they have included all of the service addresses. The utility will then need to keep track of all of the service addresses that pertain to a given building and/or lot, something that they do not currently do. This means that, in essence, utilities would need to recognize buildings and lots, not just service addresses.

Building Level Meters. Many properties, including hospitals, universities and housing complexes, are on lots that contain more than one building. In many cases, energy information is not available at the building level since the buildings are not individually metered for electricity or are served by a shared energy system. Consequently, these buildings are very difficult to individually benchmark. This is a significant issue, because 40% of the square footage covered by LL84 is contained on lots with more than one building. Without benchmarking information at the building level, it will be more difficult to audit them and/or track the impacts of various efficiency measures.

The City will work with the utilities and state regulators to explore ways to offset the cost of installing energy sub-meters to enable building owners to measure their energy use for each building. Such infrastructure will be necessary to achieve the full potential of energy efficiency improvements in multiple building lots.

Accurate Square Footage. The accurate gross square footage of covered buildings can be surprisingly difficult to obtain. The square footage reported in the Department of Finance database often does not include sub-grade floor areas, so the reported area could be as much as 10% less than the gross square footage as defined in Portfolio Manager. To accurately obtain a building's gross area, one must measure the building or calculate from floor plans. Unfortunately, the municipal records do not always include floor plans, especially for older buildings, and many buildings have been expanded over time.

A tool could be created to make it simpler to obtain the gross square footage of New York City's buildings. In 2010, an extremely accurate three-dimensional map of New York City was created by an optical remote measuring technique using laser pulses. The technique is known as Light Detection and Ranging (LIDAR). LIDAR data could be married to building data to transform this three dimensional data into an above ground square footage number of reasonable accuracy. Of course setbacks and architectural details could create problems in more ornate buildings, but such a strategy could be very helpful for many types of properties. This challenge merits more study by programmers and geographers.

Coordinating Building Identification

Link BBL and BIN Data. Different departments of the City of New York use different data systems for building identification. The Department of Finance's (DOF) database is organized around tax lots, and designates properties by Borough, Block, and Lot or BBL. Because a BBL is unique to each lot, LL84 relies on this system to determine which lots are required to comply with LL84. However, a BBL does not provide any information about the number of buildings on a lot or how to identify them. The Department of City Planning (DCP) assigns each building a Building Identification Number (BIN), and the Department of Buildings (DOB) uses that designation to identify which buildings complied with LL84. Unfortunately, a BIN does not provide any information about the lot a building sits on. In short, the two systems are not aligned.

Multiple buildings on a lot must be benchmarked separately when they have independent energy systems, and together as a lot when the systems are inextricable. Sometimes multiple buildings on multiple lots share systems and therefore need to be benchmarked together. In these situations, the independent data systems for lots and for buildings make compliance verification difficult.

The City is using a patch to tie the BBL and BIN data systems together. To simplify LL84 compliance tracking, we are proposing that Portfolio Manager be modified to allow it to collect data on both BBLs and BINs. But the long term solution to this problem would be to tie the BBL and the BIN data together, and have one unique number that identifies a building on a lot. More specifically, a number or letter might be added after the BBL to identify each building on a lot. Not only would this facilitate benchmarking, but it would also streamline the City's notification and violation process. Alternatively, the City could move toward a system involving GIS.

Improving the Quality of Benchmarking Data

Feedback to Benchmarking Consultants. 75% of the benchmarking data was compiled by consultants—with more than two-thirds of all benchmarking completed by just 30 consultants. The 2010 benchmarking data revealed a pattern of common errors, from inaccurate square footage to procedural mistakes. Once the errors had been documented, OLTPS met with the consultants completing the majority of the work, explained the common errors, and sent each consultant a list of errors found in their portfolio. We will continue the practice of providing such feedback in future rounds of benchmarking.

Auditing. While certain errors were detectable by performing a statistical analysis on the benchmarking results, it is impossible to fully assess the quality of the submissions without auditing. Therefore, we will audit a percentage of the benchmarking submissions.

Upgrading Portfolio Manager

The EPA is currently pursing an upgrade to Portfolio Manager scheduled to be ready in June 2013. We are offering the following recommendations for consideration during this project.

Fields for Building Identification. Accurately identifying buildings within Portfolio Manager to determine compliance has been a challenge for New York City because buildings and lots are identified differently, as discussed earlier. Other cities are faced with similar difficulties in building identification. We recommend the EPA add "city specific" fields to Portfolio Manager, where each city can define what needs to be included in these fields. In New York City's case, four fields would be used: one for the BBLs, one for the BINs, one to identify how many properties were benchmarked together, and one to identify how many BINs were benchmarked together.

Quality Control Flags. Many of the common errors that were made in the benchmarking were easily detectable mistakes, such as EUI values of 0; below 30 or above 500 kBtu/sq ft; no reported EUI; omission of square footage; omission of “Facility Type”; DOF square footage entered in Portfolio Manager; and ENERGY STAR score of 1 or 100. The EPA should create a Quality Control function to flag such errors, blocking submission until correction and/or bringing the suspicious entry to the individual’s attention. If the EPA does not create such functionality, perhaps the City could partner with NYSERDA to create such a tool for New York State.

Creating a Multifamily Building ENERGY STAR Score. CBECs is not available for multifamily buildings, and therefore the EPA has not developed an ENERGY STAR score for multifamily properties, the sector which dominates New York City’s energy profile. Moreover, this is not just a New York City issue. The U.S. 2010 Census data indicates that roughly 13% of residential units nationwide are in multifamily properties with 10 or more units, a number which is growing as the population increases and as the country continues to urbanize. In this report, we have created New York City specific A-B-C-D grades based on the 2010 LL84 quartiles for Source EUI to convey the comparative energy efficiency of buildings in the absence of a national score. Note that these grades reflect weather-normalized information, but they have not been normalized to account for other parameters that might impact energy use.

The EPA is partnering with Fannie Mae to gather data to support a normalized score for multifamily buildings. If this effort is not successful, New York City will consider creating its own interim rating, perhaps in partnership with others, using the very large LL84 database of multifamily properties. The EPA should assist such an effort by expanding and improving the attribute fields it collects for multifamily properties, such as the number of washers and dryers, and making them mandatory. (An alternative, local strategy would be to ask covered properties to fill out a brief survey with additional data points at the time they are performing the benchmarking, but this would be strenuous.)

Improving the Benchmarking of Data Centers. Data centers are now specified as a space type within Portfolio Manager, to account for their high energy use and allow them to receive a more accurate ENERGY STAR score. The inputs required for data centers include gross square footage, IT energy configuration, and sub-metered energy usage. Separately metering data centers can be very difficult for owners because they are generally located within tenants’ spaces. This obstacle makes it hard for owners to categorize these intensive energy use spaces in Portfolio Manager, possibly resulting in a score that is not accurately accounting for all energy consumption in the building. The City will work with the EPA to address this concern.

Providing Technical Assistance to Property Owners

Continuing the Benchmarking Help Center. To assist property owners and consultants, the City partnered with the City University of New York (CUNY) Institute for Urban Systems Building Performance Lab (CIUS BPL) to create the first-of-its-kind Benchmarking Help Center, staffed by CUNY students. Funding for a supervisor and student staffing was provided by NYSERDA. The City provided the workspaces and phone lines for the Help Center.

The Benchmarking Help Center provided a place for property owners and consultants to call with questions and to receive information. The first live day of the Benchmarking Help Center was in April, one month before the initial benchmarking deadline of May 1. Through extensions in funding, the Benchmarking Help Center operated intermittently through the final deadline of December 31, 2011. After the NYSERDA funding ended in December 2011, the Institute for Market Transformation (IMT) provided funding to keep the Benchmarking Help Center open through Spring 2012. The Benchmarking Help Center received over 1,700 calls.

New York City’s Benchmarking Help Center significantly contributed to property owners’ ability to benchmark. Given the diversity of the 12,600 properties that are required to benchmark, property owners new to the process will continue to need guidance. The Benchmarking Help Center also provides job skills to CUNY students, making them more marketable in energy efficiency related fields upon graduation. The City will seek funding and space for the continuation of the Benchmarking Help Center for three more years.

Properly Accounting for High Density and High Energy Space Types

Continue to Work with Industry and the EPA to Address Benchmarking in Specialized Spaces. LL84 Section 28-309.9 (v) includes a disclosure exemption for the scores for buildings in which high intensity uses like data centers, trading floors and television studios comprise more than 10% of the floor area, because of concern that Portfolio Manager does not accurately account for those uses. We will work with the EPA and property owners to improve the data and accuracy of these uses.

Improving the National Energy Data

Updating the Commercial Building Energy Consumption Survey (CBECS). An ENERGY STAR score for 11 building types is obtained through the analysis of energy information that is entered into Portfolio Manager and compared against similar building types in the CBECS national database, operated by the U.S. Energy Information Administration. The CBECS database has not been updated since 2003, contains few large buildings, and is hindered by concerns about scope and quality. We recommend that the CBECS database be updated, so that the data quality be improved and that the database be expanded to include more buildings, particularly large ones.

Creating a National Energy Efficiency Data System. Nationally and internationally, the field of energy efficiency has been hampered due to a lack of information. The huge new data set produced by the New York City benchmarking law is a sizable contribution to the field. Its value will be leveraged to the extent it is linked and coordinated with other comparative sets.

For example, the City will link benchmarking data to the information that is forthcoming under other provisions of the GGBP, which will require energy audit and retro-commissioning data in future years. Other municipal and private actions, such as the on-going retrofits of City-owned buildings or projects funded by the New York City Energy Efficiency Corporation (NYCEEC), will provide additional types of data that could be linked to the benchmarking data.

Other jurisdictions and entities are also collecting increasing amounts of building data. All of this data should be systematized and linked so that researchers, financiers, engineers and other experts can access broad national energy data sets. The U.S. Department of Energy is developing the beginnings of such an energy data system, called the Standard Energy Efficiency Data (SEED) Platform. Phase 1 will collect benchmarking information from jurisdictions like New York City and systematize the process of creating reports. We recommend these national efforts continue and pledge to participate.

Credit: Associated Press

Appendix: Data Accuracy

The data set of properties that submitted by August 1, 2011 included 10,016 submissions. Before the data could be analyzed, extensive "cleaning" of the data set was required to remove the most obvious errors (see Fig. 34). Our academic partners, Dr. Constantine Kontokosta of New York University (NYU) and Dr. David Hsu of the University of Pennsylvania (UPenn) utilized slightly different methodologies for data cleaning and therefore had somewhat different totals for their final datasets. UPenn removed submissions with extreme EUIs, followed by the removal of the top and bottom 5% of EUIs for each use type, whereas NYU did not. Therefore the data set analyzed by UPenn had fewer remaining submissions than the one analyzed by NYU. It also means that NYU's data set includes more submissions with very high or low energy usage, which may or may not be erroneous.

Gross Square Footage Entry Errors

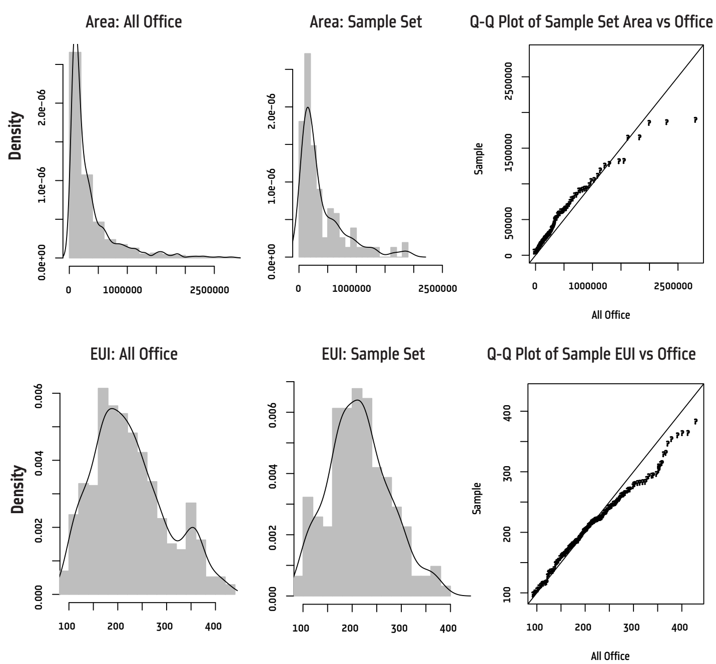
Under-reporting of the gross square footage of covered buildings was one of the most common errors made by benchmarkers. Square footage determined by the City's Department of Finance was used to determine which properties were covered under LL84, but is inaccurate for use in benchmarking due to its omission of sub-grade levels. However, almost 44% of multifamily and 13% of office buildings used this value as their gross square footage in their benchmarking reports. Inputting a square footage that is too small would make a building appear less efficient, with high EUIs and lower ENERGY STAR scores.

Figure 34: How the Data was Cleaned

CLEANING STEPS BY UPENN	REMOVED	PROPERTIES REMAINING
Original Dataset	--	10,016
(-) not in New York State	-6	10,010
(-) duplicate entries (older records for same building IDs)	-355	9,655
(-) minor building types (CBECS: Other and less than 10)	-56	9,599
(-) not in New York zip codes	-163	9,436
(-) not in New York City five counties	-46	9,390
(-) buildings with no energy use reported	-922	8,468
(-) buildings with no floor space reported	-12	8,456
(-) buildings with EUI below 5 or above 1,000 kBtu/sq ft	-214	8,242
(-) remove top and bottom 5% of EUIs	-841	7,401

Source: University of Pennsylvania

Figure 35: Area and EUI Comparisons between Sample Set and All NYC Office Buildings



Source: University of Pennsylvania

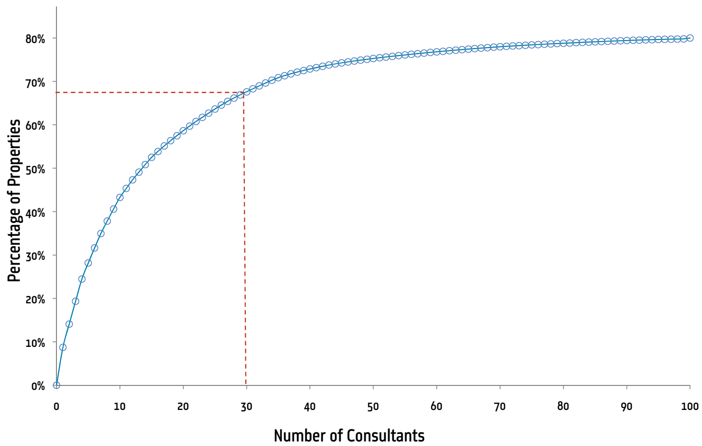
Comparison with Control Groups

One way of assessing the quality of the data is to compare the distribution of the EUIs of all the submissions with the distribution from a sample set of consultants or owners known for accuracy. This sample set was created from two data sets known to be accurate—a building owner's and a consultant's, both of whom benchmarked many properties. The plots are used as general diagnostics to see how these samples compare to the general population.

Figure 35 above shows the area and Source EUI comparisons between a sample set and all NYC office buildings. Histogram and quantile-quantile ("Q-Q") plots show the fit between the larger database and the smaller sample set. Both the size and Source EUI distribution of the sample buildings are a close match to the overall office population, except at the high end, an indication that the data quality is of the entire data set relatively good.

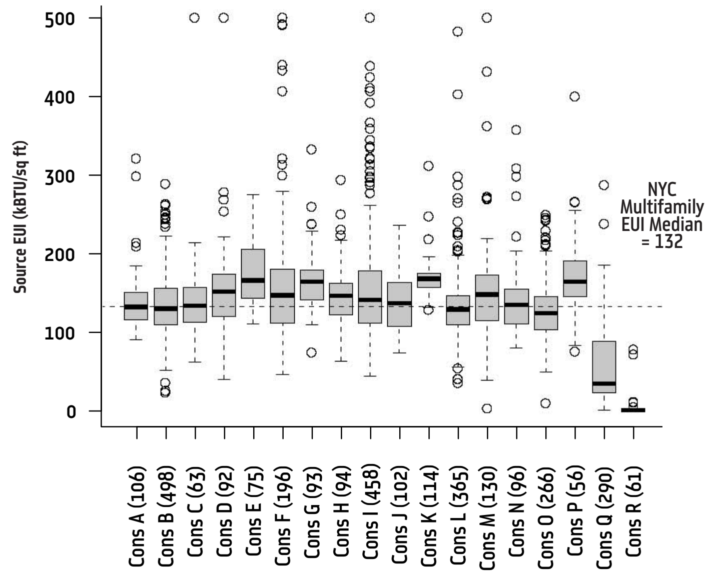
Figure 36: Percentage of Properties Benchmarked by Consultants

The circles represent the cumulative percent of properties benchmarked by an increasing number of consultants, arranged such that the consultant with the largest percentage comes first, followed by the next largest, and so on.



Source: NYC Mayor's Office

Figure 37: Distribution of Multifamily EUIs Obtained by 18 Consultants



Source: University of Pennsylvania

Analysis of Consultant Data

80% of all of benchmarking was done by 100 firms, with just 30 firms performing 68% of all the benchmarking (Fig. 36). Because so few professional firms were involved, communication and improvements in quality will be much easier than communicating directly with thousands of property owners and managers. If concentrating on the largest properties reduced a "million building problem" into a "15,565 building problem," the technical aggregation simplified this once more to a "30 consultant problem."

This aggregation enabled the City to analyze the quality of the consultant data by comparing the distributions of the EUIs the consultants in a box-and-whisker chart developed by UPenn (Fig. 37). In this chart, each column represents the range of EUIs obtained by a specific consultant. The box represents the range of Source EUIs from the 25th to the 75th percentile, the "interquartile range." The thick dark line within the box represents the median value of Source EUIs. The whiskers go 1.5 times the interquartile range, with the circles representing the outliers. The horizontal dashed line indicates the New York City median for the whole New York City multifamily data set.

The results from certain consultants stand out as being markedly different from the rest, potentially indicating a problem with the consultants' methodology. For example, the median EUI for several consultants are dramatically higher or lower than the overall median, while others have a much wider variation in EUI or an unusual number of outliers. Conversations with the consultants revealed that sometimes these variations resulted from unique building profiles, and incorrect methodologies in other cases.

In addition to these box-and-whisker charts, UPenn also did a breakdown of common data errors by type, for each major consultant. The common errors found were the following: Source EUI = 0, No Source EUI entered, Source EUI > 500 kBTU/ sq ft, Source EUI < 30 kBTU/ sq ft, zero area entered, no facility type entered, and Portfolio Manager sq ft = PLUTO sq ft.

The fact that a relatively few number of consultants firms conducted most of the benchmarking, combined with the way these box and whisker charts and the chart of data errors highlight potential anomalies, enabled the development of a targeted approach to improving quality control. The Mayor's Office of Long-Term Planning and Sustainability (OLTPS) sent the box-and whisker error analysis plots and the analysis of common data errors directly to the major consulting firms, with the names of other firms masked. This proved invaluable for the consultants' internal accuracy checking and validation. It also helped establish a direct working relation between OLTPS and the benchmarking service provider community, which should improve the quality of the second year of benchmarking.

Assessment of Issues Affecting Data Quality

This analysis indicates that most of the inaccuracies in the data resulted from unintentional errors, difficulties in obtaining accurate information, or a lack of familiarity with Portfolio Manager and the City's filing process. The close correlation between the median EUIs of New York City's benchmarking database and the national databases for buildings in the Northeast, and the good correlations between the control sets and the whole New York City data set both indicate that systematic misrepresentation of energy usage and other input data did not occur.

This assessment of errors leads to the conclusion that accuracy can best be improved through more education, training, and better input data. Because so few professional firms performed so much of the benchmarking, this outreach is relatively straightforward. Significant improvements could also be achieved through automatic screening during data input, which could warn benchmarkers when their input data appears to be erroneous. Audits of benchmarking submissions by the City will also help improve data quality. See the Policy Recommendations chapter on page 25 for for further information.

Common Problems Causing Data Inaccuracies

Discontinued Service Accounts. Obtaining whole building energy data from utilities was made much easier by the cooperation of both Con Edison and National Grid, but there were still difficulties. Tenant turnover inhibited data collection. Con Edison's system for 2010 data dropped information from accounts that had been closed, necessitating extrapolation to fill in the missing data. Con Edison has corrected this problem, so it will no longer be an issue.

Missing Service Addresses. Con Edison's data system is not based on buildings or properties, but rather on accounts connected to service addresses. Properties can have multiple service addresses. Finding all service addresses related to a property can be difficult, often resulting in the under-reporting of energy data.

Under-reporting of Gross Square Footage. Many buildings used the Department of Finance gross square footage, which often omits sub-grade levels and therefore leads to under-reporting of building area.

The 24-hour Waiting Period. Many users of Portfolio Manager did not know that the data is updated nightly, requiring a 24-hour waiting period after edits are made to be saved in the system. In other words, reports submitted the same day that data entries were made did not contain the latest entries. This resulted misinformation received by the City. Anomalous entries included incomplete energy profiles, missing borough-block-lot numbers, and inaccurate square footage reporting.

Multiple Buildings on Multiple Lots that Share Systems. New York has a number of properties that span several lots and that share energy systems, such as central boiler, chiller plants or cogeneration facilities. These campuses can be complex to benchmark. The benchmarking rule established a pro-rating methodology for benchmarking such properties, but that methodology is not aligned with the EPA protocols; as is noted elsewhere, we intend to amend the rule to correct this problem. Several strategies were used to benchmark such properties, some of which produced anomalous data. Some individuals pro-rated as per the rule, but did not correctly allocate the square footage or energy. Others allocated all of the energy and all of the square footage to one lot and entered zero energy and zero square foot for the others. Still others entered the data using the Portfolio Manager "campus" feature, which meant they lost building specific information.

Learning Curve

15% to 25% of the submissions had errors that were obvious enough that they had to be "cleaned" (i.e. removed) from the data set from the outset, so it is clear that the data needs improvement. Errors in the first year's data was anticipated, since any new process entails a learning curve; this was the reason that the first years' scores are not being publicly disclosed. As the benchmarking process moves forward and benchmarking scores are posted, however, much greater accuracy will be required.

Outreach and training is essential for achieving high compliance and accuracy. The City engaged in a variety of efforts, including extensive outreach by the UGC, half-day trainings by AEA, and the Benchmarking Help Center, funded by NYSERDA and managed by the CUNY Institute for Urban Systems Building Performance Lab (CIUS BPL). Staffed by CUNY students, the Benchmarking Help Center provided live telephone assistance for Portfolio Manager and compliance methodology. It also established a communication channel that enabled the City to learn where problems were occurring. For instance, a large percentage of calls were about confusion over utility meter data. The utility companies responded by completely revamping and improving their energy usage reporting in time for the 2012 compliance deadline for 2011 data.

The New York City Local Law 84 Benchmarking Report
is published pursuant to Local Law 84 of 2009.

The data presented is for calendar year 2010.

For more information, please visit:
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