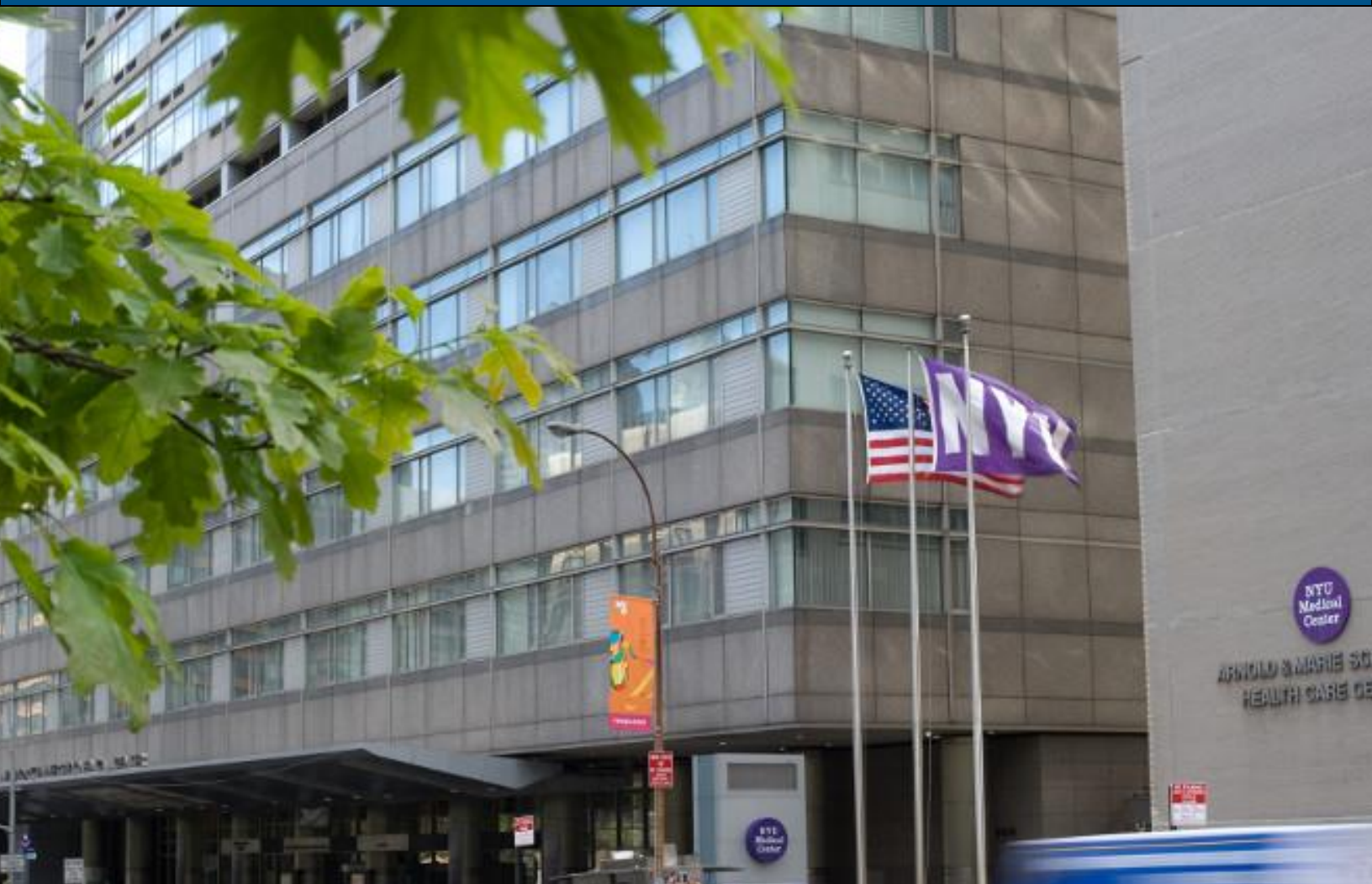


# NYU Langone Medical Center Climate Action Plan



**Produced by the NYU Langone Energy Committee**

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# Executive Summary

### NYU Langone Medical Center’s Commitment to the Carbon Challenge

The NYC Carbon Challenge is a voluntary program for prominent universities, hospitals, and commercial offices in New York City to reduce their building-based greenhouse gas (GHG) emissions by 30% or more in ten years. NYU Langone Medical Center accepted the NYC Carbon Challenge to Hospitals in 2009, committing to reduce emissions from its New York City buildings by 30% from 2005 levels by 2019. This Climate Action Plan lays out NYU Langone’s strategy to meet this goal.

### Current Reductions in Emissions

Since accepting the Carbon Challenge, NYU Langone has reduced both its carbon emissions intensity per square foot by 27.63% and its energy consumption by 23.84% from its 2005 base year levels through calendar year 2014.

### Reductions in Carbon and Energy Use Intensity

|                | Carbon Intensity<br>(lbs CO2e / Sq Ft) | Energy Use Intensity<br>(kBtu / Sq Ft) |
|----------------|--|--|
| 2005 (Base)    | 66.51                                  | 546                                    |
| 2014 (Current) | 48.13                                  | 415.99                                 |
| Reduction      | -27.63%                                | -23.84%                                |

### Current and Completed Projects

The Medical Center recognizes the value of taking a ‘whole-building’ approach to energy efficiency and sustainability and over the past few years has worked to incorporate this approach into its larger Campus Transformation

construction development program and throughout its real estate portfolio.

NYU Langone has worked on implementing sound energy management and conservation strategies that help the bottom line while also enhancing the environment. NYU Langone Medical Center has completed several projects to reduce carbon emissions, increase building efficiency and decrease operational costs. These include strategic planning, comprehensive preventive maintenance schedules, technology enhancements, commissioning and energy efficiency infrastructure upgrades. Between the start of the Energy Management Program in 2008 through end of calendar year 2014, the program has reached a total cumulative savings of roughly \$34 million. The Medical Center has been able to use these savings to continuously reinvest in the program and to use it to improve the facilities and patient experience.

In the wake of Super Storm Sandy, NYU Langone leadership recognized the need for unprecedented disaster preparedness, adaptation and resiliency planning. The Medical Center is on track to complete a brand new 11MW Combined Heat and Power plant (CHP) and 7.5MW Emergency Power Plant by 2015 to substantially reduce reliance on the grid for its main campus and enhance system redundancy. Following Sandy, planning teams modified all existing new construction plans to protect or raise critical infrastructure, patient care and support functions to 500 year flood levels plus 2 feet and installed a flood wall system to protect the campus. It has also hired an experienced

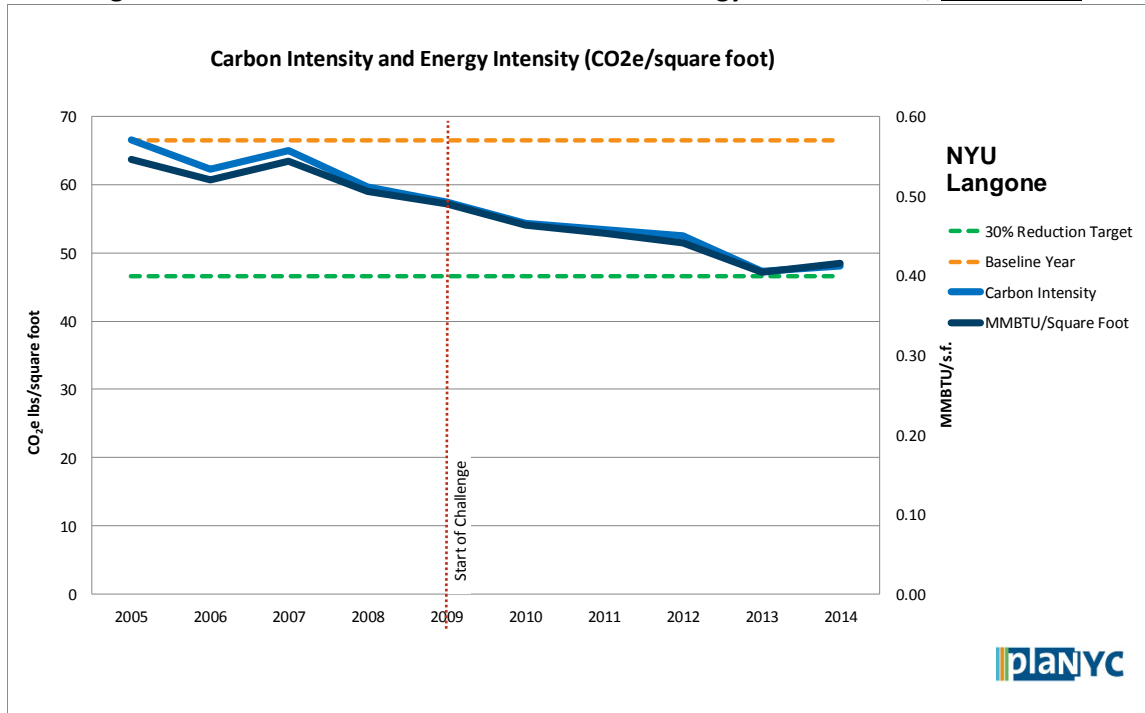
Vice President for Emergency Management & Enterprise Resilience who will lead and manage the strategic design, implementation and continuous updating of our comprehensive program for emergency preparedness and disaster planning, as well as business continuity and resilience. In spite of the challenges faced after the storm, including emergency evacuation and then necessary rebuilding, NYU Langone Medical Center was named #1 for overall quality and patient safety among leading academic medical centers across the nation by the University Health Systems Consortium 2013 Quality and Accountability Performance Scorecard.

### **Planned Projects and Next Steps**

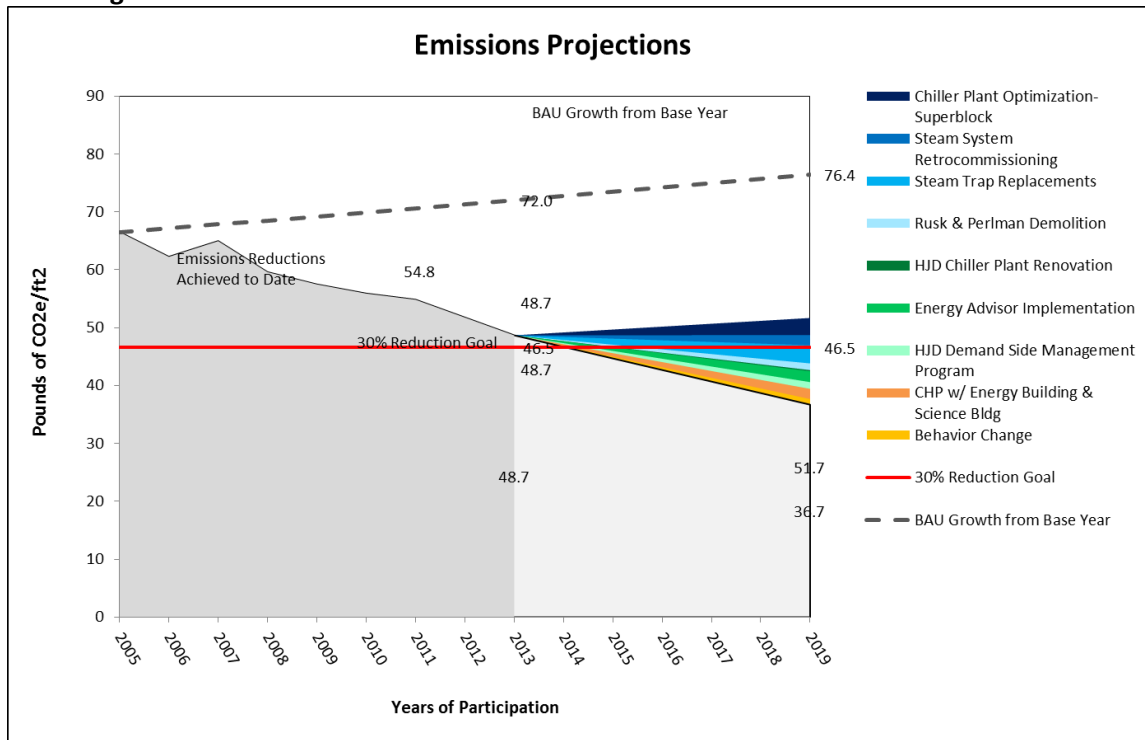
Building on its progress thus far in the Challenge, NYU Langone Medical Center has developed a road map to meet the Carbon Challenge goal. The hospital has identified projects and strategies across the areas of lighting and infrastructure upgrades, operations and maintenance, on-site generation, advanced building management systems, behavior change, commissioning and LEED green building design and construction.

Over the next five years, NYU Langone Medical Center will continue to evaluate projects and monitor progress toward the Carbon Challenge goal. By committing to this goal, the hospital is demonstrating its dedication to environmental sustainability and helping New York City reduce its emissions 30% by 2030.

## NYU Langone Medical Center's Carbon Emissions and Energy Use Reduction, 2005 –2014



## NYU Langone Medical Center's Plan to Reach a 30% Reduction



# About the Challenge

## Background

Tackling global climate change is one of the most significant challenges we face today. Projected impacts of climate change include rising sea levels and storm surges, increased heat and heat waves, and more frequent droughts and floods, all of which pose serious threats to public health, safety, and continued economic development. Given the overwhelming proof that anthropogenic or “man-made” greenhouse gas emissions are the cause of global climate change, bold action is needed to reduce our energy consumption and mitigate these emissions.

## PlaNYC

Although climate change is a global problem, its effects are often felt locally. Recognizing the need for action, in 2007 New York City released PlaNYC, a comprehensive sustainability plan that set out the ambitious goal to reduce the city’s greenhouse gas emissions by 30% from 2005 levels by 2030.

## Green Buildings and Energy Efficiency

Because roughly three-quarters of New York City’s emissions come from the energy used in buildings, almost double the proportion within the U.S. as a whole, the City has focused on reducing energy use from its buildings to meet the PlaNYC goal. A key component of this effort is a package of legislation called the Greener, Greater Buildings Plan (GGBP), which updates the city’s energy codes and requires owners of large buildings to measure their energy performance annually, conduct energy audits and undergo retro-commissioning of building

systems every ten years, upgrade to more energy efficient lighting, and provide all large commercial tenants with energy sub-meters by 2025. Together, these laws are projected to reduce citywide GHG emissions by roughly 5%.<sup>1</sup>

## The NYC Carbon Challenge

The New York City Carbon Challenge builds on these initiatives by engaging leaders in the private and institutional sectors to achieve accelerated GHG reductions in their buildings. Following City government’s pledge to cut its own emissions by 30% in just ten years (30x17), New York City Mayor Michael R. Bloomberg issued a “challenge” to leaders in the private and institutional sectors to match this goal. Since then, 17 of New York City’s leading universities, the 11 largest hospital systems, and 10 global companies with office space in the city have accepted the challenge to reduce their GHG emissions per person or per square foot by at least 30 percent in ten years. Together, these participants make up more than 140 million square feet of space and contribute roughly 4 percent of New York City’s total emissions—meaning that their efforts are expected to reduce citywide emissions by more than 1 percent by the end of the Challenge.<sup>2</sup>

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<sup>1</sup> Information from the NYC Mayor’s Office of Long-Term Planning and Sustainability.

<sup>2</sup> Information from the Mayor’s Office of Long-Term Planning and Sustainability. Based on 2005 levels.

## **NYU Langone Medical Center's Commitment to the Carbon Challenge**

NYU Langone Medical Center accepted the Carbon Challenge in 2009 and committed to reduce its greenhouse gas emissions<sup>3</sup> by 30% from 2005 levels by 2019. This Climate Action Plan lays out NYU Langone Medical Center's strategy to meet this goal and the progress it has made through 2013 and work undertaken in the first half of 2014. NYU Langone Medical Center's participation in the NYC Carbon Challenge will help cut citywide GHG emissions and allow the hospital to continue its commitment to reducing its energy use, increasing environmental sustainability and enhancing the health of the community.

### **What Is a Climate Action Plan?**

The Climate Action Plan is NYU Langone Medical Center's roadmap for achieving a 30% reduction in greenhouse gas emissions by 2019. This plan puts forward a framework to develop and implement strategies to meet this goal and allows the hospital to track its progress as it moves forward with the Carbon Challenge.

## **Scope**

This Plan includes:

- Background information about NYU Langone Medical Center and its facilities;
- A description of NYU Langone Medical Center's additional commitments to environmental sustainability;
- Energy use benchmarking information for all NYU Langone Medical Center's New York City-based properties over 50,000 square feet, as required by Local Law 84 of 2009;
- An inventory of annual greenhouse gas emissions from NYU Langone Medical Center's New York City properties using the NYC Carbon Challenge reporting methodology;
- A description of completed projects and strategies the hospital has undertaken to reduce its energy use and emissions;
- Highlights of NYU Langone Medical Center's innovative projects;
- An explanation of the strategy moving forward that will enable NYU Langone Medical Center to meet its 30% emissions reduction goal by 2019.

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<sup>3</sup> Note: For purposes of the Mayor's Carbon Challenge, greenhouse gas emissions are measured in terms of carbon dioxide equivalent (CO<sub>2</sub>e) per square foot. Please see the explanation of standard units on the next page for more information.

### Standard Units

The Carbon Challenge and the U.S. Environmental Protection Agency’s Portfolio Manager Tool, which is used to complete

benchmarking, require energy reporting to be completed in standard units. Below is a list and explanation of these standard units, which will be used throughout this Climate Action Plan.

### Standard Units for the Carbon Challenge

| Measure                              | Units   | Abbreviation              | Description   |
|--------------------------------------|---|---------------------------|---|
| <b>Greenhouse Gas Emissions</b>      | Carbon dioxide equivalent                           | CO <sub>2</sub> e         | The level of carbon dioxide (CO <sub>2</sub> ) that would have the same climate impact as a given concentration and type of greenhouse gas.   |
| <b>Energy Use</b>                    | Million British thermal units                       | MMBtu                     | A standardized measure of total energy use to compare energy use across different fuel types. For purposes of the Challenge, energy use is measured in terms of <i>source energy</i> , or energy use that takes into account weather fluctuations or transmission, delivery, and production losses of an energy source. |
| <b>Floor Area</b>                    | Gross square feet                                   | Sq. Ft.                   | Includes the total number of square feet measured between the <i>exterior</i> surfaces of the enclosing fixed walls. This includes spaces such as vent shafts, stairs, basements, etc.  |
| <b>Carbon or Emissions Intensity</b> | Pounds of carbon dioxide equivalent per square foot | Lbs. CO <sub>2</sub> e/SF | A measure of the intensity of carbon emitted per person or square foot, which standardizes emissions levels for companies of different sizes.   |
| <b>Energy Use Intensity</b>          | One thousand British thermal units per square foot  | kBtu/SF                   | A measure of the intensity of energy used per square foot, which standardizes energy use for companies of different sizes.  |

### Standard Units for EPA’s Portfolio Manager

| Measure  | Units  | Abbreviation | Description  |
|--|--|--------------|--|
| <b>Site Energy Use Intensity (Site EUI)</b>                        | One thousand British thermal units per gross square foot | kBtu/SF      | A measure of the on-site energy use per square foot in a building (does not take into account weather fluctuations or source energy losses).                     |
| <b>Weather-Normalized Source Energy Use Intensity (Source EUI)</b> | One thousand British thermal units per gross square foot | kBtu/SF      | A measure of energy use per square foot that takes into account weather fluctuations and all transmission, delivery, and production losses of the energy source. |



# About NYU Langone Medical Center

## Background

NYU Langone Medical Center, a world-class, patient-centered, integrated, academic medical center, is one of the nation's premier centers for excellence in clinical care, biomedical research and medical education. For over 167 years, NYU physicians and researchers have made contributions to the practice and science of healthcare.

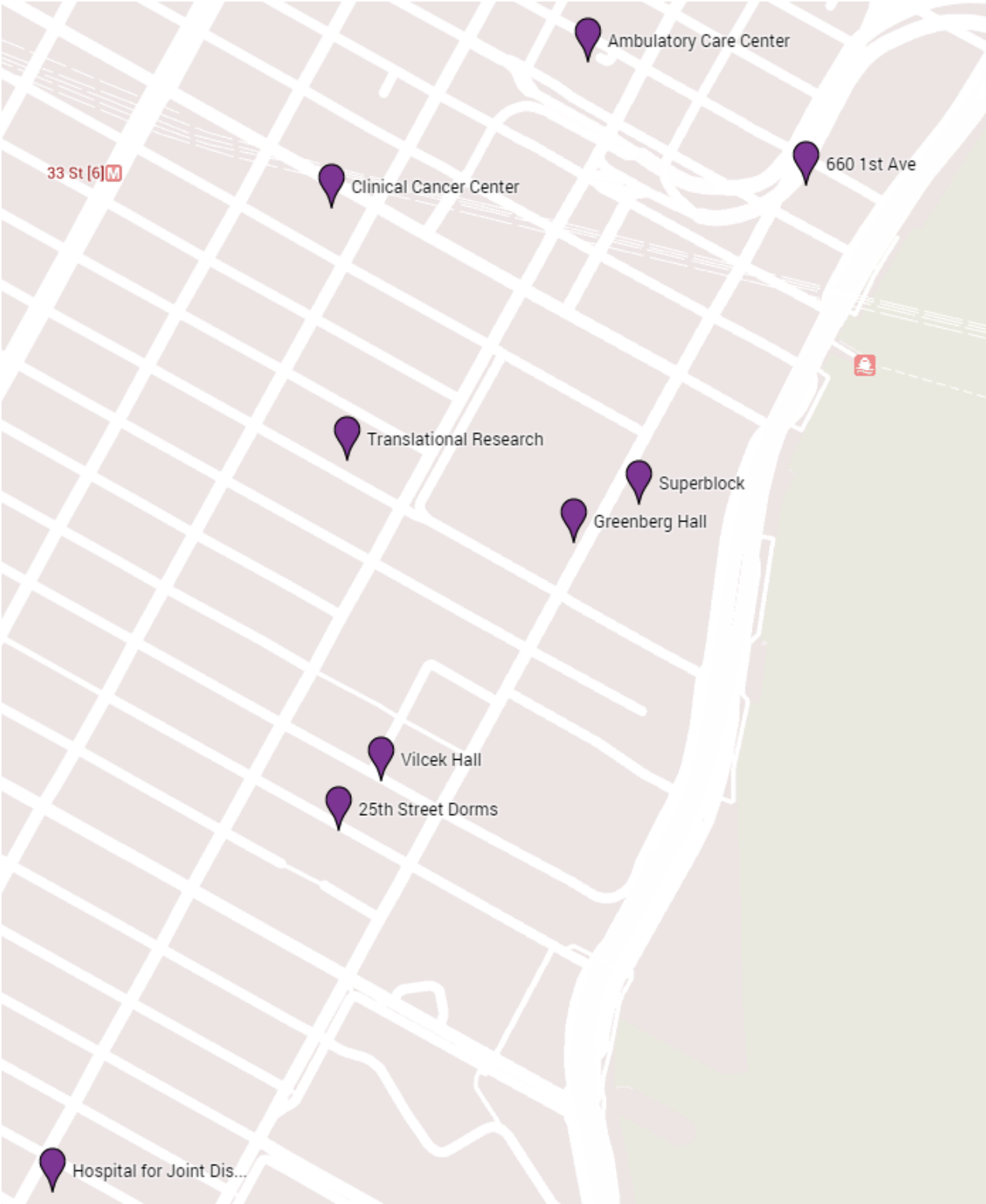
Located in the heart of Manhattan, NYU Langone is composed of four hospitals: Tisch Hospital, its flagship acute care facility; the Hospital for Joint Diseases, one of only five hospitals in the nation dedicated to orthopedics and rheumatology; Hassenfeld Pediatric Center, a comprehensive pediatric hospital supporting a full array of children's health services; and the Rusk Institute of Rehabilitation Medicine, the world's first university-affiliated facility devoted entirely to rehabilitation medicine. These facilities together boasts 1,069 beds and 77 operating rooms and continues to grow as the

main campus undergoes a significant transformation. These facilities are joined by the NYU School of Medicine, which since 1841, has trained thousands of physicians and scientists who have helped to shape the course of medical history. The medical center's tri-fold mission to serve, teach and discover is achieved 365 days a year through the advancement of a culture devoted to excellence in patient care, education and research.

## Campuses and Buildings

NYULMC's main campus, referred to as the Superblock, is located between First Avenue and the FDR Drive between East 30th and East 34th streets in mid-town Manhattan. The Superblock is comprised of 12 buildings or about 2 million square feet with functions that range from acute care, medical research and medical school delivery. Together with several offsite and ambulatory facilities this Climate Action Plan addresses just under 4 million square feet of space.

Campus Map



### Building Area Breakdown for NYU Langone Medical Center

| Building Name                   | Building Address     | Floor Area (Gross SF) | Building Type                           | BBL   |
|---------------------------------|----------------------|-----------------------|---|---|
| 25 <sup>th</sup> Street Dorm    | 330 East 25th Street | 53,492                | Residence Hall/ Dormitory               | 1-00930-0041;1-00930-0038                           |
| Vilcek Hall                     | 334 East 26th Street | 142,475               | Residence Hall/ Dormitory               | 1-00931-0021  |
| 660                             | 660 First Avenue     | 112,000               | Medical Office                          | 1-00969-0005  |
| Clinical Cancer Center          | 160 East 34th Street | 117,467               | Medical Office                          | 1-00889-0050  |
| Greenberg Hall                  | 545 First Avenue     | 217,465               | Multifamily Residential                 | 1-00936-0037  |
| Hospital for Joint Diseases     | 302 2nd Avenue       | 338,424               | Hospital (General Medical and Surgical) | 1-00923-0001  |
| Translational Research Building | 227 East 30th Street | 83,052                | Office                                  | 1-00911-07503                                       |
| Ambulatory Care Center          | 240 East 38th Street | 367,995               | Hospital (General Medical and Surgical) | 1-00918-07501                                       |
| Superblock                      | 550 First Avenue     | 2,323,082             | Hospital (General Medical and Surgical) | 1-00962-0108;1-00962-7501;1-00962-0008;1-00962-0080 |

|                        |           |
|------------------------|-----------|
| <b>Total Buildings</b> | 9         |
| <b>Total Area</b>      | 3,751,612 |

### **NYU Langone Medical Center's Additional Commitments to Sustainability**

In addition to its commitment to the NYC Carbon Challenge, NYU Langone Medical Center has made other internal and external commitments to reduce its global environmental footprint and increase the sustainability of its operations.

**Enhanced Management Practices:** While sound energy management practices have been a decades-long initiative at the NYU Langone Medical Center, the creation of a specific Energy Management leadership position in 2008 provided the impetus to coordinate a variety of plans for innovative energy purchasing and project development. The Medical Center's program is modeled on the highly successful ENERGY STAR *Guidelines for Energy Management*. This document has been an indispensable tool for the establishment of facility-wide best practices. The NYU Langone Medical Center also employs the EPA's national ENERGY STAR energy performance rating system to track energy performance, benchmark data and engage operations teams across the entire real estate portfolio to regularly track energy demand statistics and meet monthly targets.

**Energy Committee:** The NYU Langone Medical Center has developed a series of policies and procedures to ensure sustainable, long-term results throughout the organization. To focus on the development and attainment of energy conservation goals, the NYU Langone Medical Center established a formal Energy Committee, chaired by the Senior Vice President for Facilities. This team meets on a weekly basis and focuses on project implementation, technology development, departmental coordination, educational programs and

community outreach. The diverse team includes parties responsible for energy management, operations, engineering, commissioning, environmental sustainability and new buildings design and construction, recognizing the importance of these many facets in achieving lasting energy conservation success.

This Energy Committee also reviews the Executive Energy Report on a monthly basis to examine performance to budget, energy usage to historical data and weather normalized energy usage. The performance within the EPA's Portfolio Manager benchmarking is also discussed and new strategies to improve performance are developed.

**EPA Battle of the Buildings:** For the past several years, NYU Langone has participated in the EPA's National Battle of the Buildings competition. This competition utilized EPA's Portfolio Manager to track all energy usage comparing comparable buildings across the United States. NYU Langone's Hospital for Joint Diseases has been an active participant since the 2011 Battle of the Buildings; however, as of 2014, it is now one of five buildings that are enrolled. NYU Langone is the only healthcare organization in New York State participating in this national competition and one of only 2% of hospital competitors countrywide.

#### **Construction and Demolition Debris Policy:**

As NYU Langone continues to move forward with its Campus Transformation, it will involve large amounts of renovations, demolition and build-outs in both new and occupied spaces. NYU Langone recognizes the impact that construction debris can have on the waste stream and instituted policies to limit construction and demolition debris in smaller projects. The Medical Center is also committed

to achieving an 80% diversion rate of C&D to recycling on all new construction projects. To that end, Real Estate Development & Facilities is working on incorporating the proper policies and procedures for debris recycling into its construction contracts to ensure this goal can be achieved. For any projects currently pursuing LEED certification, these policies are already in place.

***Green Cleaning:***

In an effort to reduce the use of harmful cleaning agents, the Medical Center instituted a Green Cleaning program. Under this program, the Medical Center only employs Green Seal certified products, unless otherwise specified for infection control risks. In addition, instead of chemical-based floor scrubbers, the staff utilizes machines that employ ionized water to meet disinfection standards, which eliminates the need for additional chemicals. The facility also utilizes microfiber mops and cleaning cloths to reduce water and chemical use.

***Healthier Food:***

NYU Langone understands that healthy eating plays an integral role in wellness and the healing process. The Food Services group is committed to providing the healthiest and freshest food options to patients, guests and employees and serving local, seasonal and chemical and hormone-free foods whenever possible. In 2013, the Medical Center eliminated fryers across the campus and instead bakes its food which, in addition to eliminating cooking oil waste, produces healthier choices for patients and employees. Efforts such as these coupled with initiatives to improve the nutritional content of food and beverage options in cafeterias, vending machines and on patient meal trays, earned NYU Langone Gold Status in the New York City Department of

Health's Healthy Hospital Food Initiative for 2014.

***Reprocessing:***

The Medical Center has recently initiated a single-use device reprocessing program. This program will not only save money, it will keep thousands of pounds of materials out of landfills, particularly as all reprocessed devices are recycled at end of life. To begin, NYU Langone will be participating in a donor program of its OEM materials; however, the long-term goal is to begin purchasing a variety of reprocessed devices to create a closed loop system.

***Mercury Elimination:***

In an effort to protect patients, staff, researchers and the environment, NYU Langone aims to control, catalog and work to virtually eliminate all mercury-containing materials and equipment within the main campus, all off-site properties and fully-owned physician practices where safe, effective alternatives exist. The Medical Center will also support industry development of new, proven alternatives and properly track, control and minimize the impact of any remaining mercury use.

***Communication & Engagement:*** Sustainability outreach at NYU Langone is currently undergoing a large overhaul begun in 2014. The Sustainability Team received approval from the Dean & CEO for rebranding of the sustainability program. Branding now includes a unique logo and name, which is Green First. This new identity will help streamline communications and raise awareness among staff, students and patients. A recently redesigned internal website will help disseminate information and keep Medical Center stakeholders up to date on energy and sustainability projects. A new

external facing web presence will share information about the program with key stakeholders and the media. Other key forms of communication include articles in internal publications, emails, conferences and speaking engagements, Earth Day activities, and student-facing announcements. The team is also in the process of creating an online-based internal social networking Community to engage with employees and solicit feedback, ideas and participation and award participation badges to members with high participation rates. More recently, the Energy Management Team worked with an internal production crew to create a video capturing the building and development of the on-campus CHP plant in order to educate viewers on the benefits it will provide in terms of the resiliency and sustainability of the Medical Center. The Medical Center has also focused on better coordinating with the larger NYU University—which has its own successful Office of Sustainability—and is exploring the feasibility of several joint engagement efforts.

***Awards and Recognition:***

In 2014, NYU Langone received the Partner Recognition Award from Practice Greenhealth, the preeminent healthcare sustainability membership organization. Baseline requirements for the award include achieving at least a 10% recycling rate and successfully completing a number of sustainability projects and initiatives. This award recognizes leaders in the healthcare sustainability field and NYU Langone was proud to be among them.

# Benchmarking Information

## Background

New York City's Local Law 84 of 2009 is the first in a package of four local laws collectively called the Greener, Greater Buildings Plan (GGBP). Local Law 84 requires owners of all buildings over 50,000 square feet in gross floor area and in lots with more than 100,000 square feet of built floor area to report their buildings' annual energy use through a process called benchmarking. Benchmarking measures a building's total energy use by fuel type and adjusts for other factors, which allows owners to compare building energy performance to other similar buildings and help determine whether systems are operating efficiently.

NYU Langone Medical Center benchmarked its properties for 2013 using an online tool developed by the U.S. Environmental Protection Agency called Portfolio Manager. Using NYU Langone Medical Center's energy use information, Portfolio Manager produces a measure of energy use intensity (EUI), or energy use per square foot per year, and an ENERGY STAR score for each benchmarked building.

A building's EUI can be expressed in several ways. Portfolio Manager generates site EUI and the weather-normalized source EUI for each benchmarked building. The site EUI provides the on-site energy use per unit of gross building area, while the weather-normalized source EUI incorporates weather fluctuations and losses from production, transmission, and delivery of the energy source into the final number.

The ENERGY STAR score is a number on a scale of 1-100 assigned to each eligible building that compares the efficiency of energy use across similar facilities. For example, an ENERGY STAR score of 75 indicates that a building performs better than 75% of all comparable buildings nation-wide. The score is based on the Commercial Building Energy Consumption Survey (CBECS), which is conducted every four years by the U.S. Department of Energy's Energy Information Administration. ENERGY STAR scores are only available for certain building types and at least 50% of the gross floor area must be one of these eligible building types to receive a score, so the lack of an ENERGY STAR score for a building does not indicate poor energy performance in a building.

## NYU Langone Medical Center's Benchmarking Information

NYU Langone Medical Center has submitted benchmarking information for its owned buildings to comply with NYC Local Law 84 since 2011. In 2014, NYU Langone Medical Center was required to benchmark 9 buildings. Below is a table that includes the benchmarking results for these buildings in 2013.

**Weather Normalized Site EUI:** NYU Langone Medical Center's average site EUI for benchmarked buildings in 2014 was 170.2 kBtu/ft<sup>2</sup>, with a high of 244.8 and a low of 82.8 kBtu/ft<sup>2</sup>.

**Weather Normalized Source EUI:** The average weather-normalized source EUI for 2013 was

381.8 kBtu/ft<sup>2</sup>, with a high of 634.3 kBtu/ft<sup>2</sup> and a low of 156.1 kBtu/ft<sup>2</sup>.

benchmarked buildings ranged from a low of 7 in the 660 First Avenue Building to a high of 66 in the 330 East 25th Street Building with an average score of 34 for all eligible buildings.

ENERGY STAR Scores: In 2014, NYU Langone Medical Center's ENERGY STAR scores from

**NYU Langone Medical Center Benchmarking Results – 2014**

| Benchmarked Property Name       | Address              | BIN   | BBL   | Weather Normalized Site EUI (kBtu/ft2) | Weather Normalized Source EUI (kBtu/ft2) | ENERGY STAR Score |
|---------------------------------|----------------------|---|---|--|--|-------------------|
| 330 E 25th                      | 330 E 25th St        | 1081673;1081672;1020602   | 1-00930-0041;1-00930-0038                           | 95.6                                   | 156.1                                    | 66                |
| Vilcek Hall                     | 334 E 26th St        | 1020607   | 1-00931-0021  | 82.8                                   | 168.4                                    | 61                |
| 660 First Ave                   | 660 First Ave        | 1022549   | 1-00969-0005  | 233.1                                  | 634.3                                    | 7                 |
| Clinical Cancer Center          | 160 East 34th Street | 1018503   | 1-00889-0050  | 181.1                                  | 499.3                                    | 30                |
| Greenberg Hall                  | 545 1st Avenue       | 1020760;1800054   | 1-00936-0037  | 64.4                                   | 150.9                                    | 34                |
| Hospital for Joint Diseases     | 302 2nd Avenue       | 1020429   | 1-00923-0001  | 244.8                                  | 531                                      | 23                |
| Translational Research Building | 227 East 30th Street | 1019951   | 1-00911-07503                                       | 217.8                                  | 337.6                                    | 14                |
| Ambulatory Care Center          | 240 East 38th Street | 1020338   | 1-00918-07501                                       | 189.2                                  | 432                                      | 48                |
| Superblock                      | 550 First Ave        | 1085694;1081693;1081694;1085695;1081692;1085588;1087297;1088433;1805035 | 1-00962-0108;1-00962-7501;1-00962-0008;1-00962-0080 | 223.1                                  | 486.5                                    | 23                |



# Carbon Emissions Inventory

## Background

All Carbon Challenge participants complete a portfolio-wide carbon emissions inventory to calculate their energy use and associated carbon emissions for New York City-based properties for each year of the Challenge, beginning with a selected base year and ending with the last year of the Challenge. The GHG emissions calculated in the participant's base year are the level from which Carbon Challenge reduction goal is measured. NYU Langone Medical Center accepted the Carbon Challenge in 2009 and pledged reduce its carbon emissions in 2005 by 30% by 2017.

## Emissions Sources

The Carbon Challenge covers all building-based emissions from the energy use over which participants have direct operational control. These include emissions that are attributable to on-site energy use on participants' properties as well as emissions that result from offsite generation of the energy sources. It is important to note, however, that emissions reported for the Carbon Challenge do not include the full profile of each participant's emissions. For one, the Carbon Challenge only includes emissions from properties that are located in New York City, and some participants operate properties outside the city limits that are not counted in the Challenge. In addition, emissions include only what the World Resources Institute (WRI) labels "Scope 1" and "Scope 2" emissions.

According to the WRI's Greenhouse Gas Protocol, an organization's full profile of

emissions consists of: Scope 1 emissions, which include emissions that are physically produced on an organization's property (for example, fossil fuels used in boilers); Scope 2 emissions, which are indirect emissions from the offsite generation of energy sources that are used on-site (for example, electricity or district steam); and Scope 3 emissions, which are emissions that are not produced on-site or from offsite generation but are nonetheless attributable to the organization's activities (for example, from air travel or solid waste disposal). The Carbon Challenge includes Scope 1 and Scope 2 emissions but does not necessarily include Scope 3 emissions because they are not always produced within city boundaries and lack general agreement on proper accounting methodologies.

The Carbon Challenge requires that NYU Langone Medical Center measure emissions from all buildings and properties that it owns and operates and from rental properties greater than 10,000 square feet where NYU Langone Medical Center pays the entire utility bill. In rental properties greater than 10,000 square feet where NYU Langone Medical Center does not pay the entire bill, the gross square footage of the property is discounted by 50%. Rental properties of less than 10,000 square feet are optional under the Challenge. NYU Langone Medical Center has decided not to count these properties.

The majority of carbon emissions from hospitals come from the energy used in their buildings. For this reason, the participants in the Carbon

Challenge are focused primarily on reducing carbon emissions from these sources. Reducing and reporting carbon emissions from vehicle fleets is optional under the Challenge. NYU Langone Medical Center has not chosen to include carbon emissions from its vehicle fleet beginning in its 2013 inventory.

### **GHG Accounting Methodology**

As a Carbon Challenge participant, NYU Langone Medical Center agrees to track its carbon emissions according to the methodology of the Carbon Challenge. Under this methodology, participants report their non-weather normalized source energy use for all covered properties by fuel type and aggregate it annually for every year of the Challenge, beginning in the base year and ending in the end year. Participants enter this energy use into a carbon emissions inventory calculator tool, provided by the NYC Mayor's Office of Long-Term Planning and Sustainability, which multiplies energy consumption by a "carbon coefficient" to find the associated level of carbon dioxide equivalent (CO<sub>2</sub>e).

All carbon coefficients for the Carbon Challenge were developed by the NYC Mayor's Office of Long-Term Planning and Sustainability and are in compliance with the 2013 United States Community Protocol for Accounting and Reporting Greenhouse Gas Emissions (USCP). The Carbon Challenge uses New York City-specific carbon coefficients for electricity and steam, which are calculated by the Mayor's Office of Long-Term Planning and Sustainability based on power plant data. All coefficients for natural gas and heating fuel oils No. 2, 4, and 6 were developed by the U.S. EPA.

For purposes of the Challenge, the carbon coefficients for electricity and steam are fixed at

2005 base year levels because the coefficients for these fuel types can vary significantly between years. Improvements in New York City's electricity supply, for example, would provide an advantage to Challenge participants who depend primarily on electricity, regardless of their energy efficiency investments. Fixing the carbon coefficients at 2005 levels therefore standardizes the competition across all the Challenge participants. Please see below for the complete list of the Carbon Challenge carbon coefficients.

The Carbon Challenge also requires a minimum reporting of annual mixed/unsorted MSW (general municipal solid waste sent to a landfill), recycled waste (sent to a recycling facility), and composted waste (if there is an institutional composting program). Waste inventories are recorded in short tons. Institutions have the option to complete a physical waste audit to determine waste characterization percentages, which would break down the mixed/unsorted MSW category into mixed recyclables, mixed organics, and sorted MSW. Breaking down the waste stream provides more accurate emission levels.

The emission factors for mixed/unsorted MSW, mixed recycling, and mixed organics were derived from the EPA WARM model, Exhibit 6 and material definitions list. They were modified according to the methodology New York City accounts for greenhouse gas emissions. Transportation to landfills is not included in the equation, as it is counted separately for the city and would have a minor effect on the coefficients. For simplicity of accounting, all waste is assumed to be taken to a landfill. According to New York City data, 95% of commercial waste is landfilled, and only 5% is incinerated. The Carbon Challenge assigns a

carbon coefficient of zero to recycling and composting, although it recognizes that the EPA WARM model provides a negative coefficient for these diversions because of attributed carbon sequestration. This methodology was

meant for influencing waste management practices, not greenhouse gas accounting. A zero coefficient acknowledges that recycling and composting reduces emissions, but there is no current research to accurately quantify it.

### Carbon Challenge Emissions Coefficients

#### Emissions Coefficients for Buildings

|                                      | Electricity (kWh)* | Natural Gas (therms)* | #2 Fuel Oil (gal) | #4 Fuel Oil (gal) | #6 Fuel Oil (gal) | Diesel for back-up generation (gal) | Steam (Mlbs) |
|--------------------------------------|--------------------|-----------------------|-------------------|-------------------|-------------------|-------------------------------------|--------------|
| MT CO <sub>2</sub> e per unit energy | 0.000422704        | 0.005315600           | 0.010264026       | 0.011016722       | 0.011327550       | 0.010264026                         | 0.086629611  |
| MMBtu per unit energy                | 0.009546           | 0.1                   | 0.138             | 0.146             | 0.15              | 0.138                               | 1.33015      |

\*Fixed at 2005 Levels

#### Emissions Coefficients for Waste

|                                      | Mixed MSW - Sorted & Unsorted (tons) | Mixed Organics (tons) | Mixed Recyclables (tons) | Composted Waste (tons) | Recycled Waste (tons) |
|--------------------------------------|--------------------------------------|-----------------------|--------------------------|------------------------|-----------------------|
| MT CO <sub>2</sub> e per unit weight | 0.819                                | 0.282128              | 0.416475                 | 0                      | 0                     |

### NYU Langone Medical Center's Goal

To measure progress toward the Carbon Challenge goal, participants perform a baseline carbon emissions inventory to measure emissions levels in their base year. Based on this inventory, NYU Langone Medical Center will need to reduce its 2005 carbon intensity of 66.51 pounds per foot by 30% to 46.55 by 2019.

### NYU Langone Medical Center's Carbon Emissions Inventory

NYU Langone Medical Center completed its most recent carbon emissions inventory for the Carbon Challenge for 2013. Based on this inventory, NYU Langone Medical Center has reduced its carbon intensity by 26.82% and reduced its energy use intensity by 24.07%. See below for a summary of NYU Langone Medical Center's progress.

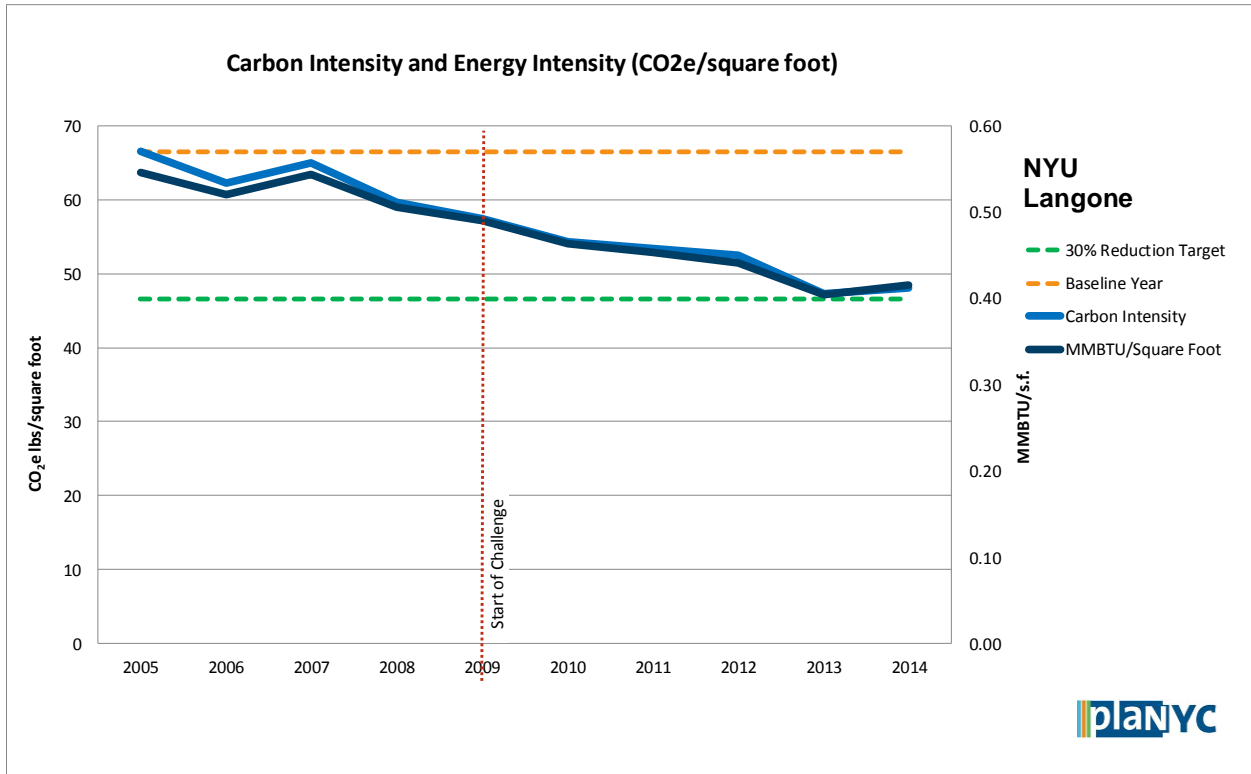
### NYU Langone Medical Center's Carbon Emissions Reduction, 2005 – 2014

|   | Base Year (2005) | Current Year (2014) | Percentage Change |
|---|------------------|---------------------|-------------------|
| Total Emissions (MT CO <sub>2</sub> e)              | 94,547           | 81,891              | -13.39%           |
| Gross Floor Area (Sq Ft)                            | 3,134,569        | 3,751,612           | 19.69%            |
| Emissions Intensity (lbs CO <sub>2</sub> e / Sq Ft) | 66.51            | 48.13               | <b>-27.63%</b>    |

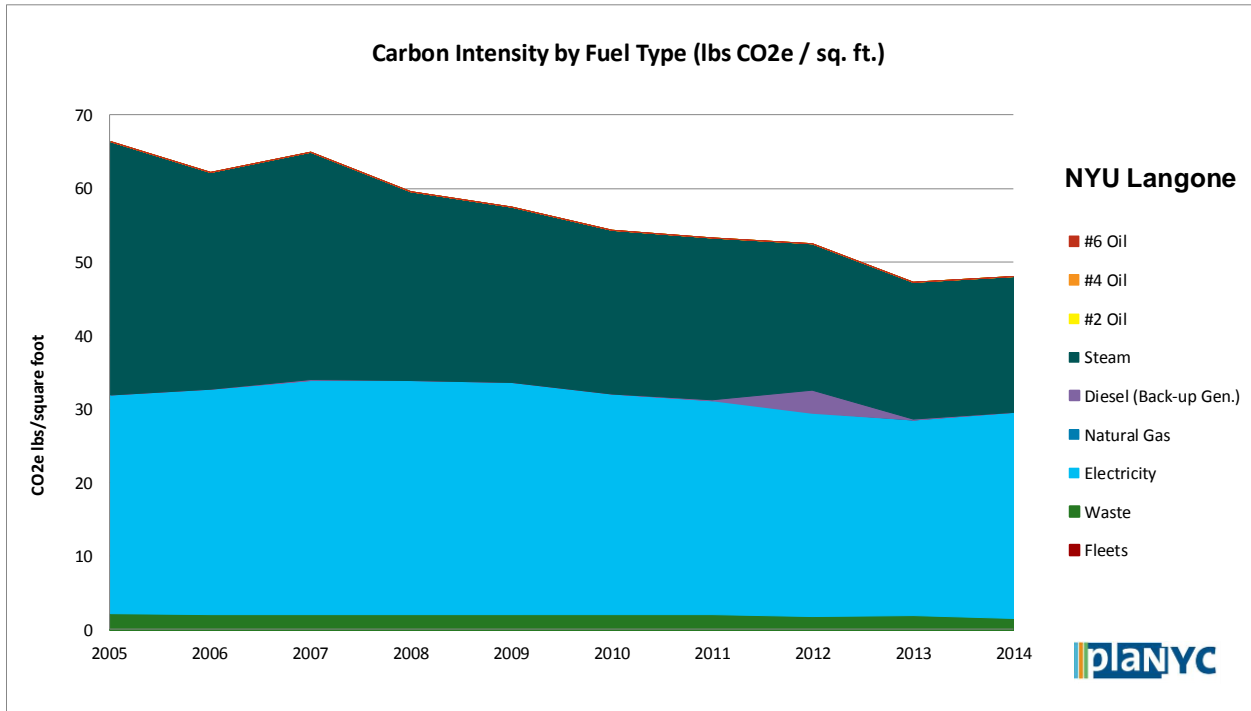
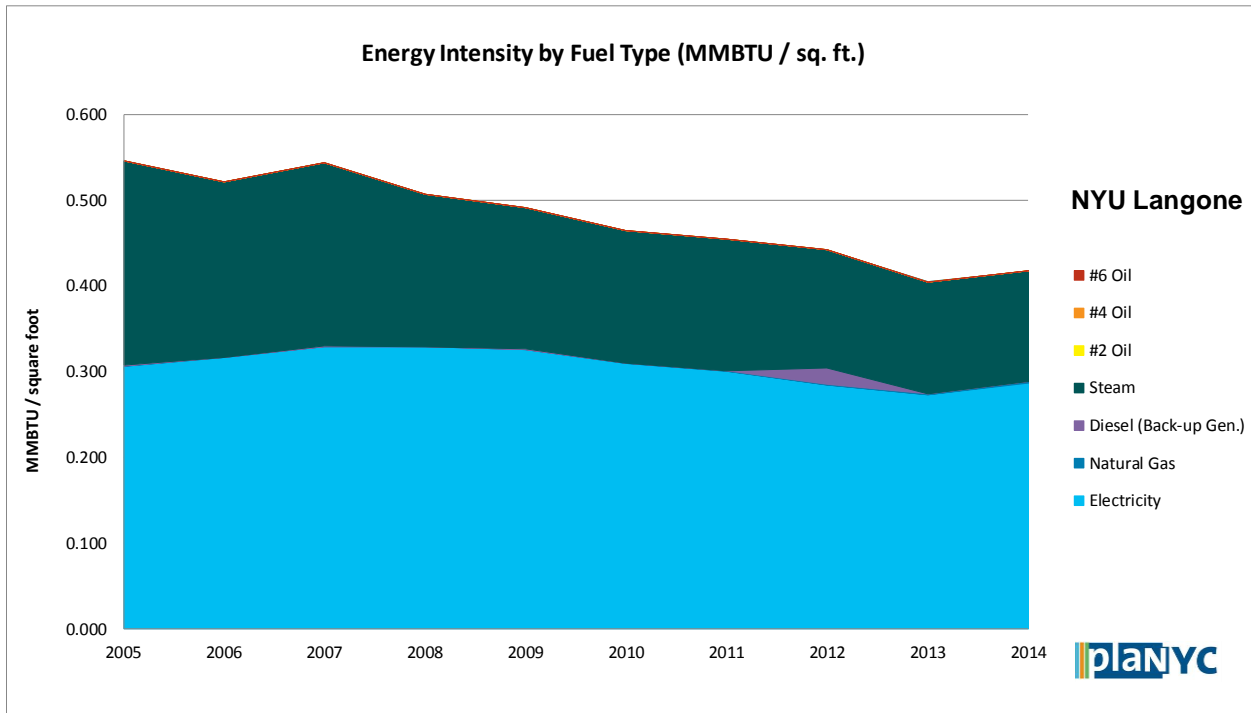
### NYU Langone Medical Center's Energy Use Reductions, 2005 – 2014

|                                      | Base Year (2005) | Current Year (2014) | Percentage Change |
|--------------------------------------|------------------|---------------------|-------------------|
| Total Energy Use (MMBtu)             | 1,712,218        | 1,560,632           | -8.85%            |
| Gross Floor Area (Sq Ft)             | 3,134,569        | 3,751,612           | 19.69%            |
| Energy Use Intensity (MMBtu / Sq Ft) | 546.24           | 415.99              | <b>-23.84%</b>    |

**NYU Langone Medical Center's Carbon and Energy Use Intensity Reduction, 2005 – 2014**



**NYU Langone Medical Center's Carbon and Energy Use Intensity by Fuel Types, 2005 – 2014**



# Completed Projects

## Overview

Participants in the Carbon Challenge may achieve reductions in carbon emissions through both energy efficiency projects and conversions to cleaner energy sources. Energy efficiency projects include the installation of equipment or implementation of processes that are more efficient than currently required by relevant standards and achieve a permanent reduction in energy consumption. Fuel conversions include the replacement of one energy source for a building system with another source, which can result in emissions reductions even while using the same level of energy.

## Methodology of Estimating Energy and Carbon Reductions

NYU Langone tracks its carbon emissions according to the methodology of the Carbon Challenge. Under this methodology, all energy use in buildings is categorized by fuel type and aggregated together for all facilities for every year of the Challenge, beginning in the baseline year and ending in the end year. The annual energy consumption for each fuel type is entered into a Carbon Emissions Inventory calculator tool, provided by the NYC Mayor's Office of Long-Term Planning and Sustainability, which multiplies energy consumption by a "carbon coefficient" to find the associated level of carbon dioxide equivalent (CO<sub>2</sub>e).

All carbon coefficients for the Carbon Challenge were developed by the NYC Mayor's Office of Long-Term Planning and Sustainability and are in compliance with the 2009 Local Government

Operations Protocol (LGOP). The Carbon Challenge uses New York City's carbon coefficients for electricity and steam, which are based on power plant data. All emissions coefficients for natural gas, propane, and heating fuel oils No. 2, 4, and 6 were developed by the U.S. EPA.

For purposes of the Challenge, however, the carbon coefficients for electricity and steam are fixed at their 2005 baseline year levels because the coefficients for these fuel types can vary significantly between years. Improvements in New York City's electricity supply, for example, provide an advantage to Challenge participants who depend primarily on electricity, regardless of whether they make any energy conservation investments. Fixing the carbon coefficients at 2005 levels therefore serves to standardize the competition across all Challenge participants. Please see the complete list of the carbon coefficients below.

NYU Langone chooses to measure the carbon emissions from our solid waste stream as a single unsorted municipal solid waste (MSW) number as our recycling efforts have not yet expanded to all reported buildings. The Medical Center's goal is to complete a waste characterization study to determine the baseline volume and composition of this MSW and conduct annual waste studies to track changes to this baseline. Note that both the methodology and the carbon coefficients for waste are still under development and will be incorporated in the future.

## Completed Projects and Estimated Impacts

**Energy Advisor Program:** EME Consulting Engineering Group, LLC (EME) has been providing energy advisory services to the NYU Langone Medical Center (NYULMC) for the past several years through the New York State Energy Research & Development Authority (NYSERDA) FlexTech Program. EME's scope of work has included a wide range of services that have touched upon all of NYULMC's buildings and energy sources. Over the past year, EME developed, managed and implemented a number of energy efficiency projects that have aggregate electric and steam savings of 1,397,418 kWh and 12,364 MMBtu, respectively.

**Lighting:** Original energy audits conducted in 2011 identified energy efficiency measures related to lighting and lighting controls. Recommendations ranged from T12 lighting fixture retrofits to LED installations. All lighting retrofits that met the internal criteria of a 5 year payback were implemented.

**Commissioning (Cx):** Design, construction, and retrocommissioning (RCx) efforts have been integral in both achieving and maintaining energy savings and efficiency measures. NYU Langone has instituted a robust commissioning program and hired dedicated managers for both engineering and electrical systems. Key initiatives have included:

### *Medical Science Building:*

The Medical Science Building, (MSB) is the largest research building on campus and contains science laboratories, libraries, and administrative space. This building was targeted by the committee as a strong candidate for an energy audit due to the age of the building (1950's vintage) & significant number of

summer and winter season comfort issues. This ASHRAE Level II audit identified 722,341 kWh in electricity, 25,819 Mlb of steam, and 15,236 MMBTU of chilled water savings.

### *Hospital for Joint Diseases:*

The Hospital for Joint Diseases (HJD) is a 338,000 sq. ft. healthcare facility specializing in musculoskeletal and neurological disorders. This building was also targeted for an energy audit due to both the age of the building and its poor score on the Portfolio Manager tool. This ASHRAE Level II audit identified 2,954,103 kWh in electricity, and 22,244 MMBTU of steam savings. The magnitude of the energy savings found were so significant, a third party project manager was enlisted by the Energy Committee to implement the projects as expeditiously as possible.

### *Skirball:*

The Skirball Multi-Use Building (MUB), constructed in 1992, is a high-rise mixed use building whose first floor serves as the main entrance and lobby to the Medical Center. The building totals approximately 550,000 sq. ft. on 26 floors.

The Skirball initiative was comprised of a study to identify operation and maintenance (O&M) measures that would optimize the building's mechanical systems. The RCx study focused on the requirements related to operating protocols; calibration and sequencing; equipment cleaning repair; and training and documentation. It also outlined the activities, roles and responsibilities and provided a general understanding of the testing to be completed. Deficiencies identified during the testing were tracked in an Issues Log with recommendations for resolution including low-cost/no cost and capital improvements.



#### *Clinical Cancer Center:*

The NYU Langone Medical Center Clinical Cancer Center is an eleven story building first opened in 2003, totaling approximately 110,000 square feet. The building was designed as an outpatient medical facility complete with office, exam rooms, and treatment rooms. Retro-commissioning was carried out in 2013, ten years since the opening of the facility. Despite being a relatively new facility, with equipment still in good working condition, the engineers carrying out the retro-commissioning were able to find places of improvement. With simple adjustments to existing systems, NYU Langone Medical Center was able to optimize existing systems to provide energy reductions with little to no financial investment.

#### *660:*

One of the oldest facilities in the NYU Langone portfolio, 660 First Avenue was built in 1901. With seven stories totaling approximately 112,000 square feet, NYU Langone Medical Center recognized the importance of investing in retro-commissioning. The building holds many important systems for the Medical Center, such as a majority of the outpatient MRI machines and reproductive laboratories. These labs and machines use a large amount of power and it was found that through simple measures, the Medical Center could save significant amounts of energy and money. These measures included the replacement of insulation on pipes and valves, replacing filters, and creating a schedule for the air conditioning system. Overall NYU Langone Medical Center was able to witness financial paybacks of less than one year. As with every other retro-commissioning projects, deficiencies were identified during the testing and were tracked in an Issues Log.

#### **Financial Impacts**

The NYU Langone Energy Committee currently has at least 30 active projects underway, and since September of 2008 has committed \$17.4 million in funding via a strategic and wholly elective (outside of maintenance & operations projects) energy planning account to further the conservation efforts of the Medical Center.

#### **Exogenous Impacts**

Exogenous factors can significantly impact building-level energy use and therefore affect NYU Langone Medical Center's progress in the Carbon Challenge. In 2012, Hurricane Sandy caused a multi-week power outage in the Superblock, reducing annual electricity consumption in this property. NYU Langone Medical Center brought in diesel generators to power these buildings for multiple weeks of the power outage, which partly, but not completely, offset the decrease in energy use and emissions. In turn, 2013 was very much a rebuilding year for the Medical Center. In the wake of Hurricane Sandy, staff worked tirelessly to bring the majority of facilities back online within 2 months. However, rebuilding and the subsequent reoccupation of affected buildings took place throughout the year and accounts for some of the larger dips and spikes in energy usage. This work was also folded into the overall campus development plan including the demolition of older facilities and construction of new ones.

#### **Measurement and Verification**

Based on the projects that NYU Langone Medical Center has completed, the hospital has updated its strategy and adjusted its original projections for energy savings and emissions reductions.

To quantify the energy and carbon reductions of completed projects and strategies, NYU Langone uses a measurement and verification process that adheres to the NYSERDA M&V Protocol and it is applied where required depending on the type of project. Measurement and verification includes data collection, measurements, monitoring and analysis to determine the energy and demand savings from

completed energy efficiency and fuel conversion projects. It is important to note, however, that even with a robust measurement and verification process, there is always some degree of uncertainty in the energy reduction estimates that may be the result of end use or demand changes, exogenous factors such as the weather and inherent uncertainties with modeled data.

# Highlights

## The Kimmel Pavilion Project

NYU Langone Medical Center is embarking on a major transformation of its campus, which includes the construction of the 800,000 sq. ft. Helen L. and Martin S. Kimmel Pavilion, slated to open in 2017. This transformation allows for a more sustainable approach to building design to be adopted and for cutting edge accommodations for our patients to be created. NYU Langone's resources for acute clinical care will also be integrated into a single, contiguous facility incorporating the Kimmel Pavilion and a refurbished Tisch Hospital, which is also currently under construction.

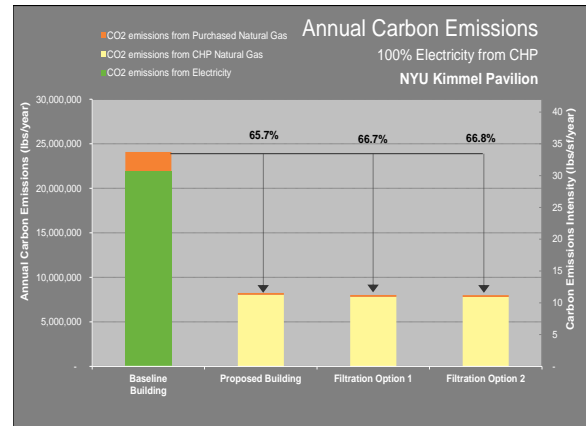
The Kimmel Pavilion will be a 300-bed, 21-story clinical facility that will be comprised of 30 procedure/operating rooms, inpatient beds and additional support functions.



In conjunction with the Medical Center's long-term strategic plan, the Kimmel Pavilion will be designed and constructed with energy efficiency and sustainability at the forefront. The Kimmel Pavilion will strive to meet a LEED-

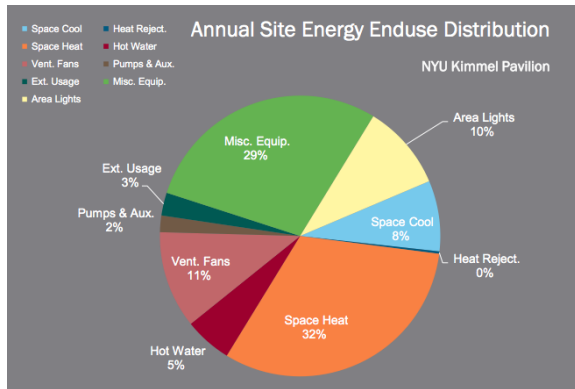
NC Gold Certification or higher by maximizing energy savings and incorporating a 50,000-gallon storm water tank, supplying irrigation needs of the green roof and landscape. Additional water saving measures will result in a 37% reduction in potable water use for this project.

The NYU Langone Medical Center Energy Committee has funded additional energy efficiency design assistance to perform DOE-2.1E building energy simulations to identify and analyze energy efficiency measures in order to maximize the project's overall energy efficiency.



Currently, the design for Kimmel includes a number of energy efficiency measures, among them water and air side economizers, high efficiency fans and pumps, efficient cooling controls, efficient lighting and lighting controls. The design is 25% more energy efficient against an ASHRAE 90.1 2007 Appendix G compliant Baseline Building. In terms of annual energy cost, the Proposed Design is approximately 32% more energy cost efficient, and efficiency increase to 67% with incorporation of the

Medical Center’s new CHP plant. Additionally, the proposed design generates about 65% fewer emissions than the Baseline Building. The design for the Kimmel Pavilion is aiming to achieve an Energy Star Performance Rating of 94.



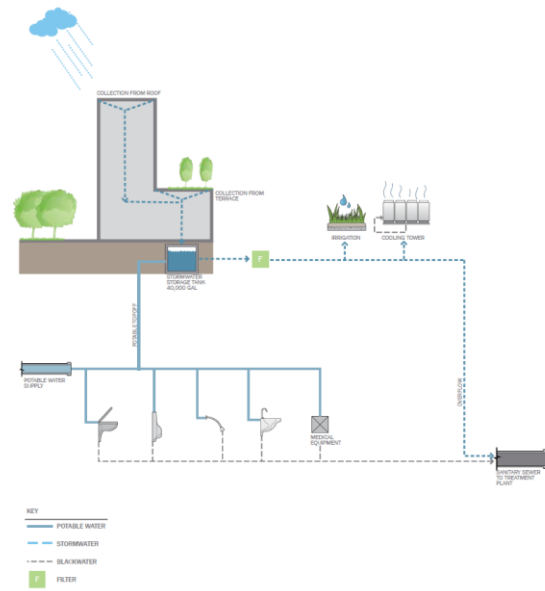
*Kimmel Pavilion Proposed Design*

The proposed Kimmel Pavilion rainwater catchment system can collect up to 40,000 gallons of water than can be used for landscaping irrigation, plumbing, and the cooling tower of the campus heating plant. By recycling rainwater, NYU Langone is lessening its reliance on municipal resources, transforming and increasing the sustainability and resiliency of the campus.

**The Energy Building**

The Medical Center is on track to complete a brand new 11MW Combined Heat and Power plant (CHP) and 7.5MW Emergency Power Plant by 2015 to substantially reduce reliance on the grid for its main campus and enhance system redundancy. The Medical Center’s on-campus energy needs are high and will continue to

grow. Meanwhile, power costs continue to rise, turning energy efficiency into both an economic and environmental goal.



A new 71,000 sq. ft. Energy Building will relieve the strain on NYU Langone’s energy infrastructure. It will provide primary electric service to the campus, accommodate anticipated growth in energy consumption, and at the same time employ combined heat and power (CHP) generation technology to produce energy that is cleaner and more economical.

The state-of-the-art design includes an 8-megawatt cogen plant with standby boilers; a 7.5-megawatt emergency power plant to feed Tisch Hospital and the Energy Building in case of a Con Edison power outage; and 36-megawatt high-tension electric service.

The new structure will sit immediately south of the Kimmel Pavilion and adjacent to Tisch Hospital, hugging the FDR Service Road at the eastern boundary of the campus, with new loading docks at the ground level and a sleek facade facing the East River.

The building will also house the campus' Radiation Oncology department, in a configuration that enables seamless connections between Tisch and Kimmel, both of which will utilize the new radiation oncology facility.

### **The Science Building**

The Science Building will be a new state-of-the-art facility encompassing more than 365,000 square feet and 10 floors of laboratory space dedicated to research—including wet laboratory space, core facilities, a new vivarium, conference spaces, and public amenities in an expansive, integrated environment.

Its 30th Street entrance will provide a prominent new gateway to research and education on campus. The project team is in the midst of excavation and foundation building for the new Science Building.

As with the Kimmel Pavilion, NYU Langone will strive to meet a LEED-NC Gold Certification or higher for the Science Building and will emphasize design, infrastructure choices, commissioning and operations that ensure energy use optimization.

# Next Steps

## Overview

To achieve the Carbon Challenge goal, NYU Langone Medical Center must identify and assess the estimated energy and carbon reductions from a range of potential projects. This section includes a list of planned projects in the short term for which the hospital has completed comprehensive analysis of energy projections, as well as a broader strategy to meet the goal based on potential opportunities that have not yet been fully assessed. Taken together, NYU Langone Medical Center's planned projects and strategies provide a road map for meeting the Challenge goal.

## "Business as Usual" Projected Growth

To map out the strategy for meeting the Carbon Challenge goal, participants must understand both their base year level of emissions and, to a certain degree, their "Business as Usual" projected growth if no further action is taken to reduce energy use or carbon emissions. Based on the available historical data, the Mayor's Office assumes citywide "Business as Usual" growth to be roughly a 1% increase in emissions per year. The Mayor's Office is currently revising this projection, but because this analysis is not yet complete. For planning purposes, NYU Langone Medical Center will assume 1% annual growth under its "Business as Usual" scenario to account for expected increases in emissions as a result of greater intensity of energy use from IT equipment and other sources. This means that the hospital will plan to reduce emissions by *more than* 30% in order to offset this projected growth in emissions and meet the Challenge goal.

## Remaining Reduction

NYU Langone determined its 2005 baseline to be a carbon intensity of 66.51 pounds of CO<sub>2</sub>e/sq. ft. To reduce carbon intensity by 30%, the Medical Center committed to reduce this intensity to 46.55 pounds of CO<sub>2</sub>e/sq. ft., by 2019. In the six years since accepting the Carbon Challenge, NYU Langone has reduced carbon intensity by 26.82% to 48.66 pounds of CO<sub>2</sub>/sq. ft.

Assuming a "Business as Usual" projection of 1% growth in emissions intensity per year, NYU Langone will experience a 5.1% increase in from 2011 to 2017 if no further action is taken. To offset this future growth, NYU Langone plans to achieve an additional 18-20% reduction in emissions from baseline levels.

## Planned Projects and Strategies

The Real Estate Development and Facilities Department (RED+F) sees its future Campus Transformation strategy as the opportunity to build a healthier medical center that will benefit patients, staff, the community and the global environment far into the future. To this end, RED+F has undertaken sustainability initiatives in the following categories: Sustainable Operating Practices, Energy Management Strategies, Sustainable Architecture, and Community Outreach and Training.

### **Sustainable Operating Practices:**

Providing cutting-edge healthcare services to a diverse group of patients is an extremely resource-intensive enterprise. NYU Langone is

continuously looking for new ways to operate that lowers the impact of its footprint, increases efficiency, improves the working environment for our employees and keeps its community healthier.

The Medical Center has invested in upgraded infrastructure and smart building automation systems, and support these improvements with dedicated energy managers and facilities staff that keep us running at peak performance. Facilities Operations is committed to continuous improvement through commissioning, regular monitoring and reporting. It will continue to partner with EME Group through the NYSERDA FlexTech program as well as other consultants to forecast energy consumption, utilize smart power purchasing practices, anticipate energy market changes, find ways to safely cut electricity use during periods of peak demand on the power grid and identify areas for energy conservation and infrastructure improvements.

***Energy Management Strategies:***

***On-site Generation:***

Slated for completion in 2015, the 71,000 sq. ft. Energy Building will house a new energy infrastructure serving NYU Langone's main campus. It will provide primary electric service to the campus, accommodate anticipated growth in energy consumption and employ combined heat and power (CHP) generation technology to produce cleaner energy more economically. The Energy Building will also have the capacity to meet 60% of the Medical Center campus' future electricity requirements, and 100% of future steam requirements. The CHP plant at NYU Langone will have an 11 megawatt load capacity and approach 83% efficiency. It will produce enough steam to heat approximately 1,650 homes, and enough

electricity to power about 7,400 homes (both estimates based on average U.S. home size).

***Renewable Energy Usage:***

NYU Langone is committed to increasing its use of renewable energy. It already purchases renewable hydro power through the NYPA Recharge New York program. The Medical Center will continue to explore on-site solar generation where possible, in particular as part of its achieving LEED building design goals. It will also support the development of off-site solar facilities in NYC's Zone-J by acting as a potential large-scale off taker and through the purchase of RECs tied to actual renewable asset development.

***Chiller Renewal:***

The Superblock currently has approximately 13,200 tons of installed chilled water (CHW) capacity in three plants. The Skirball plant, which dates to 1992, is equipped with three 1200-ton electric centrifugal chillers; the Smilow plant, which dates to 2005, is equipped with three 1200-ton electric centrifugal chillers; and the Tisch plant, which dates to 2007, is equipped with three 2000-ton steam turbine-driven centrifugal chillers. Each plant feeds into a central chilled water loop that provides most of the campus' cooling. As a part of the campus transformation initiative, over the next 6 years, the Medical Center will be adding approximately 9,000-10,000 tons and decommissioning the Skirball plant.

In order to optimize chilled water use throughout the campus, the Energy Management team is utilizing EME Group to create a building-by-building CHW usage monitoring plan for the Superblock. EME has identified 12 locations for sub-meters that will be able to capture each building's demand and

consumption enabling the Team to identify areas for optimization.

*Steam Sub-Metering:*

Due to the age and layout of the buildings on the main campus, there has been no way to determine each building's steam usage accurately. In order to better understand how each building utilizes steam, NYULMC has issued a scope of work and RFP for the installation of strategically placed steam sub-meters. This will allow for a more detailed breakdown of steam usage in each building with integration of the output data to the BMS.

*Tisch Hospital Operation Room Ventilation Controls:*

Tisch Hospital's sixth floor Operating Room (OR) suite has 18 ORs, 12 main and 6 ancillary rooms. This initiative is investigating control and retrofit options for reducing ventilation air rates during unoccupied periods. Several air testing and balancing reports dating back to 2004, 2007 and 2011 showed considerable variation in air flow rates from one report to another. Through the course of field surveys, it was found that the existing traverse locations are not ideal based on the SMACNA recommendations. In order to evaluate the ventilation rates, EME Group, in conjunction with NYULMC, developed a scope of work and bid package for certified air testing of the OR AHUs following testing procedures outlined in ASHRAE Standard 111-2008, "Measurements, Testing, Adjusting, and Balancing of Building HVAC Systems," which identified more suitable traverse locations as well as taking measurements at each diffuser location. As there are a large number of ORs, NYULMC installed the new control system in a single room to show proof of concept. With the success of the first phase, NYULMC will continue to move forward upgrading the

ventilation controls for the remaining operating rooms.

*New Energy Efficient Data Center:*

As a result of the loss of the primary on campus data center due to Hurricane Sandy, NYU Langone has endeavored to build a new energy efficient and resilient data center. From the operational aspect, the data center will utilize the preexisting efficient chilled water system in place, while installing high efficiency cooling equipment. The servers for the data center will also be energy efficient with the ability to utilize a number of virtual servers, reducing the need for additional IT equipment. The initial application stated that this energy efficient data center would reduce the load of NYU Langone Medical Center by close to 1.46 MWh and with 159 kW peak demand reduction, but is still under M&V so these numbers are not yet verified. The largest single energy saving measure will be the virtualization of servers.

*Lighting Projects:*

Current plans for 2015 and 2016 include additional lighting audits, driven in part by new NYSERDA and ConEd incentives that will make some previously and recently identified lighting projects economically viable under existing internal financial hurdle rates.

***Sustainable Architecture:***

The objective of NYU Langone's Sustainable Architecture program is to consider holistically how it designs, builds and operates facilities that foster superior healing environments. The Medical Center is committed to following the Green Guide for Healthcare (GGHC) as well as seeking out LEED certification for renovations and new construction, where appropriate.

*Campus Transformation:*



Sustainable principles are directly incorporated into NYU Langone's ongoing Campus Transformation, which is dramatically reshaping the main campus and offsite facilities through a series of major new constructions, renovations and expansions. It will provide for new clinical facilities, research laboratories and dynamic education spaces. Crucial to this effort is robust and efficient infrastructure that will support new technology, reduce energy use, facilitate operations and maintenance, promote a sustainable environment and deliver a world-class quality of environment.

In addition, the RED+F department emphasizes the importance of in-house energy engineers and operations managers working hand-in-hand with both internal and external the architects and designers on construction projects to ensure that new buildings benefit from the most efficient operating environments that can be provided.

*NYSERDA New Construction Program:*

As part of the Kimmel Pavilion's participation in the NYSERDA New Construction Program, energy technical advisors EME have provided the Medical Center with a comparative analysis on chiller plant options for the new facility. The Kimmel analysis evaluated multiple chiller plant options including all electric, gas/electric hybrid and steam turbine alternatives.

Subsequently, this drove development of a full Superblock campus energy model to assist with optimizing operation of the existing plants and the cogeneration plant to support optimized operating costs and efficiency as new buildings and loads are brought on-line. This predictive modeling tool coupled with building-level electric, steam and chilled water metering currently will provide real-time and on-going

energy tracking and will be the basis of an energy dashboard to support continued optimization efforts.

*Green Roof:*

NYU Langone evaluated the benefits of a green roof for its Alumni Hall located on the Main Campus including economic, aesthetics and maintenance issues. Findings included green roof recommendations based on characteristics such as aesthetics including seasonal variations, storm water retention, insulation, maintenance, roof loading and optimal location. Project implementation will be part of a larger, building-wide renovation and will likely seek funding through the DEP stormwater management grant program.

***Community Engagement and Outreach:***

As previously stated, Sustainability outreach, branding and communications at NYU Langone is currently undergoing a large overhaul that was begun in 2014. The team is also in the process of creating an online-based internal social networking community to engage with employees, faculty and students and solicit feedback, ideas and participation. Major focuses of outreach include soliciting participation in the EPA's National Building Challenge, exploring "green" office and lab-based programs, expanding the program to departments and facilities located outside of the main campus buildings, and developing internal champions for sustainability projects. There is also a concerted effort to incorporate and benefit from the distinct enthusiasm of the medical student community and help students become advocates for change. There are also many behavior-based changes that can be implemented by students to help them contribute to overall energy reduction. The Medical Center has also begun working with the

larger University to coordinate sustainability efforts more closely and learn from one another's successes. Medical students will hopefully serve as a clear bridge between the groups.

### **Summary of Next Steps to Meet the Challenge Goal**

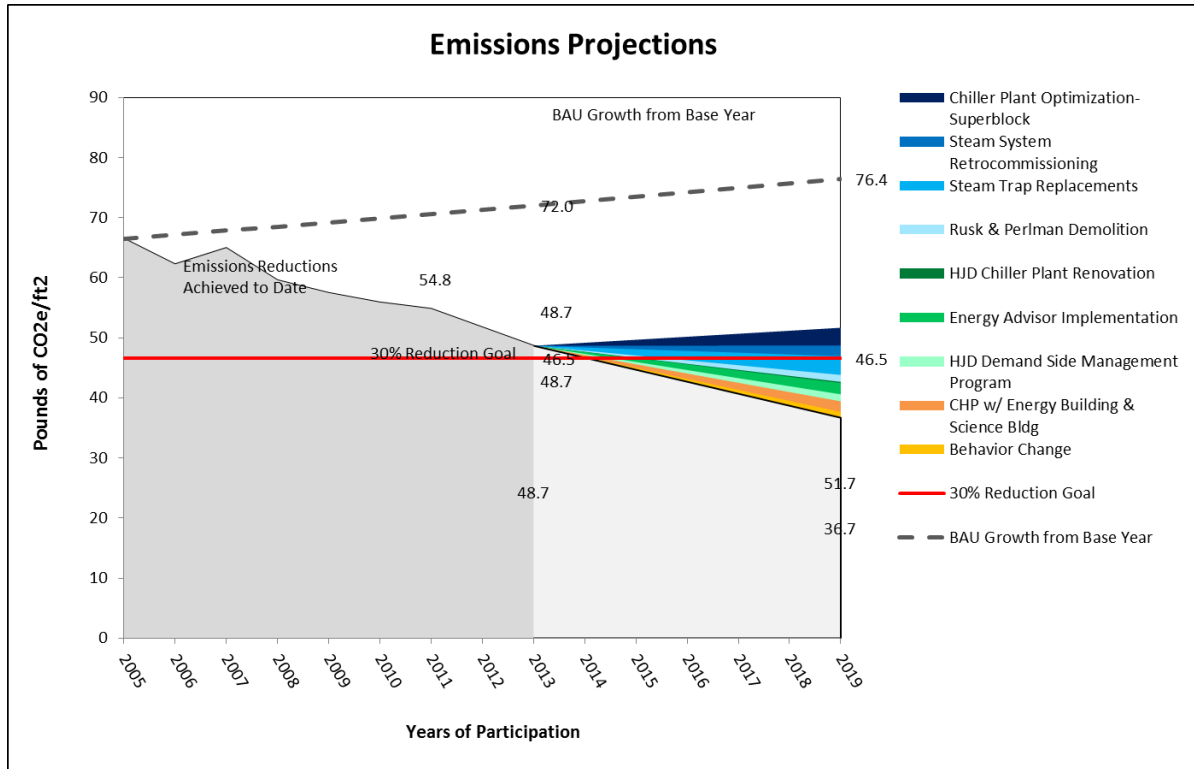
Based on the initial results of NYU Langone Medical Center's energy model, the hospital estimates that it will achieve the remaining carbon reductions to meet the 30% reduction goal through several main strategies focused on designing, building and ensuring sustainable operations of the most energy efficient infrastructure possible that allows the Medical Center to meet its mission. As discussed in this section, some of these strategies include infrastructure upgrades and replacement, optimized building management, comprehensive preventative maintenance, commissioning, on-site generation, exploration of renewable energy usage, and employee engagement. However, the Medical Center will continue to evaluate and revise its strategies to ensure it reaches the 30% reduction target.

The contribution of these strategies is demonstrated by the wedge chart below, which assumed a 1% annual growth in "business as usual" emissions for planning purposes. NYU Langone will continue to invest in development of its Energy Management team, choosing strong, technical talent that will help the organization take a whole-building approach to energy management and long term operations. It will continue to make deep carbon cuts while delivering world-class health care, medical education and cutting-edge research.

### **Measurement and Verification**

Because there is a degree of uncertainty in all projections, NYU Langone Medical Center will continue to update energy use projections over the next five years to reflect additional evaluation, measurement and verification of its projects using the NYSERDA protocols.

# NYU Langone Medical Center's Plan



| Projected Reductions                       |   |
|--|---|
| Energy Conservation Measure (ECM)          | Reduction Target (% of current emissions) |
| Chiller Plant Optimization- Superblock     | -6.1%                                     |
| Steam System Retrocommissioning            | -3.6%                                     |
| Steam Trap Replacements                    | -6.4%                                     |
| Rusk & Perlman Demolition                  | -2.4%                                     |
| HJD Chiller Plant Renovation               | -0.4%                                     |
| Energy Advisor Implementation              | -3.9%                                     |
| HJD Demand Side Management Program         | -2.4%                                     |
| CHP w/ Energy Building & Science Bldg      | -3.6%                                     |
| Behavior Change                            | -2.0%                                     |
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| Total Projected Reductions from 2013       | -30.8%                                    |
| Carbon Intensity in 2013                   | 48.67                                     |
| Projected Carbon Intensity in 2019         | 33.69                                     |
| <b>Total Projected Reduction from 2005</b> | <b>-49.3%</b>                             |