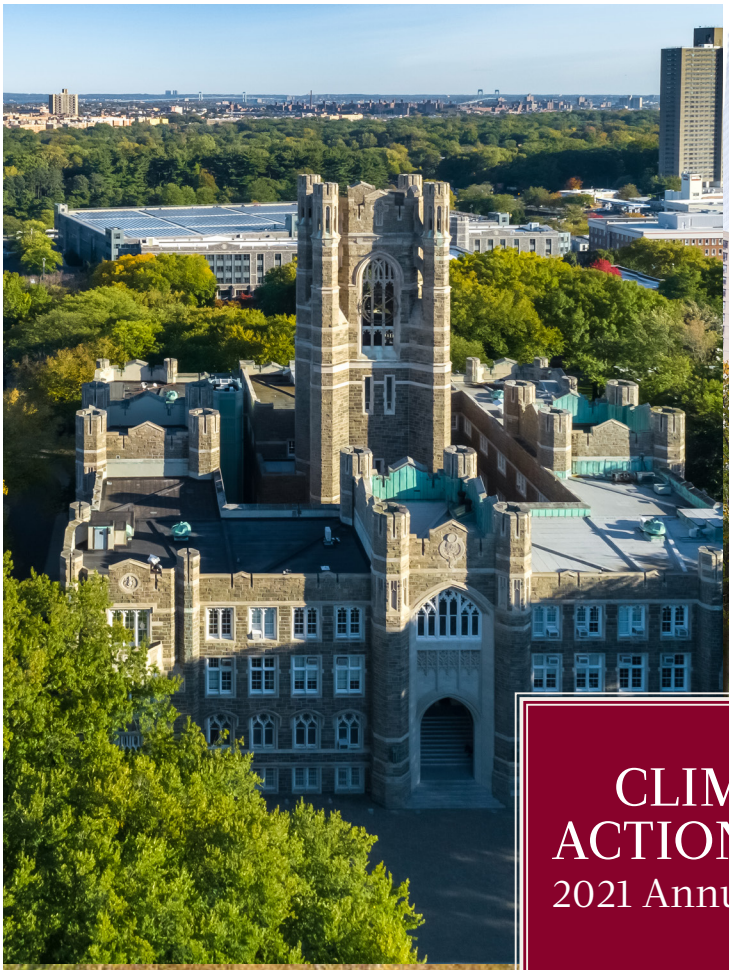
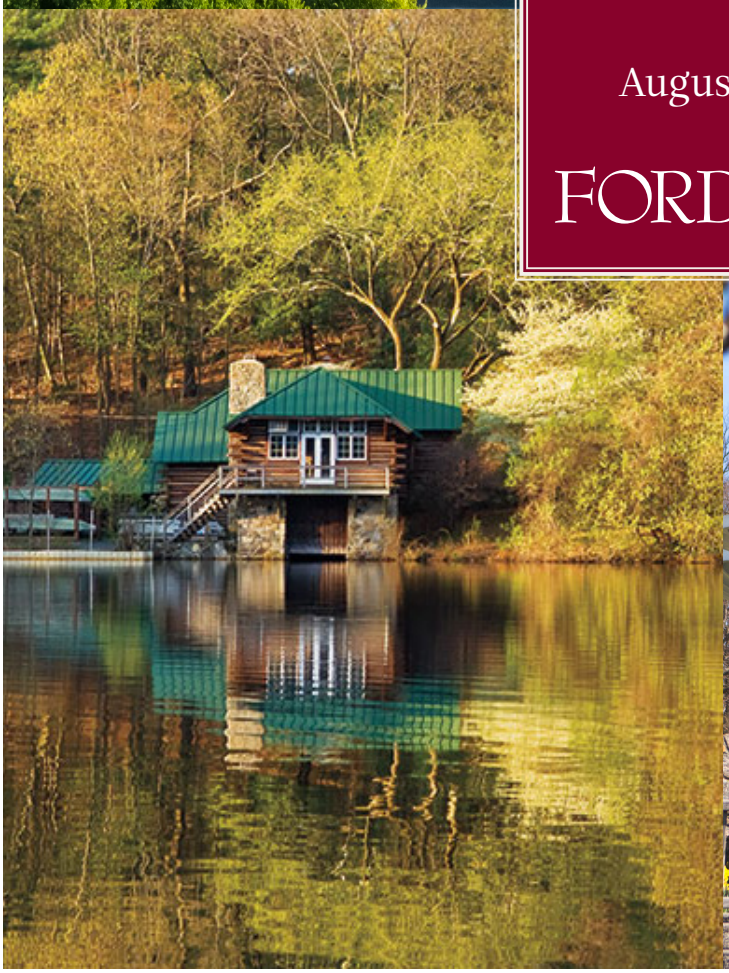


CLIMATE ACTION PLAN

2021 Annual Report

August 2022

FORDHAM



EXECUTIVE SUMMARY

Fordham University has committed to reducing its environmental impact through targeted, verifiable measures that focus on reducing our greenhouse gases generated from all aspects of our operations. Our focus has been concentrated on reducing emissions from our buildings, which constitute the majority of CO2 emitted from our campuses. This commitment is manifested by our early involvement with New York City's Carbon Challenge, which started in 2007. Since joining the Challenge, we have reduced our CO2 equivalent intensity (CO2e) by 31.77%, on our way to meeting our commitment to reduce emissions 40% by the year 2030.

The Climate Action Plan highlights the progress we have made through 2021 and establishes a framework to minimize our environmental impact in all areas of our operations. Fordham University remains committed to sustainability as a central consideration in all aspects of our activities, including curriculum, student development and education, faculty and staff involvement, and physical plant and campus operations.

In keeping with the Jesuit traditions of the pursuit of wisdom and learning, educating the whole person, and respect for the environment, the University recognizes the tremendous importance and value of this undertaking.

In the spring of 2021, the Vatican released the Pope's Encyclical Letter on ecology, *Laudato Si': On Care for Our Common Home*, in which he calls on every person to acknowledge the immensity and urgency of the environmental challenges we face and to work together to address them. As an independent institution in the Catholic and Jesuit tradition, Fordham University was proud to commit to the goals outlined in the Encyclical Letter, which focus on integral ecology, with an understanding that everything is connected.

About Fordham University

Founded in 1841, Fordham was the first Catholic university in the northeastern United States, and today is the third-oldest university in New York and the only Jesuit university in New York City. Fordham offers degrees in more than 60 programs and enrolls nearly 17,000 students from 49 states, the District of Columbia, Guam, Puerto Rico, the United States Virgin Islands, and 87 countries. The University is composed of four undergraduate and six graduate and professional schools across four campuses in southern New York State: the Rose Hill campus in the Bronx; the Lincoln Center campus on Manhattan's Upper West Side; the Westchester campus in West Harrison, New York; and the Louis Calder Biological Field Station in Armonk, New York. In addition to these locations, the University maintains a study abroad center in London and field offices in Spain and South Africa.

Campus Description and Facilities Overview

ROSE HILL CAMPUS:

This 85-acre Bronx campus features Collegiate Gothic architecture and tree-lined walkways. The earliest standing building on this campus was built in 1838, with many of the campus facilities constructed in the early 1900s. The Rose Hill campus is home to more than 7,200 undergraduate and graduate students enrolled in Fordham College at Rose Hill, the School of Professional and Continuing Studies, the Gabelli School of Business, the Graduate School of Arts and Sciences, and the Graduate School of Religion and Religious Education.

Campus size: 85 acres with over 500 mature trees, including the oldest tree on campus, a 290-year-old specimen of American Elm, *Ulmus Americana*, an endangered species.

Facilities: Over 37 buildings totaling 2.8 million gross square feet (GSF) of space, with 30 buildings over 25,000 GSF in size. Building ages vary greatly, with the oldest, Cunniffe House, dating from 1838, and the newest, the Joseph M. McShane, S.J. Campus Center, having opened in 2022.

LINCOLN CENTER CAMPUS:

This campus spans two full city blocks in midtown Manhattan. It is home to more than 9,400 undergraduate and graduate students enrolled in Fordham College at Lincoln Center, the Gabelli School of Business, the School of Professional and Continuing Studies, the Graduate School of Arts and Sciences, the Graduate School of Education, the Graduate School of Social Service, and the School of Law.

Campus size: Eight acres on a superblock from 60th Street to 62nd Street, bounded by Columbus and Amsterdam avenues. Features an outdoor tree-lined three-acre plaza on a green roof surrounded by vertically sizable campus buildings that create an enclosed courtyard feeling in the campus' urban setting.

Facilities: Five buildings totaling 1.4 million GSF. Buildings are relatively modern, compared with those on the Rose Hill campus, with the oldest having been built in 1961.

WESTCHESTER CAMPUS:

Home to the Westchester branches of the Fordham School of Professional and Continuing Studies, the Gabelli School of Business, the Graduate School of Education, and the Graduate School of Social Service, Fordham Westchester is also home to three institutes: The Beck Institute on Poverty and Religion, Children FIRST, and the Ravazzin Center on Aging.
Campus Size and Facilities: Set in almost 32 green acres, this campus features one 65,000 GSF building with commuter parking.

THE LOUIS CALDER BIOLOGICAL FIELD STATION:

The Louis Calder Biological Field Station, located in Armonk, New York, in a hilly, wooded region of northern Westchester County. The 113-acre property is a protected forest preserve located just 30 miles north of New York City, and is the only full-time ecological research field station in the New York City metropolitan area.

The Field Station is home to laboratories focused on collecting climate and other ecological data and maintains several long-term databases on the chemical and biological features of the station and its surroundings.
Campus Size and Facilities: The 113 acres, including a five-acre lake, are mostly undeveloped forest. Facilities include several small buildings set throughout the station.

Collaborations and Commitments to Greenhouse Gas Reductions

THE NYC CARBON CHALLENGE

Launched in 2007, the NYC Carbon Challenge is a voluntary leadership program for universities, hospitals, hotels, commercial offices, and multifamily buildings to achieve reductions in their building-based greenhouse gas (GHG) emissions by 2030. To date, more than 125 of the largest organizations in New York City—including 18 leading institutions of higher education—have pledged to achieve these goals.

Fordham University was a founding signatory to the NYC Carbon Challenge when it debuted in 2007, initially committing to reducing its greenhouse gas emissions by 30%. In the fall of 2017, the University extended its commitment to the challenge by pledging a 40% reduction by 2030. Fordham has reduced its carbon emissions intensity by 31.77% and its energy consumption by 16.64% from its 2005 base-year levels. Altogether, NYC Carbon Challenge participants have cut their annual emissions by more than 600,000 metric tons of carbon and are collectively saving over $200 million annually in lower energy costs. By the end of the program, current participants are projected to reduce citywide emissions by nearly 1.5 million metric tons of carbon dioxide equivalent—the equivalent of taking more than 300,000 cars off the roads—and to produce an estimated $700 million in energy cost savings.

NYSERDA REV CAMPUS CHALLENGE

The REV Campus Challenge, a program of the New York State Energy Research and Development Authority (NYSERDA), recognizes colleges and universities that strive to meet their financial, environmental, academic, and community goals through clean energy solutions. Fordham University accepted the REV Campus Challenge and was recognized by the state as a "First Mover," demonstrating leadership among our peers and a commitment to clean energy by joining the REV Campus Challenge in its first six months. As a REV Campus Challenge participant, Fordham has committed to investing in clean energy projects across our campuses, embracing clean energy curricula and research and development, and further engaging with our communities.

FRAMING OUR FUTURE

Fordham University was proud to become the first institution of higher education in the United States to collaborate with the Wildlife Conservation Society's *Framing our Future Campaign*, with a commitment to educating about climate change and advocating for nature-based solutions.

UNITED NATIONS PRME

Fordham is one of 37 Champion schools, and the only one from New York, within the United Nations Principles of Responsible Management Education (PRME) network. The PRME initiative is a relationship between the United Nations and business schools across the globe to transform management education. In addition to creating a learning environment that promotes awareness of the United Nations' Sustainable Development Goals, Fordham is committed to providing students the platform to create innovative solutions to the environmental, social, and economic challenges of today's business landscape.

Fordham's role as a Champion school allows the University to engage with other management programs through collaborative projects and research. These efforts seek to implement sustainability principles within academic curricula and co-curricular activities. In both contributing to and taking part in game-changing projects that address the social responsibility of the business sector, Fordham is developing future leaders who see business as a force for good.

Since 2009, Fordham students have participated in the Breakthrough Innovation Challenge. This year-long initiative led by the UN Global Compact offers students the opportunity to solve real-world sustainability challenges in collaboration with managers from multinational companies. Eight companies have created cases specific to their firms that invite students to evaluate sustainable business models and make final recommendations to the companies. The process allows students to engage with disruptive technologies and, ultimately, provides each company the means to effectively address the UN Sustainable Development Goals through their business operations.

COORDINATION

The University will continue to coordinate sustainability efforts with our peer institutions of higher education, New York City agencies, and other community stakeholders, such as the Wildlife Conservation Society/Bronx Zoo and the New York Botanical Garden, to enhance our impact through strategic partnerships and programs.

Fordham's Commitment to Sustainability

The University designs, constructs, and maintains its buildings, infrastructure, and grounds in a manner that ensures environmental sustainability. Reaching beyond compliance in areas of environmental concern, Fordham pursues sustainability best practices in a broad range of areas:

ENERGY

Cost-effective energy reduction initiatives will be implemented to reduce our impact by minimizing energy consumption. We pursue alternative energy strategies, including new technologies, as they become more available.

The University completed two strategic Light Emitting Diode (LED) re-lamping initiatives on the Rose Hill and Lincoln Center campuses in 2015, which has helped the University conserve 712,000 kWh of energy annually. Upgrades in lighting initiatives were completed in 39 buildings on the Rose Hill and Lincoln Center campuses.

New steam boilers that are 15% more efficient are being installed at the Rose Hill campus, and campus building HVAC systems will be converted to electric heat pumps and geothermal over time, thus significantly reducing the amount of fossil fuels consumed.

WASTE DIVERSION, RECYCLING, AND MINIMIZATION

A uniform recycling program has been established across all campuses for construction debris. In 2015, an intensive study found that more than 208,000 pounds of paper, cardboard, plastic, glass, and metal were being recycled and diverted from the University's waste stream annually. During move-out, students donate goods, clothes, and furnishings, with almost two tons of items repurposed or recycled.

Additionally, toner cartridges at the print shop, individual printers, and used furniture are recycled or donated to local charities. Instructional recycling announcements and signs help educate students, faculty, and staff about community guidelines while increasing program visibility. Ongoing educational efforts involving students, faculty, and staff, as well as more and revised placement of recycling bins throughout all campus buildings, have contributed to the success of these initiatives.

BUILDINGS CONSTRUCTION

All new buildings will be designed from an energy standpoint to achieve the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) New Construction Silver rating, ensuring that all new properties are environmentally responsible.

Campbell, Salice, and Conley halls, a 172,265 GSF residential complex the University dedicated in 2010, achieved LEED Gold Certification.

The Law School building and McKeon residential tower are Fordham's newest LEED Silver certified buildings. The new facilities have added more than 478,000 square feet of residential and academic space to the Lincoln Center campus.

The new campus center addition at the Rose Hill campus was designed to LEED standards and uses passive heating and cooling technology. It is currently under construction and anticipated to be completed by 2025. In addition, all renovations of existing facilities will meet or exceed LEED for the existing buildings criterion.

TRANSPORTATION

Fordham's Department of University Transportation has converted its entire vehicle fleet of vans (50+) to biofuel. These vans provide transportation between our Bronx Rose Hill campus garage and our Lincoln Center campus, transporting employees and students who otherwise might have used their cars to travel between campuses. Fordham will shift its vehicle fleet to primarily electric vehicles (EV's) as EV technology evolves. Currently, the University has 20 EV's in its fleet. EV charging stations are installed at the Rose Hill campus garage, with more planned.

EDUCATION

Fordham University will advance understanding of environmental change through its curriculum and academic programs, including, but not limited to, the following programs:

- In 2021, Fordham's Gabelli School of Business provided an online course in organizational sustainability for working professionals to train thought leaders with the necessary analytical tools to originate, market, and lead sustainability initiatives in a variety of professional contexts.
- Fordham's Gabelli School of Business is making the case that sustainability is good for the environment—and business. "Leading Toward a Finer Future," a four-day intensive master class, aims to prepare graduate and undergraduate students for leadership in the sustainable business field.
- In 2020, the Gabelli School of Business officially announced the launch of the Responsible Business Coalition (RBC), an incubator that combines the power of industry and academia to identify and implement sustainable business solutions for some of the world's most challenging environmental and social problems. The goal of the RBC is to improve the environmental, social, and governance (ESG) impact of industries worldwide and to foster values-based education.
- Environmental Studies, a Science and Humanities program, has been offered at Fordham since 2002. Within this major, students tackle the most pressing issues of our times: climate change, habitat loss, mass species extinction, natural capital degradation, environmental health, environmental justice, and building sustainable societies.

Progress Towards a 40% Reduction by 2030

Fordham University joined the New York City Carbon Challenge in 2007 and committed to reduce its greenhouse gas emissions by 40% from 2005 levels by 2030. Since accepting the NYC Carbon Challenge, Fordham University has reduced its carbon emissions intensity, measured in pounds of carbon dioxide equivalent intensity per square foot, by 31.77% and its energy use intensity measured in kilo-British thermal unit (kBtu's) per square foot by 16.64% from its 2005 base-year levels. The goal of a 40% reduction by 2030 means that the University will reduce its carbon emissions per square foot to 12.19 pounds of CO_2e/ft^2 from 20.31 pounds of CO_2e/ft^2. More details about the Carbon Emissions Inventory methodology that is used for Carbon Challenge reporting can be found in Appendix A.

This Climate Action Plan lays out Fordham University's strategy to meet this goal and includes the following:

- Background information about Fordham and its facilities;
- A description of Fordham's additional commitments to environmental sustainability;
- Energy use benchmarking information and energy audit and retro-commissioning for all Fordham's New York City-based properties over 25,000 square feet, as required by LL84 and LL87;
- An inventory of annual GHG emissions from all of Fordham's New York City properties using the NYC Carbon Challenge reporting methodology;
- A description of completed projects and strategies the University has undertaken to reduce its energy use and emissions;
- Highlights of Fordham's innovative projects; and
- An explanation of the strategy moving forward that will enable Fordham to meet its 40% emissions reduction goal by 2030.

[1] **Note:** For purposes of the NYC Carbon Challenge, greenhouse gas emissions are measured in terms of carbon dioxide equivalent (CO_2e) per square foot. Please see the explanation of standard units further in this report for more information.

BASE YEAR INVENTORY		2005 INVENTORY		2021 INVENTORY	
Name	*Fordham University*	**Square Feet**	3,180,320	**Square Feet**	4,232,699
Normalization	*Square Feet*	**Emissions** (Metric Tons of CO2e)	29,305	**Emissions** (Metric Tons of CO2e)	26,611
Base Year	*2005*	**Energy Use** (MMBtu)	575,895	**Energy Use** (MMBtu)	638,896
End Year	*2030*	**Carbon Intensity** (lbs CO2e /sq. ft.)	20.31	**Carbon Intensity** (lbs CO2e /sq. ft.)	13.86
Submission Year	*2021*	**Energy Use Intensity** (KBtu /sq. ft.)	181.08	**Energy Use Intensity** (KBtu /sq. ft.)	150.94
Challenge Goal	*40%*	**40% Challenge Goal** (lbs CO2e /sq. ft.)	12.19	**Carbon Reduction** % Change from Base Year	-31.77%

ENERGY USE INTENSITY AND EMISSIONS REDUCTION

	Carbon Intensity (lbs CO2e/sq. ft.)	Energy Use Intensity (Kbtu/sq. ft.)
2005 (Base)	20.21	181.08
2021 (Current)	13.86	150.94
Reduction	-31.77%	-16.64%

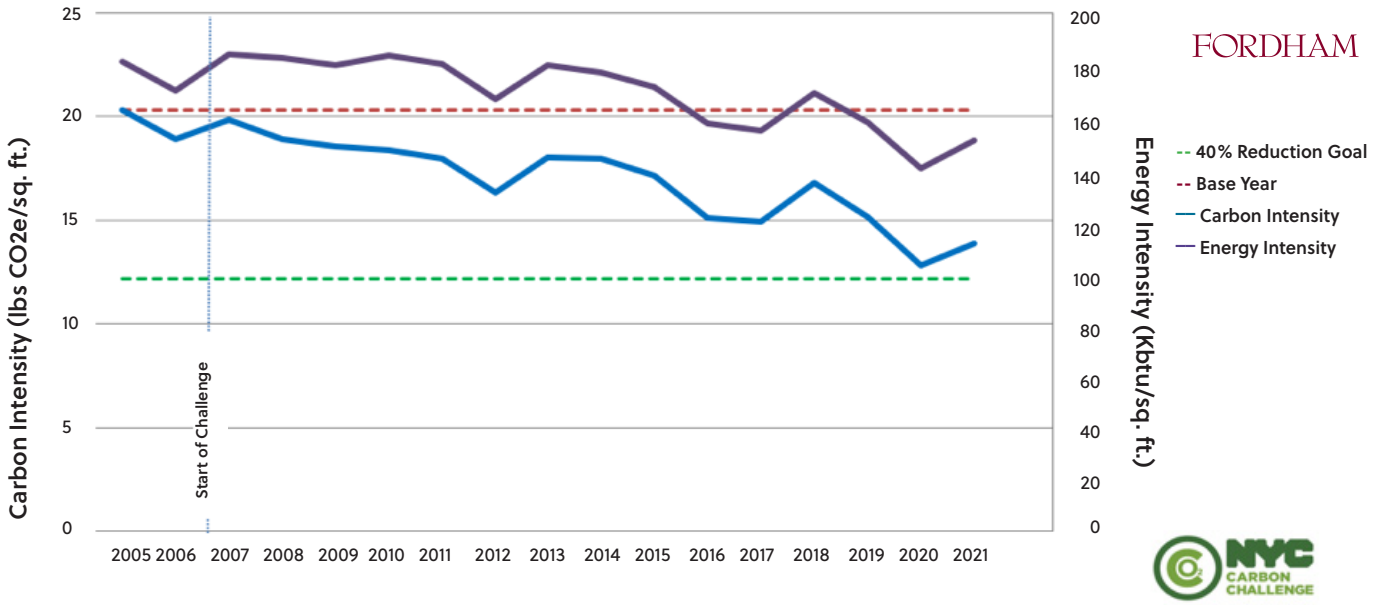
EMISSIONS COMPARISON: BASE YEAR AND SUBMISSION YEAR

	2005	2021	Change
Total Emissions (tCO2e)	29,305	26,611	-9.19%
Square Feet	3,180,320	4,232,699	33.09%
Carbon Intensity (lbs. CO2e/sq. ft.)	20.21	13.86	-31.77%

ENERGY USE COMPARISON: BASE YEAR AND SUBMISSION YEAR

	2005	2021	Change
Total Energy Use (MMBtu)	575,895	638,896	10.94%
Square Feet	3,180,320	4,232,699	33.09%
Energy Usage Intensity (KBtu/sq.ft.)	181.08	150.94	-16.64%

CARBON INTENSITY AND ENERGY INTENSITY



Fordham's energy usage in 2020 and the prospective energy projects planned for the near future indicate that Fordham's 25-year reduction is on track to reach the goal of a 40% reduction.

Roadmap to Achieve 40% Emissions Reduction by 2030

Fordham began its plan to reduce greenhouse gas emissions in 2008 when it commissioned a master plan, which involved energy audits of major facilities as well as identifying strategies, through fuel switching, which could reduce greenhouse gases. A number of energy conservation and retro commissioning measures, as described below, were identified.

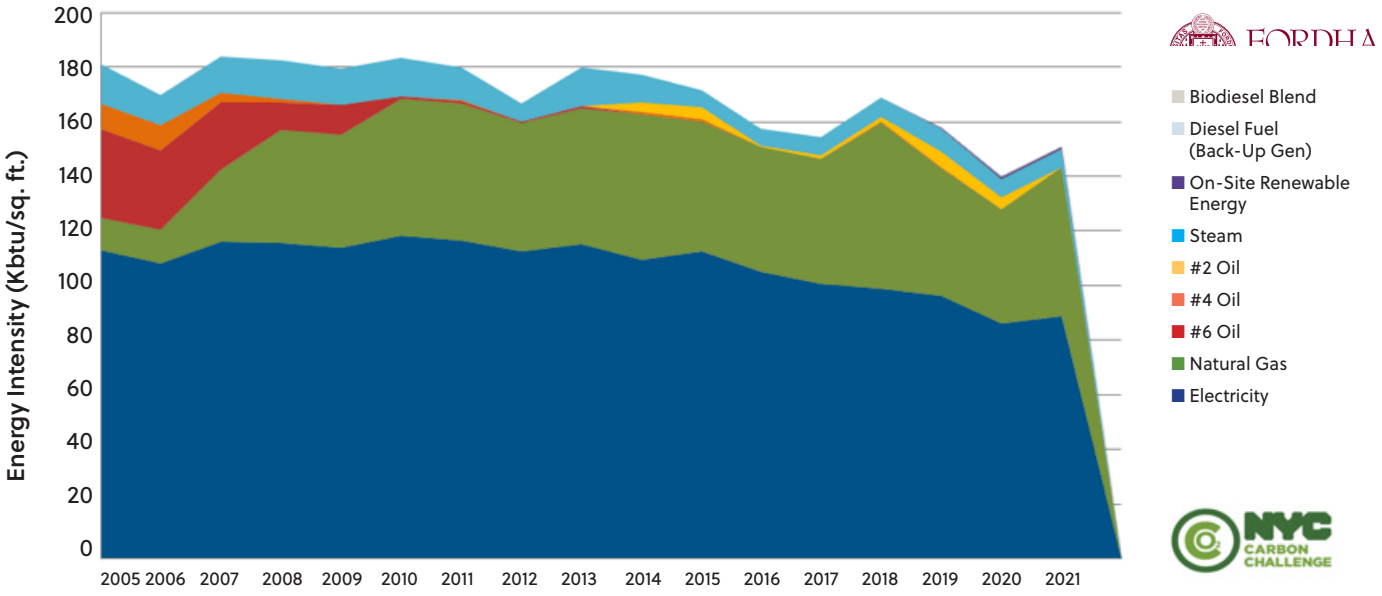
As explained in the following chart, there has been a consistent decrease in carbon intensity across Fordham's campuses since 2005. One of the largest impacts occurred in 2010, when the boilers at Rose Hill were converted to natural gas, which is about 50% cleaner. Additionally, in the winter of 2020 and fall of 2021 the remaining dual-fuel boilers were converted to natural gas, eliminating the need for fuel oil on the Rose Hill campus. Reductions have also been realized by equipment replacement, converting fluorescent lights to LED, and no longer participating in the Con Ed Interruptible Heating Fuel Oil Program. During much of this time, Fordham relied upon subsidy funding to reduce the use of electricity by investing in the use of steam for cooling. However, New York City's recently passed Climate Mobilization Act now prioritizes increased use of electricity. Fordham University intends to electrify its heating and cooling systems where possible, but will still require subsidy funding, similar to what was previously offered, in order to meet the goal of a 40% reduction by 2030.

ACHIEVED REDUCTIONS (lbs CO_2e/ft^2)

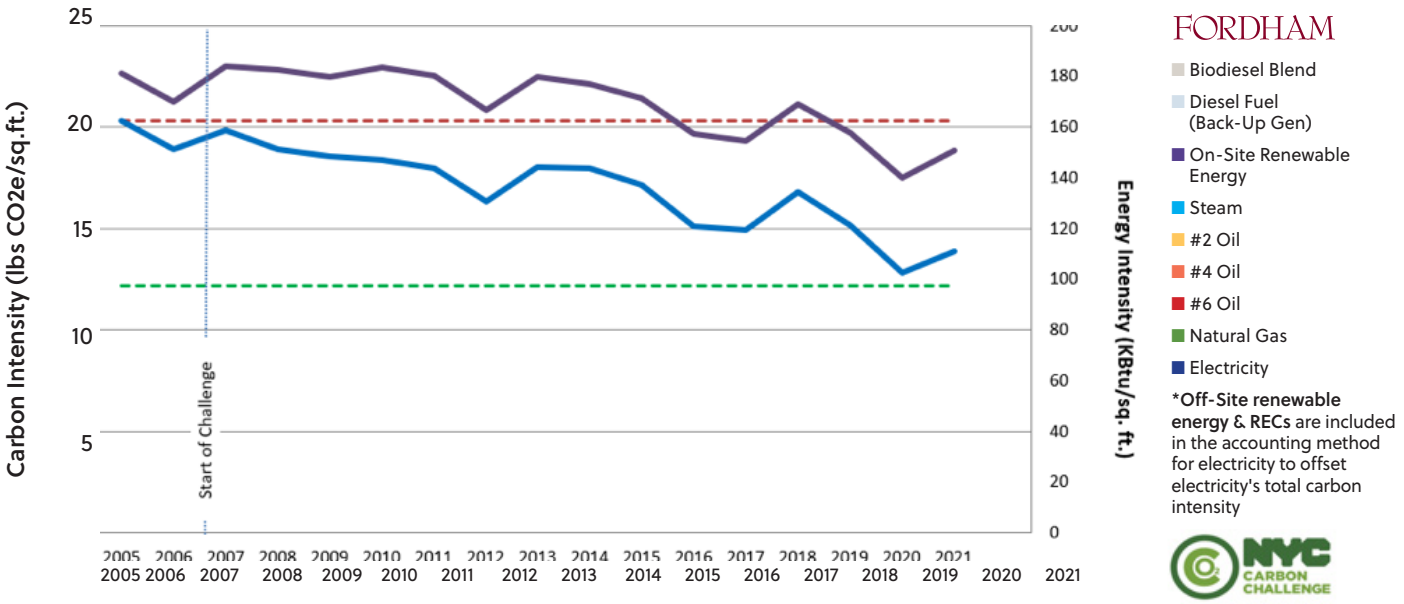
Carbon Intensity in 2005	20.31
Carbon Intensity in 2006	18.89
Carbon Intensity in 2007	19.84
Carbon Intensity in 2008	18.90
Carbon Intensity in 2009	18.56
Carbon Intensity in 2010	18.38
Carbon Intensity in 2011	17.99
Carbon Intensity in 2012	16.32
Carbon Intensity in 2013	18.04
Carbon Intensity in 2014	17.95
Carbon Intensity in 2015	17.13
Carbon Intensity in 2016	15.09
Carbon Intensity in 2017	14.90
Carbon Intensity in 2018	16.81
Carbon Intensity in 2019	14.85
Carbon Intensity in 2020	12.82
Carbon Intensity in 2021	13.86

In 2012, Fordham was well on its way to meeting its goal, but this progress was somewhat reversed in 2013-15 due to the extreme cold. Con Edison called 16 separate gas interruptions over these two winter seasons, increasing the fuel oil used during that period. However, by 2017, we nearly eliminated the use of all fuel oil on the Rose Hill and Lincoln Center campuses and completed major energy conservation measures to ensure that we stay on target and meet the future goal set.

ENERGY INTENSITY (KBtu/sq. ft.) - BY FUEL TYPE



CARBON INTENSITY (lbs CO2e/sq.ft.) - BY FUEL TYPE



DEMAND RESPONSE

Fordham University has enrolled in Con Edison's Demand Response incentive program. By doing so, Fordham has committed to reducing its energy demand during peak load events caused by higher-than-average temperatures, while also receiving incentives for each kWh reduced during such peak load events. These demand response incentives are then added to the University's fund for use in Energy Efficiency strategies and projects.

RENEWABLE ENERGY CREDITS

Fordham University has purchased 14.03 million kWh in Renewable Energy Credits (RECs) over the calendar years since 2016. The purchase of these RECs from off-site energy production may be used to offset consumption of electricity from the grid.

MAJOR PROJECTS

In addition to the conversion of boilers to natural gas, Fordham has completed several major projects:

- The design and construction of Campbell, Salice, and Conley residence halls to achieve LEED Gold.
- The installation of a 250-kilowatt photovoltaic energy generation system (solar panels) at Walsh Family Library.
- Ongoing conversion of the vehicles fleet to electric vehicles.
- The conversion of all lighting to LEDs.
- A retro commissioning survey and implementation for buildings greater than 25,000 square feet.
- New energy audits on all buildings greater than 25,000 square feet.
- The redevelopment of the Gabelli School of Business (Rose Hill) and the new Gabelli School of Business at Lincoln center, as well as the construction of a new Law School building and residential complex at the Lincoln Center campus, at LEED Silver standards.
- The installation of a 963-kilowatt solar array atop the five-story parking garage at Fordham's Rose Hill campus, the largest consumer of locally installed solar capacity of any institution of higher education in New York City.
- The University has begun drawing renewable energy from off-site sources, including the largest solar-power system in New York City to date, through a 20-year agreement with the solar developer EnterSolar to purchase electricity generated at a 10-acre, 9,000-solar-panel installation just east of the Arthur Kill waterway in Staten Island, generating 2.6 megawatts of solar power annually, which will be credited to Fordham's energy usage.
- A solar canopy array generating nearly 1 megawatt is planned for installation at our Westchester campus parking lots.
- Fordham continues to retrofit and design buildings to meet energy conservation and greenhouse gas reductions. A number of energy conservation measures are planned, which will enable us to achieve this goal by 2030.

Please see Appendix D for current projects underway with progress towards meeting the 40% by 2030 emissions reduction goal based on implementation of these energy conservation measures.

PROJECTED REDUCTIONS	
Energy Conservation Measure (ECM)	**Reduction Target (% of current emissions)**
Behavior Change	*-3.0%*
Operations & Maintenance	*-7.0%*
Conveying Systems	*0.0%*
Cooling System	*-2.0%*
Data Centers and Server Rooms	*0.0%*
Distribution System	*0.0%*
Domestic Hot Water	*-3.0%*
Energy Management System	*-2.0%*
Envelope	*-5.0%*
Fuel Switching	*0.0%*
Heating System	*-2.0%*
HVAC Controls and Sensors	*-1.0%*
Lighting	*-4.0%*
Motors	*0.0%*
On/Off Site Generation	*0.0%*
Process and Plug Loads	*-5.0%*
Space	*0.0%*
Submetering	*0.0%*
Ventilation	*0.0%*
Other	*0.0%*
Total Projected Reductions from 2017	-34%
Carbon Intensity in 2017	15.32
Projected Carbon Intensity in 2030 with BAU	12.22
Projected Carbon Intensity in 2030 without BAU	10.10
Total Projected Reduction from 2005	-50%

In addition, among the more prominent projects being planned are:

- LED upgrades; next phase will include athletic facilities
- Geothermal installation is currently being studied at 10 buildings at the Rose Hill Campus
- McShane Campus Center expansion
- Construction of a new science center

Additional Commitments

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

UNIVERSITY SUSTAINABILITY COUNCIL

In 2012, Joseph M. McShane, S.J., president of Fordham University at the time, established the Sustainability Council. Through collaboration with independent sustainability consultants, the Council seeks to foster a University-wide discussion related to meeting the growing challenges of climate change by collaborating and developing partnerships and fostering initiatives. The Council, which consists of administrators, faculty, staff, students, and consultants, meets throughout the year to discuss keys issues such as improvements to recycling, University-wide energy and greenhouse gas reduction initiatives, and other sustainability efforts.

STUDENT SUSTAINABILITY COMMITTEE

The Student Sustainability Committee is a permanent external subcommittee of the United Student Government. It also serves as the student partner to the University Sustainability Council, which brings together students, faculty, staff, and administrators to collaborate on promoting sustainable living.

The core mission of the Student Sustainability Committee is to find new opportunities to increase campus sustainability and to create and foster a culture of sustainability among the student body by working with administrators and student organizations. To date, the Committee has organized a student-led sustainability week and worked with the University to expand the availability of recycling bins and plastic bag recycling stations. The Committee is currently working on developing a comprehensive sustainability education outreach program, initiating an eco-reps program for residence halls on both the Rose Hill and Lincoln Center campuses, and organizing a student-led on-campus composting program.

NYCDEP WATER CHALLENGE

As New York City is home to more college students than any other city in the United States, the NYC Department of Environmental Protection (DEP) has challenged institutions of higher education to help reduce citywide water demand, and in 2018 launched the NYCDEP Water Challenge with a goal of reducing the city's water consumption by 20 million gallons by 2022.

The Lincoln Center campus was selected for this challenge, since its facilities are connected to the DEP through the Automatic Meter Read (AMR) system. Student challenges as well as operational improvements that were implemented at Lincoln Center have also been conducted at Rose Hill. The goal was to reduce water consumption by at least 5% by 2020. Fordham achieved this goal through targeted water use reduction efforts in residence halls, dining halls, and the irrigation of green spaces. Through participation in this important initiative, Fordham is committed to installing submeters on the Rose Hill and the Lincoln Center campuses, which will allow us to measure usage and help us to continue to save water.

ENVIRONMENTAL STEWARDSHIP

Fordham University has been honored by the Arbor Day Foundation as a Tree Campus USA. The University earned the distinction by meeting five core standards for a sustainable campus: the establishment of a tree advisory committee, a campus tree-care plan, dedicated annual expenditures for its campus tree program, an Arbor Day observance, and the sponsorship of student service-learning projects.

SUSTAINABLE FOOD

- St. Rose's Garden: Eight raised beds with 20 yards of soil were installed by the Fordham community to establish St. Rose's Garden. St. Rose's serves as a social space, living laboratory, and classroom right on Fordham's Rose Hill campus. The raised beds are used to grow a variety of produce, including kale, collard greens, cabbage, tomatoes, peppers, and broccoli. St. Rose's also offers local, organic seasonal Community Supported Agriculture (CSA) shares for purchase to all members of the Fordham community. The Fordham Social Innovation Collaboratory has supported St. Rose's in a variety of capacities, including the financing of extended growing season initiatives and an on-campus farmers market.
- The Sustainable Food Practicum is a small committee of self-motivated students who are working to improve the sustainability of on-campus dining services on Fordham University's Rose Hill campus. The students operate as sustainability representatives between Fordham's administration, Aramark, the student body, and Fordham's sustainability consultant. They are working to increase communication among these parties to achieve measurable environmental and student health impacts.
- The Food Impact Investing Practicum focuses on collaboration as a process for financing better and more sustainable food systems. In partnership with SlowMoney NYC, and other champions from the food sustainability arena, students in this practicum learn how food impact investing entrepreneurs strategically unlock resources by connecting investors and entrepreneurs. Project highlights include developing a Local Impact Rating System for the Hudson Valley foodshed as a shared platform for entrepreneurs and investors for whom the non-financial returns of food system ventures are an important value.

SUSTAINABLE CLOTHING

The Fashion Sustainability Practicum is dedicated to improving efforts towards sustainability in the fashion industry. The fashion industry is the second most polluting industry in the world, just behind the oil industry, with problems focused on the supply chain and the environment. In today's culture of fast fashion and high trend turnover, the industry uses between 1.5 trillion gallons of water per year, 70 to 100 million trees to create wood-based fibers, and 25% of all chemicals produced worldwide. Through the Social Innovation Collaboratory, the Fashion Sustainability Practicum's goals are to partner with brands, lead on-campus initiatives to promote and improve sustainability efforts, and spread awareness.

Conclusion

In the 15 years since Fordham University accepted the NYC Carbon Challenge, we have achieved significant progress toward our new 40% emissions reduction goal, realizing a 31.77% reduction in emissions from the 2005 baseline to date. Fordham will continue to evaluate its current list of potential projects, and will identify new projects, based on our capital budget and the cost savings potential of each initiative, in order to work towards achieving our goals by 2030.

Appendix A

CARBON EMISSIONS INVENTORY METHODOLOGY

Fordham tracks its carbon emissions according to the methodology of the NYC 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 (CO2e).

All carbon coefficients for the NYC 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 NYC 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.

Fordham has also chosen to measure the carbon emissions from our solid waste stream in our future inventories. NYC Carbon Challenge participants will complete a waste characterization study to determine the baseline volume and composition of their municipal solid waste 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 into our Carbon Emissions Inventory next year.

EMISSIONS COEFFICIENTS FOR BUILDINGS

	Electricity (kwh)	Natural Gas (therms)	#2 Fuel Oil (gallons)	#4 Fuel Oil (gallons)	#6 Fuel Oil (gallons)	Propane (gallons)	Steam (Mlbs)
MTCO2e per unit energy	0.000422704	0.0053156	0.010264026	0.011016722	0.01132755	0.012413804	0.089414631
MMBtu per unit energy	0.0095346	0.1	0.138	0.146	0.15	0.091	1.33015

Appendix B

BENCHMARKING RESULTS CY 2021

Building Name	Address	BIN	BBL	Site EUI (kBtu/ft2)	Source EUI (kBtu/ft2)	ENERGY STAR Score	Reported Gross sq. ft.
Rose Hill: Main Campus	441 East Fordham Rd.	MULTIPLE	2032730001	113.4	175.6	NA	2,336,504
Rose Hill: Walsh Library	439 East Fordham Rd.	2102052	2032730001	88.9	93.4	NA	239,113
Rose Hill: O'Hare Hall	671 East Fordham Rd.	2102056; 2016244	2032730001	67.9	96.7	85	227,416
Rose Hill: O'Hare Parking	685 East Fordham Rd.	2097321	2032730075	14.5	40.7	NA	517,465
Rose Hill: Coffey Sportsplex	463 East Fordham Rd.	2102048	2032730001	15.8	44.3	NA	232,391
Rose Hill: Campbell/Conley/ Salice Halls	441 East Fordham Rd.	2102047; 2102046	2032730001	143	323.3	8	166,600
Rose Hill: Faculty Memorial Hall	655 East Fordham Rd.	2016244	2032730209	120.8	181.7	NA	91,614
Lincoln Center: Main Campus	113 West 60th St.	1028830; 1085404	1011320020	79.5	157.5	NA	1,147,386
Lincoln Center:	140 West 62 St.	1028829	1011320001	38.8	76.8	NA	159,040
Lincoln Center: Law School/ McKeon Hall	150 West 62 St.	1028830	1011320020	60.4	134.3	NA	478,306
Lincoln Center: Lowenstein Center	113 West 60 St.	1028830	1011320020	115.6	228.5	NA	386,575

Appendix C

FORDHAM SOLAR

The following are recent major solar projects:

- **Fordham Staten Island Solar Project** – this 2.6 MW ground mounted solar project is the largest solar array dedicated to any educational entity in NYC.
  - System was formally placed in service in June 2018
  - The project has generated over 7,300 MWH to date, with Fordham owning and retiring 100% of the associated Renewable Energy Credits (substantial LL 97 benefits)
  - System has saved Fordham over $185,000 on its ConEdison electric bills to date

- **Rose Hill Parking Garage Community Solar Project** – this 960 kW roof mounted system is the largest Community Solar project to be hosted by any educational entity in NYC.
  - System was placed in service in September 2019, and has generated over 1,000 MWH to date
  - Fordham University has saved over $53,000 to date from this project
  - Innovative Community Solar structure allows Fordham to share the savings with other "subscribers," including St. Paul's and over 30 small Fordham accounts across NYC
  - **Campbell Hall Solar Project** – this 7.7 kW roof mounted system was installed on the roof of Campbell Hall in 2019, and was funded by a student and alumni GoFundMe campaign.
  - **Walsh Library** – 250 kWh roof mounted solar installed in 2012.
  - In the works: an installation of **Solar Parking Canopy Community Solar Project** for the Fordham Westchester campus of 970,000 kWh.

Ref: https://news.fordham.edu/university-news/fordham-expands-solar-power-use/

FORDHAM – STATEN ISLAND SOLAR PROJECT

- The 3.1MW Fordham Staten Island Solar Project was the largest solar energy system in NYC when it was installed in 2018
  - Fordham University off-taker on 2.6MW subarray
  - Fordham Prep off-taker on smaller 500 kW subarray
- The system was installed on surplus buffer land on Kinder Morgan's Staten Island industrial campus
- The project utilizes Remote Net-Metering, whereby the value of the off-site system's monthly solar production is allocated to Fordham University's campus in the Bronx
- The "Shared-Savings" structure provides Fordham with guaranteed cash savings every month, along with 100% of the system's Renewable Energy Credits (RECs)

PROJECT SUMMARY:

System Host: Kinder Morgan
Location: Staten Island, NY
Annual System Production:
4,000,000 kWh
Transaction Type:
"Shared Savings" PPA
System Size:
3.1MW (2.6MW and 500kW)
Installation Type:
Ground Mounted PV System
System Off-Taker:
Fordham University/Fordham Prep

ROSE HILL GARAGE – COMMUNITY SOLAR

- Completed in September 2019, this 960kW rooftop solar energy system is the largest Community Solar project in NYC to be hosted by an educational institution
- This system was installed on the top floor of the Rose Hill Parking Garage in the Bronx, and is a testament to Fordham's commitment to sustainability
- As a Community Solar project, the value of the solar energy system's production is shared with participating "subscribers" including Fordham faculty and alumni
- Since being placed into service in September 2019, the system has generated over 1,000,000 kWh of clean solar electricity

PROJECT SUMMARY:

System Host: Fordham University
Location: Bronx, NY
Annual System Production: 1,140,000 kWh
Transaction Type: Community Solar PPA/Site Lease
System Size: 960 kW DC
Installation Type: Roof-Mounted PV System

FORDHAM – CAMPBELL HALL SOLAR DEMONSTRATION PROJECT

- The Fordham University Campbell Hall solar photovoltaic system has a total capacity of 7.67 kW
- Driven by student demand, current students and alumni raised money on GoFundMe to partly fund a solar energy system for the residence hall
- The system is comprised of 26 individual 295-watt solar panels installed on the Campbell Hall rooftop
- The system includes one 5.75 kW string inverter, has a ballasted roof mounting system, and showcases state of the art data monitoring capabilities
- Since being placed into service in December 2019, the system has generated over 5,000 kWh of clean solar electricity

PROJECT SUMMARY:

System Host: Fordham University
Location: Bronx, NY
Annual System Production: 6,700 kWh
Transaction Type: Direct Purchase
System Size: 8 kW DC
Installation Type: Roof-Mounted PV System
Solar Incentives: Crowdsourced by students and alumni

FORDHAM WESTCHESTER – SOLAR CANOPY

- Fordham is developing an 846 kW Solar Parking Canopy system for the Fordham Westchester campus
- As a Community Solar project, the value of the solar energy system's production is shared with the Fordham Westchester facility as well as other participating "subscribers" including Fordham faculty and alumni
- Once the system is fully operational, it will generate almost 970,000 kWh of clean electricity per annum

PROJECT SUMMARY:

System Host:
Fordham University–
Westchester Campus
Location: Westchester, NY
Annual System Production:
970,000 kWh
Type: Community Solar
PPA/Site Lease
System Size: 846 kW DC
Installation Type: Parking Canopy
Solar PV System
Solar Incentives: NYSERDA NY Sun Initiative
Community Solar

MONTHLY PRODUCTION DATA — LIVE SOLAR PROJECTS

	ONSITE		OFFSITE	TOTAL
	Campbell Hall 7.67 kW	Fordham Garage 962 KW	Kinder Morgan 2.6 MW	Total Monthly Production kWh
May - 18	-	-	-	-
June - 18	-	-	347,776	347,776
July - 18	-	-	371,070	371,070
August - 18	-	-	319,250	319,250
September - 18	-	-	228,611	228,611
October - 18	-	-	231,269	231,269
November - 18	-	-	142,187	142,187
December - 18	-	-	27,542	27,542
January -1 9	-	-	127,540	127,540
February - 19	-	-	229,209	229,209
March - 19	-	-	316,432	316,432
April - 19	-	-	298,194	298,194
May - 19	-	-	314,046	314,046
June - 19	-	-	349,667	349,667
July - 19	-	-	362,815	362,815
August - 29	-	-	360,128	360,128
September - 19	-	59,304	326,937	386,240
October - 19	-	64,518	225,882	290,399
November - 19	-	52,916	221,022	273,937
December - 19	92	33,814	127,844	161,749
January - 20	143	45,804	182,468	228,414
February - 20	268	57,933	214,464	272,665
March - 20	592	93,782	279,597	373,970
April - 20	624	100,841	283,224	384,688
May - 20	865	145,412	379,424	525,701
June - 20	863	143,248	373,637	517,747
July- 20	798	131,674	369,471	501,942
August - 20	734	117,225	333,717	451,676
Total Production	**4,978**	**1,046,470**	**7,343,417**	**8,394,865**

Appendix D

PROJECT LIST

Energy Conservation Measure (ECM)	Measure Name	Project Description	Est. Carbon Reduction (Mg CO2e/yr)	% Carbon Intensity Reduction Against 2016 Baseline Year GHG Emissions
Onsite Generation	Solar Roofs RH	Install 450kw PV Solar Panels on Student Center Roof	169	0.4%
Onsite Generation	Solar Roofs RH	Install 1mw PV Solar Panels in Overhead Canopy in Parking Lot A	375	1.0%
Onsite Generation	Solar Roofs RH	Install 500kw PV Solar Water Heater for Lombardi Pool	163	0.4%
Onsite Generation	Solar Roofs Armonk	Install 250kw PV Solar Panels on Ground Level	95	0.2%
		Total Onsite Generation	**801**	**2.1%**
Envelope	Windows LC	Replace Windows in McMahon Hall with HE Windows	50	0.1%
		Total Envelope	**50**	**0.1%**
Cooling Systems	Electric Chiller Replacement	Replace 300 ton Electric Chiller in FMH with Air-Sourced Heat Pumps	40	0.1%
Cooling Systems	Chiller Absorber Replacement	Replace 450 ton Steam Absorber in JMH with Air-Sourced Heat Pump	295	0.8%
Cooling Systems	Chiller Absorber Replacement	Replace 250 ton Steam Absorber in Hughes Hall with Air-Sourced Heat Pump	164	0.4%
Cooling Systems	Electric Chiller Replacement	Replace 300 ton Electric Chiller in O'Hare Hall with Geothermal	154	0.4%
Cooling Systems	Chiller Absorber Replacement	Replace (2) 450 ton Steam Absorbers in 140 W 62nd with Air-Sourced Heat Pumps	178	0.5%
Cooling Systems	Gas Chiller Replacement	Replace (2) 400 ton Gas-fired Teco-Chills in CSC with Heat Pumps	52	0.1%
Cooling Systems	Gas Chiller Replacement	Replace 500 ton Gas-fired Teco-Chills in Walsh Library with Heat Pumps	33	0.1%
Cooling Systems	Electric Chiller Replacement	Replace 250 ton Electric Chiller in McMahon Hall with Heat Pump	33	0.1%
Cooling Systems	Chiller Absorber Replacement	Replace (1) 400 ton Absorber in Lowenstein with 250 ton Mag Bearing Electric Chiller	152	0.4%
Cooling Systems	Cooling Coil Flow Valves LC	Replace Flow Valves in HVAC Units at 150 W 62 St to Ensure Full Heat Transfer	10	0.03%
		Total Cooling	**1,112**	**2.9%**
Lighting	RH	Replace Lighting in University Gym	24	0.1%
Lighting	RH	Replace Lighting on Coffey Field	79	0.2%
Lighting	RH	Replace Lighting on Bahoshy Field	30	0.1%
		Total Lighting	**133**	**0.3%**
Heating System	PTAC Installation	Replace PTACs at McMahon Hall LC	364	0.9%
Heating System	Boiler Replacement	Replace (3) 500hp HPS Boilers with (3) HPS/LPS/HW Boilers	1,764	4.5%
Heating System	Steam Traps	Upgrade Steam Traps at LC	50	0.1%
Heating System	Steam Use Cessation	Remove FMH from Thebaud HPS Plant after Heat Pumps are installed	223	0.6%
Heating System	Steam Use Cessation	Convert O'Hare to Geothermal, supply hot water to Tierney & Spellman	189	0.5%
Heating System	Steam Use Cessation	Remove Walsh Hall from Thebaud HPS Steam Plant after (2) Gas-fired Condensing Boilers are installed	66	0.2%
Heating System	Steam Use Cessation	Remove Finlay from Thebaud HPS Steam Plant after Condensing Boilers are installed	21	0.1%
Heating System	Steam Use Cessation	Remove 140 W 62nd from Con Ed Steam System after Heat Pumps are installed	151	0.4%
Heating System	Steam Use Cessation	Remove JMH from Thebaud HPS Plant	102	0.3%
Heating System	Steam Use Cessation	Remove Hughes Hall from Thebaud HPS Plant	63	0.2%
Heating System	Steam Use Cessation	Remove RH Student Center from Thebaud HPS Plant	201	0.5%
Heating System	Steam Use Cessation	Remove McMahon Hall from Con Ed Steam System	282	0.7%
Heating System	Steam Use Cessation	Convert Martyrs' Court Steam Boiler to Condensing Hot Water, 150 BHP	28	0.1%
Heating System	Steam Use Cessation	Remove Alumni North and South from Martyrs' Court Steam Plant By installing (2) Condensing Boilers in Alumni	63	0.2%
Heating System (Summer Use)	Steam Use Cessation	Remove Queen's Court Steam Domestic Hot Water Systems from Martyrs' Court Steam Plant. Replace with Electric	8	0.02%
Heating System	Steam Use Cessation	Remove Faber & Loyola Hall from Martyrs' Court Steam Plant By Converting both Faber & Loyola to Heat Pumps	81	0.2%
		Total Heating	**3,657**	**9.4%**

PROJECT LIST (CONTINUED)

Energy Conservation Measure (ECM)	Measure Name	Project Description	Est. Carbon Reduction (Mg CO2e/yr)	% Carbon Intensity Reduction Against 2016 Baseline Year GHG Emissions
Energy Storage	Thermal Storage LC	Install Thermal Ice Storage System in 150 W. 62 St. & Provide Cooling to 150 (1200 tons), 140 (600 tons), and Lowenstein (800 tons). Total tonnage 2600 tons	1,335	3.4%
		Total Energy Storage	**1.335**	**3.4%**
RTEM	Meters Energy Audit System	Install Sub-Meters and route to Cloud Based Energy Audit System to Read and Interpret Meter and Sub-Metering Data from Both Campuses and Advise on Energy Use	495	1.3%
		Total Real Time Energy Management (RTEM)	**495**	**1.3%**
Training	Equipment-based Skills Training	Train New Workers and/or Advance the Skills of Existing Workers-O&M Occupations or Job Titles - on New Energy Efficient Equipment	0	0.0%
	Total Real Time Energy Management (RTEM)		**0**	**0.0%**
		Planned/Future Projects Total	**7,582**	**19.5%**
		GHG Emissions Reduction to Date (based on 2020 Inventory)	4,687	36.9%
		Completed and Planned/Future Projects	**Total**	**56.4%**

FORDHAM UNIVERSITY

THE JESUIT UNIVERSITY OF NEW YORK