



# Table of Contents

DOE Office of Sustainability  
Division of School Facilities  
44-36 Vernon Boulevard, 5th Floor,  
Long Island City, New York, 11101  
[sustainability@schools.nyc.gov](mailto:sustainability@schools.nyc.gov)  
Phone: 718.349.5738

<b>3</b>	<b>About This Report</b>	<b>17</b>	<b>Waste</b> Recycling Zero Waste Schools
<b>4</b>	<b>Letter from the Chancellor</b>	<b>22</b>	<b>Water</b> Water for the Future Green Infrastructure School Gardens Schoolyards to Playgrounds
<b>5</b>	<b>Progress and Goals Dashboard</b>	<b>27</b>	<b>Education</b> Partners
<b>6</b>	<b>Our Strategy</b> Students Sustainability Coordinators Sustainability Plans Engagement and Trainings	<b>30</b>	<b>Appendix</b> Data Policies and Regulations Methodology References
<b>12</b>	<b>Energy and Climate</b> Greenhouse Gas Emissions Energy Management		



## About This Report

The Annual Report is an overview of the New York City Department of Education's (DOE) sustainability programs and partnerships in Fiscal Year 2017 (FY17), spanning July 1, 2016–June 30, 2017. This report includes information pertaining to energy and climate, waste, water, green infrastructure, and environmental education as well as compliance with local laws and Chancellor's Regulations.

To learn more about the DOE Office of Sustainability, please visit our [website](#).







## Letter from the Chancellor

Dear Educators, Staff,  
and Community Members,

The NYC Department of Education is committed to sustainability in each of our nearly 1,900 schools, instilling efficient building operations as well as providing a unique lens for multidisciplinary education. Our schools are hubs in our communities; as such, we play a leadership role in advancing sustainability across students, families, staff, and facilities by providing innovative programs and systematic support.

The DOE instituted a formal Office of Sustainability in 2009 in response to a rapidly growing number of local laws and policies, and progress is well underway. The Office focuses on providing resources to schools to support energy management and conservation, waste reduction and diversion, water efficiency, green infrastructure, compliance with City policies and goals, and integration of sustainability into every school.

Throughout the 2016-2017 school year, several key milestones were achieved. The nation's largest effort towards school waste diversion was launched with the Zero Waste Schools program at 109 schools, supporting the City's ambitious

goal to send 'zero waste' to landfill by 2030. Participating schools achieved an average waste diversion rate of nearly 60%, demonstrating progress towards improved recycling. Energy efficiency projects have reduced greenhouse emissions 20% from 2008. In order to support the rapidly growing solar program, a specialized education program gave over 400 teachers an engaging professional development opportunity.

We aim to institutionalize sustainability at the DOE. Our schools are becoming less resource-intensive, more resilient, and increasingly engaged in sustainability throughout our organization. The Office of Sustainability doubled the number of people trained in 2016-2017, and is growing the number and type of offerings.

Thank you for your commitment to supporting our sustainability journey at DOE. I hope that you become familiar with DOE's goals and the resources available to support each school in their efforts. Your leadership will foster swifter progress and engagement that better connects our whole school communities, and will continue to make a difference in the years to come.

Sincerely,  
Carmen Fariña, Chancellor,  
the New York City Department of Education



## Progress and Goals



### ENERGY AND CLIMATE



### WASTE



### WATER



### GREEN INFRASTRUCTURE



### EDUCATION

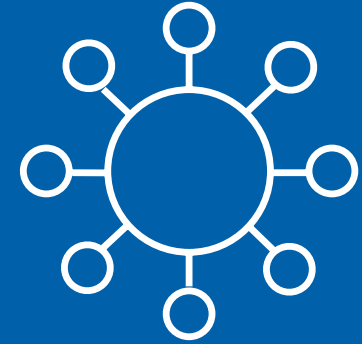
#### Progress In 2017

<b>83</b> Led 83 energy efficiency projects that prevented 3,868 metric tons of CO <sub>2</sub> e in FY17	<b>109</b> Launched the Zero Waste Schools Program in 109 schools	<b>5,711</b> Added 5,711 high-efficiency bathroom fixtures across NYC schools	<b>100</b> Added over 100 school gardens across the five boroughs. Over half of DOE buildings now have a registered school garden	<b>1st</b> Hosted the first annual DOE Sustainability Showcase to highlight school and staff achievements and provide workshops on sustainability topics
<b>20%</b> Reduced total GHG emissions 20% since FY08	<b>15,000</b> Diverted more than 15,000 tons of waste from landfill through recycling and organics programs	<b>60</b> Installed water meters in 60 schools to improve water management	<b>6</b> Renovated six schoolyards, adding new green space to NYC	<b>17</b> Led 17 sustainability trainings for 1,792 school staff including Sustainability Coordinators, Custodian Engineers, Facilities staff, and SchoolFood staff
	<b>8</b> Added eight new Zero Waste staff to directly support schools with recycling and waste management	<b>36</b> Added water bottle refill stations at 36 schools		<b>127,424</b> Supported partners that engaged over 127,424 students across 416 DOE schools

#### Goals

Reduce greenhouse gas emissions from DOE buildings 80% by 2050 from a 2005 baseline	Send zero waste to landfills by 2030	Reduce water consumption and increase water efficiency	Facilitate student environmental activity and education through citywide green initiatives, programs and contests	Support schools, Principals and teachers to integrate sustainability into the curriculum
Reduce greenhouse gas emissions from DOE buildings 35% by 2025				

# OUR STRATEGY



The DOE Office of Sustainability's vision is to transform the NYC school system into a more efficient public organization and advance the DOE's sustainability leadership. As the largest school district in the United States, work on environmental and civic issues not only improves NYC, but creates models for schools nationwide. In order to do this, we proactively engage staff to integrate sustainability practices and programs into DOE operations and education. To promote sustainability across all NYC schools, the Office of Sustainability also partners with a diverse array of nonprofits to provide curriculum and programming to students and educators.



## Students

In FY17, the Office of Sustainability and our partners engaged over 127,000 students through assemblies, activities, contests, educational programming, and curriculum. Education is used as a vehicle to connect students to real-world sustainability challenges and solutions through STEM, the arts, Career Technical Education (CTE), and vocational programs. Learn more about our growing work engaging NYC students in the [Education](#) section.

In FY17, the Office of Sustainability created a [Sustainability Coordinator Welcome Packet](#) to provide Coordinators with tips for getting started and tools to connect to partner resources.

## Sustainability Coordinators

Sustainability Coordinators are school-based liaisons that work in collaboration with the Office of Sustainability and play an integral role in facilitating school awareness around established sustainability goals. Every year in September, per Local Law 41 and Chancellor's Regulation A-850, Principals are required to appoint a Sustainability Coordinator at their school. In FY17, 74% of NYC schools complied with this requirement. The role may be assigned to any staff member, excluding Custodian Engineers and Principals. Seventy-two percent of Coordinators were teachers or Assistant Principals in FY17.

### Sustainability Coordinator responsibilities:

- Submit annual school Sustainability Plans and Survey including school recycling plan
- Consult with facilities staff to develop and expand school-based sustainability initiatives
- Form Green Teams to build support at schools
- Attend trainings by the Office of Sustainability and partner organizations

In the 2017-2018 school year, the Sustainability Coordinator designation process will be integrated into the existing Galaxy software used by Principals to assign other school roles. The DOE believes this will increase compliance and further institutionalize the Sustainability Coordinator role in every school.

### Sustainability Coordinator Participation by Borough

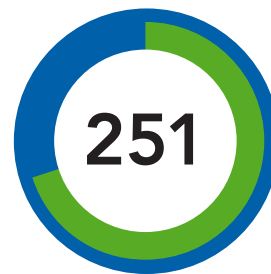
■ Schools with Sustainability Coordinators



Brooklyn



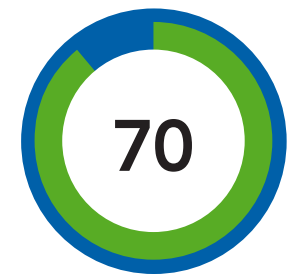
Bronx



Manhattan



Queens



Staten Island





### **Mentor Program Pilot**

In FY17, a Sustainability Coordinator Mentor Program was piloted to better support Coordinators in their day to day roles. Many Coordinators need support getting started, forming Green Teams, or simply want advice from an experienced outside source. Twelve mentees received one-on-one support from a retired teacher and a Sustainability Coordinator throughout the year. They received guidance on goal setting, organizational strategy and Green Team development. Due to the success of the pilot, the program will be expanded in FY18.

“Having a mentor gave me the courage to advocate for what I needed to be successful. I wouldn’t have been able to do it without her guidance.”

-Julie Tuifel,  
Program mentee from Q721



## School Sustainability Plans

Sustainability Coordinators are required to develop annual Sustainability Plans to set energy conservation and recycling goals at their schools and provide roadmaps for implementation. In FY17, 72% of NYC schools completed a Sustainability Plan.

Sustainability Plans were completed in October 2016 using an online platform provided by the Green Schools Alliance, a non-profit partner. In FY18, schools will use an inter-DOE platform to complete their Sustainability Plans in effort to further embed sustainability practices into the ongoing business processes at each school. We will continue outreach to Principals and Superintendents in FY18 to improve compliance and support.

## Annual Sustainability Survey

Each school Principal or Sustainability Coordinator is required by Local Law 41 to participate in the DOE's annual sustainability survey. In FY17, 74% of schools responded to the survey, a six percent year over year increase.

The survey helps to monitor sustainability activities across schools and collects feedback on the effectiveness of tools and programs. It also identifies areas for growth and opportunity. In FY17, the Office of Sustainability partnered with Teachers College, Columbia University to streamline the survey and to identify trends and potential interventions to better support Sustainability Coordinators.

### Sustainability Plan Completion by Borough

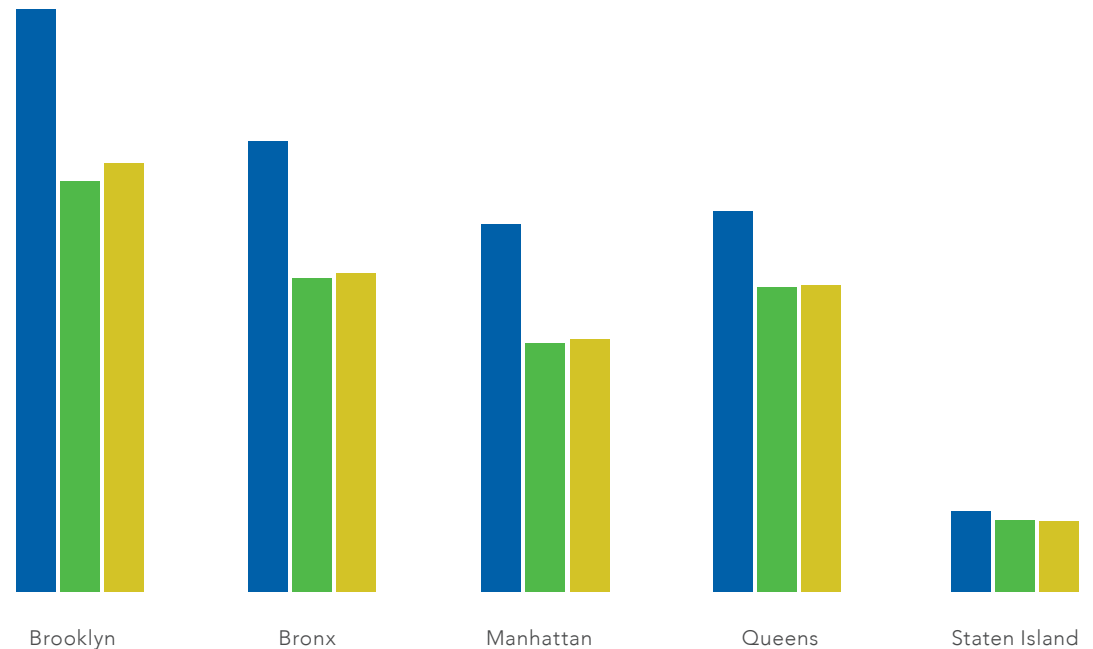
- Total Number of Schools
- Sustainability Plans Submitted

Brooklyn	568	401	70.6%
Bronx	440	306	69.5%
Manhattan	359	242	67.4%
Queens	371	297	80.1%
Staten Island	79	70	88.6%
<b>Total</b>	<b>1817</b>	<b>1344</b>	<b>72.4%</b>

### Annual Sustainability Survey Response Rates

- Total Number of Schools
- Number of Survey Responses

Brooklyn	568	418	73.6%
Bronx	440	311	70.7%
Manhattan	359	246	68.5%
Queens	371	299	80.6%
Staten Island	79	69	87.3%
<b>Total</b>	<b>1817</b>	<b>1344</b>	<b>73.9%</b>



## Engagement and Training

The Office of Sustainability provides annual trainings to school Sustainability Coordinators, faculty, Custodian Engineers, SchoolFood Managers, and other DOE staff. Trainings help staff learn about new programs and resources, review roles and responsibilities, and discover ways to take action. In FY17, the Office of Sustainability hosted 17 trainings citywide to nearly 1,800 DOE staff.

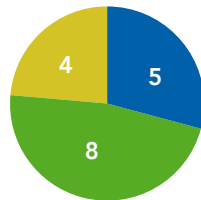
### Highlights:

- More than doubled trainings for Sustainability Coordinators
- Expanded Sustainability Coordinator trainings to multiple boroughs for the first time
- Added trainings for Custodian Engineers to accommodate new hires
- Participated in the SchoolFood's annual daylong training for the first time
- Created a new Sustainability Project Grant opportunity, awarding \$115,000 to 15 schools
- Created the first annual Sustainability Showcase (see case study on the following page)

### Sustainability Trainings in FY17

#### Sustainability Trainings Held

- Sustainability Coordinator Trainings
- Custodian and Facilities Trainings
- SchoolFood Trainings

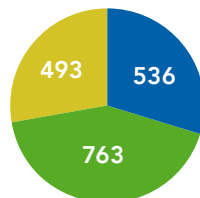


Total Trainings Held

**17**

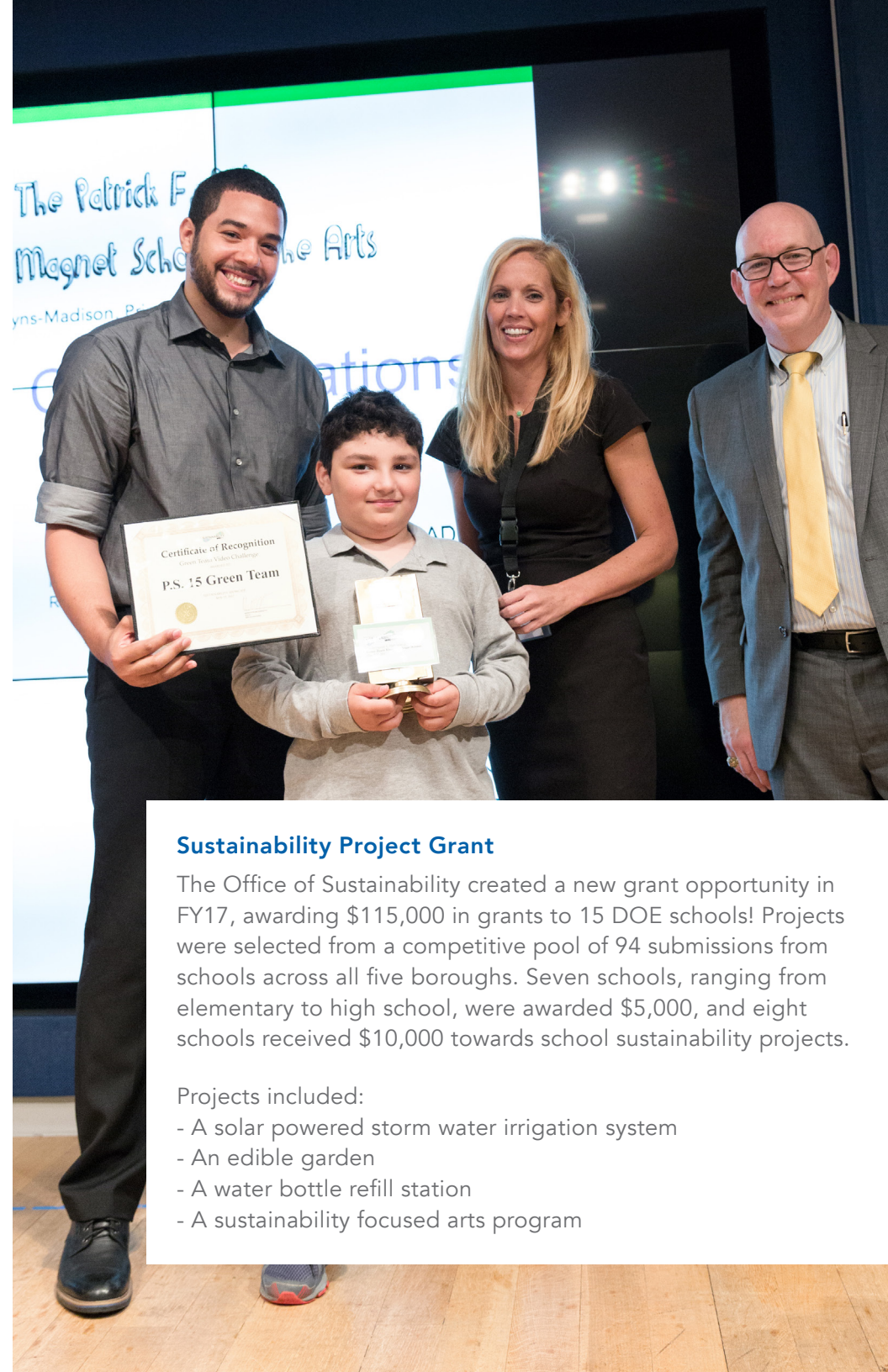
#### Staff Trained

- Sustainability Coordinators Trained
- Custodian and Facilities Staff Trained
- SchoolFood Staff Trained



Total Staff Trained

**1,792**



### Sustainability Project Grant

The Office of Sustainability created a new grant opportunity in FY17, awarding \$115,000 in grants to 15 DOE schools! Projects were selected from a competitive pool of 94 submissions from schools across all five boroughs. Seven schools, ranging from elementary to high school, were awarded \$5,000, and eight schools received \$10,000 towards school sustainability projects.

#### Projects included:

- A solar powered storm water irrigation system
- An edible garden
- A water bottle refill station
- A sustainability focused arts program





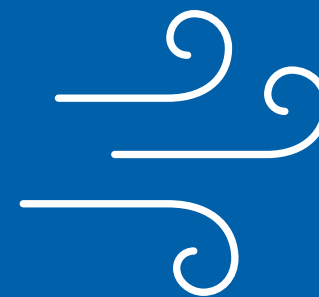
## First Annual Sustainability Showcase

In FY17, the Office of Sustainability hosted the first annual Sustainability Showcase at the United Federation of Teachers Headquarters. The showcase was attended by more than 225 school staff and students and featured workshops on climate change education, waste reduction, and grant writing. The event also recognized schools and staff for sustainability leadership.

Students and Sustainability Coordinators presented school-based sustainability projects as a centerpiece of the event. Each table had an interactive exhibit and attendees voted for their favorite project. The three schools with the most votes, M.S. 88 in Brooklyn, P.S. 120 in Queens, and the School of Cooperative Technical Education in Manhattan, each won \$5,000 for sustainability projects!



# ENERGY AND CLIMATE



Climate change and increasing building energy consumption are key challenges facing NYC in the coming decades. In 2012, Superstorm Sandy shut down all NYC public schools for a week and caused thousands of students to temporarily relocate to different locations.<sup>1</sup> NYC is particularly vulnerable to climate change-related impacts including sea level rise and increasing storm regularity and strength.

Under Mayor de Blasio's OneNYC Plan, the City set a goal to reduce its greenhouse gas (GHG) emissions 80% by 2050 from a 2005 baseline. The DOE plays a significant role in reaching this goal as DOE buildings account for 27% of the total municipal energy consumption. With support from the Department of Citywide Administrative Services (DCAS) and the Mayor's Office, the DOE focuses on reducing its carbon footprint through operations and maintenance, energy management, renewable energy projects (e.g. solar), and education targeting behavioral change and awareness.



## Greenhouse Gas (GHG) Emissions

Most of the energy sources that provide power to schools also emit greenhouse gases that contribute to climate change. In FY17, the DOE emitted 661,695 metric tons of CO<sub>2</sub>e (carbon dioxide equivalent), equating to approximately 128,000 cars on the road over one year. Emissions and total energy use increased in FY17 (see tables below). This can be attributed to an increase in winter heating days, occupancy growth at new DOE facilities, and an increase in building square footage. Overall, the DOE has reduced total GHG emissions by 20% since FY08 despite growing its building portfolio by approximately seven percent over that time.

## Energy Management

The DOE, in coordination with DCAS, oversees energy management programs and monitors performance to achieve the City's goal of reducing greenhouse gas emissions 35% by 2025. As part of our strategy to meet this goal, the DOE Energy Management team oversees the energy audit and retrofit process by identifying capital and low-cost building upgrade needs and performing preventive maintenance repairs on aging infrastructure (see [City Funded Energy Programs](#)).

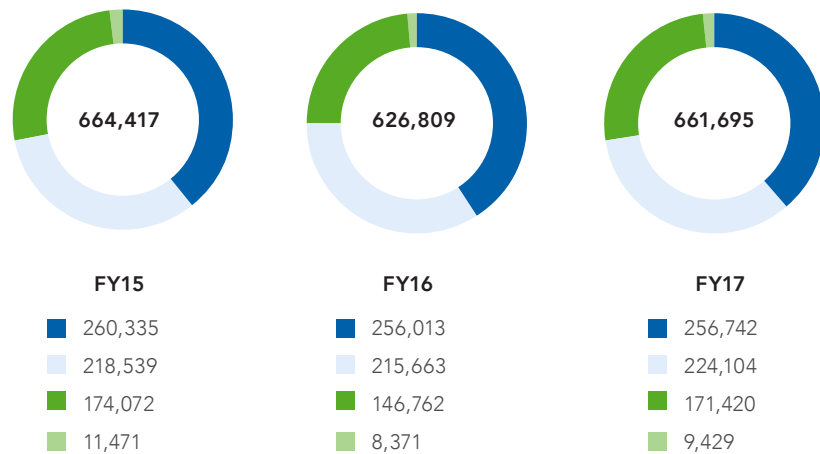
New energy efficiency projects are prioritized based on the existing Energy Use Intensity (EUI) of a building as determined by Energy Star Portfolio Manager (see [Energy Star](#)

[Performance](#)). More than 64% of the DOE's energy consumption is from natural gas, fuel oil, and steam, primarily used by buildings' heating systems during winter. The DOE targets heating system upgrades to increase efficiency in this area. With growing electrical usage from Smart Boards, laptops, and air conditioning, the DOE is evaluating controls to best manage demand.

As a result of our targeted strategy, the DOE's energy consumption and greenhouse gas emissions have declined since FY08. This can be attributed to energy efficiency projects and the conversion of fuel oil boilers to new systems that burn cleaner fuels such as bio-fuels and natural gas.

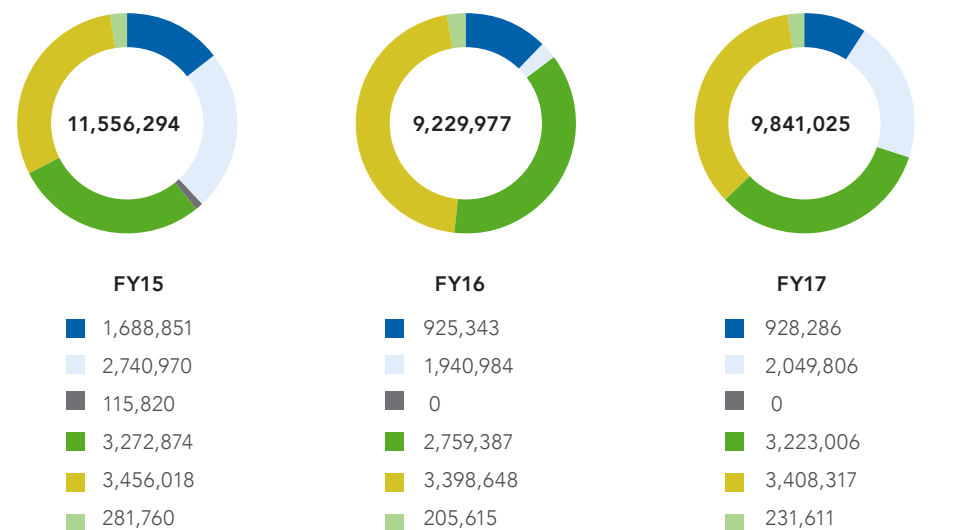
### Greenhouse Gas Emissions (metric tons CO<sub>2</sub>e)

■ Electricity ■ Fuel Oil ■ Natural Gas ■ Steam



### Total Energy Consumption by Source (MBTUs)

■ #2 fuel oil ■ #4 fuel oil ■ #6 fuel oil ■ Gas ■ Electricity ■ Steam





### **An Elementary School that is up to the Energy Challenge**

Two partner organizations, the National Wildlife Federation (NWF) Eco-Schools USA and Solar One, led two energy conservation competitions across 142 NYC schools. In FY17, the NWF Cool School energy competition inspired P.S. 94 in Queens to reduce their electricity usage more than 32%, preventing 12,500 pounds of CO<sub>2</sub>e in one year. Dorothy Nossa, a science teacher, engaged 11 classrooms to conduct energy audits and create energy action plans. Teachers throughout the school embraced the competition by incorporating energy themes into curriculum. P.S. 94's success shows how energy education combined with real world actions can lead to powerful change.



## Solar Projects

In FY17, Mayor De Blasio expanded the City's solar commitment to 1,000 MW of citywide solar capacity by 2030, increasing the City's previous target of 100 MW of solar capacity on public buildings by 2025. Many NYC schools have large, unobstructed roofs that make them ideal for solar photovoltaic (PV) arrays. To date, the DOE has installed 9.76 MW of solar capacity across 35 schools citywide. In FY17, DCAS developed a Power Purchase Agreement and contracts that laid the groundwork to expand solar to over 83 buildings starting in FY18.

To date, the DOE has installed 9.76 MW of solar capacity across 35 schools citywide.



### Teaching with Solar

Producing solar energy onsite turns NYC schools into renewable energy education labs. In FY17, DCAS funded the installation of digital display kiosks at 24 solar schools. The kiosks display solar production data and serve as learning tools for students, staff, and other building occupants. In addition, the DOE Offices of Sustainability and STEM worked with Solar One to provide solar education trainings for over 400 teachers to strengthen the connections to the classroom.

P.S. 402 The Urban Assembly School  
for Green Careers, Manhattan



## City-Funded Energy Efficiency Programs

The Divisions of School Facilities' Maintenance and Optimization team works with DCAS to audit the energy performance of buildings, perform retrofits and retro-commissioning projects, introduce efficient operations and maintenance plans, and measure results. DCAS provides two programs, ACE and ExCEL, that fund energy efficiency projects on a fiscal year cycle. These programs provide a critical mechanism for the DOE to increase building efficiency through equipment upgrades, operational and maintenance improvements, and staff training.

### Accelerated Conservation and Efficiency (ACE)

The ACE Program provides funding for energy efficiency projects that are identified and managed by the DOE. ACE prioritizes projects that provide high energy savings, greenhouse gas emissions reductions, and cost savings. In FY17, the DOE performed 61 projects including water heater upgrades and lighting sensor installations. These projects will save the City an estimated \$1.1 million annually and prevent 2,684 metric tons of CO<sub>2</sub>e each year.

### Expenses for Conservation and Efficiency Leadership (ExCEL)

The ExCEL program enables City agencies to develop energy efficiency projects and building retrofits. In FY17, ExCEL funded more than 20 projects including LED lighting upgrades, boiler pump and steam trap replacements,

and cooling system optimization. The projects save nearly \$400,000 annually in electricity and heating fuel costs and prevent 1,184 metric tons of CO<sub>2</sub>e each year. The upgrades also have a positive impact on building operations and the comfort of occupants. The ExCEL program supports trainings for Custodian Engineers and Sustainability Coordinators and provides program support for the DOE's annual energy reduction competitions.

## Energy Star Performance

According to Local Law 84, the DOE is required to benchmark and report energy performance for all buildings with a gross square footage of 10,000 or more using the U.S. Environmental Protection Agency's Portfolio Manager. The tool calculates buildings' energy efficiency by evaluating over 100 metrics and assigning Energy Star Scores from 1 through 100 (based on comparisons to similar facilities across the country). A score of 75 or higher indicates a building is performing better than 75% of the same type building nationwide and are eligible for Energy Star certification. Currently, 1,272 DOE buildings are in Portfolio Manager, with 787 buildings (62%) eligible for Energy Star certification. This is a 10% increase compared to FY16.

## Demand Response Program

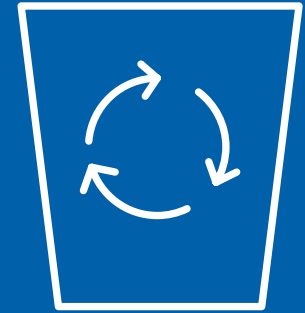
The DOE is the largest participant in the City's Demand Response Program, accounting for almost half of all City buildings enrolled. DOE buildings reduce electricity consumption and mitigate stress on the NYC electric grid

during high demand periods, such as during heat waves. The Program provides a valuable service to utilities and NYC residents by helping to prevent blackouts and brownouts. In FY17, 246 buildings were enrolled in the DOE's Demand Response Program and participated in eight Demand Response events. The DOE nearly doubled participation in the New York Independent System's Operator (NYISO) winter and summer programs. By shutting off unnecessary lights and electrical equipment, DOE buildings reduced consumption by 275,000 kWh and saved over \$43,000 in electricity costs. The Office of Sustainability reinvests revenue earned from the program into energy saving projects and sustainability programs, such as the annual Sustainability Grant.

## SchoolFood and National Grid

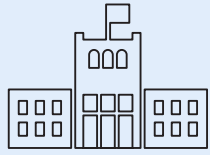
Thanks to National Grid's energy efficiency program, SchoolFood received \$36,000 in rebates for equipment to reduce energy consumption in FY17. With support from the program, SchoolFood replaced almost 1,300 ovens, refrigerators, and other appliances with Energy Star-Certified equipment. To save energy during summer recess, SchoolFood also cleaned and unplugged school refrigerators that were not being used for the SummerMeals Program.

# WASTE



Every year, New Yorkers create more than 6 million tons of trash and recyclables that strain resources and impact our environment. Waste creates an estimated 2 million metric tons of CO<sub>2</sub>e and costs taxpayers millions to landfill. Through OneNYC, the City created a zero waste goal to divert all recyclable and compostable materials from landfills by 2030. The DOE Office of Sustainability manages programs, processes, and resources to help schools make progress towards this goal. In Fall 2016, the DOE began providing hands-on outreach, training and support to schools citywide for the first time to help meet waste reduction goals. Previously, there was limited capacity to provide on-the-ground support to help schools properly manage waste and comply with collection procedures. Through these efforts, the DOE is connecting teachers, administrators, parents, and students around a common goal.

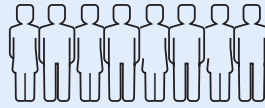
## FY17 ACCOMPLISHMENTS



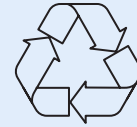
# 109

Launched Zero Waste Schools Program in 109 schools.

# 8



Added a new Zero Waste Team of eight full time staff at the Office of Sustainability to assist schools with proper waste management, recycling, and waste reduction.



# 15,000

Diverted more than 15,000 tons of waste from landfill through recycling and organics programs.

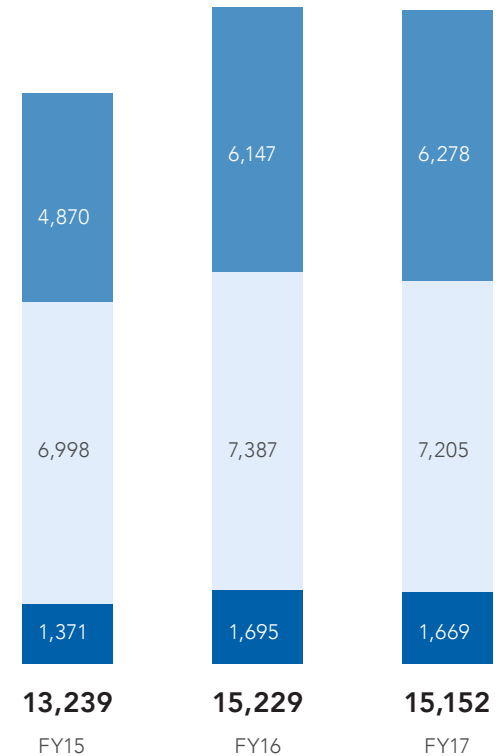
## Recycling

Every NYC school and DOE building must comply with local recycling laws and work to meet the City's zero-waste goals. This can be challenging given the differing spacial and logistical constraints across schools. The DOE Office of Sustainability provides school-based and citywide trainings for Facilities and Custodial staff, SchoolFood staff, Principals, Assistant Principals, teachers, and students. The required Annual School Sustainability Plan sets school-based goals for waste diversion and reduction.

In FY17, over 725 schools participated in the Department of Sanitation's (DSNY) Organics Collection Program that diverts food scraps and food-soiled paper from landfills. Schools are able to recycle electronic waste, textbooks, textiles, and bulky items through partnerships with DSNY and numerous nonprofit organizations that support reducing waste to landfill (See [Partners](#) section). Through the Zero Waste Schools initiative, 109 schools are on a five-year plan to achieve zero waste and the Office of Sustainability is developing scalable best practices and consistent monitoring.

## School Waste Diverted Through Recycling (Tons)

- Organics
- Paper Recycling
- Metal, Glass, Plastics and Cartons Recycling
- Total Waste Diverted







### Student Curiosity Leads to Waste Reduction at Columbia Secondary

Education is a powerful tool to inspire students to create change. In FY17, the [Recycling Champions Program \(RCP\)](#) supported a screening of “Bag It”, a movie about the impact of plastic waste, at Columbia Secondary School (M362) in Manhattan. Following the event, a student approached the school’s Sustainability Coordinator to inquire about the use of plastic cups at the school. The Coordinator worked with the school’s Green Team, the Office of Sustainability, and SchoolFood to remove plastic cups from their school. Each student was also provided with a reusable water bottle. Thanks to the curiosity of a student and actions of green ambassadors, Columbia Secondary is now plastic cup free!

### Zero Waste Schools

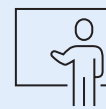
At the beginning of the FY17 school year, the Zero Waste Schools (ZWS) initiative was launched to put NYC schools on track to support the City’s goal of zero waste to landfill by 2030. The program provides educational and operational support to 109 schools along two Department of Sanitation truck routes, focusing on creating a school culture of recycling and sustainability through student and staff engagement. To implement the collaborative effort, the DOE partnered with the NYC Department of Sanitation and GrowNYC’s [Recycling Champions Program \(RCP\)](#). Our near-term target for the program is to achieve zero waste at 100 schools within five years and to expand best practices across the DOE.

### FY17 ACCOMPLISHMENTS



**62**

Equipped 62 school buildings with recycling equipment including sorting stations and recycling bins for classrooms, common areas, offices, and cafeterias.



**1,500**

Conducted over 1,500 citywide outreach events, 232 classroom presentations, and 151 student assemblies.



**45**

Supported 45 Green Teams to help reinforce waste management programs and effective recycling.



**59%**

Achieved a landfill diversion rate of 59% in Brooklyn and 51% in Manhattan among Zero Waste Schools.





### DOE Outreach Drives Recycling Citywide

In FY17, the DOE Office of Sustainability added a new Zero Waste Team to assist schools citywide with waste management procedures and systems. The Zero Waste Coordinators provided the Office of Sustainability new ability to work directly with schools to impart meaningful change. They work closely with Custodian Engineers, Sustainability Coordinators and SchoolFood to troubleshoot and strengthen school systems that drive recycling and improve compliance.



## Electronic Waste Management

Electronic equipment can contain heavy metals that negatively impact ecosystems and human health. Toxic metals can leach into groundwater and other parts of the environment when placed in landfills. The EPA estimates that more than 1.8 million tons of electronic waste end up in U.S. landfills every year.<sup>11</sup> In FY17, the DOE recycled more than 72,000 units of electronics through the Division of School Facilities' E-Waste Recycling Program. This included desktop computers, monitors, laptops, printers, servers, batteries, and other accessories. In addition, 65.8 tons of lamps and lightbulbs were also recycled.

## Book Recycling

As textbooks get damaged or become obsolete, they can be recycled into new products. Since FY15, we have worked closely with the DOE Office of Curriculum, Instruction, and Professional Development and DSNY to offer book recycling across DOE schools. Through streamlined processes and increased outreach, a 60% increase in book recycling from FY16 resulted (over 137,000 books)!

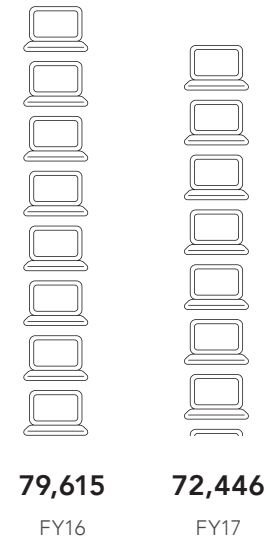
## Textile Recycling

As a daily touchpoint for families and communities, schools are a convenient location for donation programs. To encourage textile recycling during Earth Month in April 2017, [Wearable Collections](#) hosted textile and shoe drives at schools. In FY17, nearly 9,000 pounds of clothing were collected across 22 schools. The initiative also raised \$2,235 for schools to use towards programs and supplies.

## Furniture and School Materials

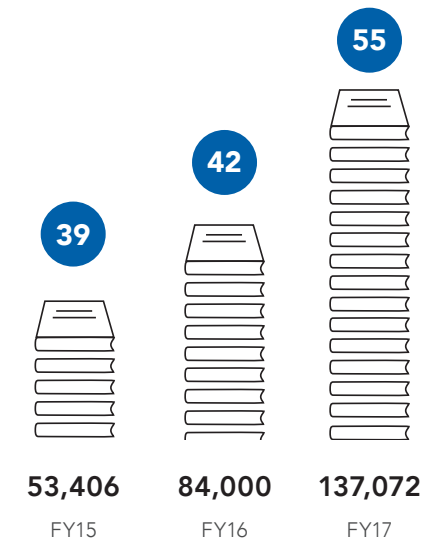
In FY17, we grew our unique partnership with Materials for the Arts (MFTA), a local organization that collects unneeded items from businesses and individuals, and makes them available for free to nonprofit organizations and schools. When schools have unwanted but usable items (e.g. desks, chairs, or metal file cabinets) the first goal is to determine if other schools and non-profits can make use of them, so they are not discarded. MFTA advertises the materials on their listserv throughout NYC and coordinates their relocation. This is a helpful service to schools that need to discard items, or are seeking specific items. Funds are tight, so reuse is encouraged! The MFTA program directly supports sustainability in NYC. To learn more about MFTA and how they promote waste reduction and school sustainability, see the [Education](#) section.

### Units of E-Waste Recycled

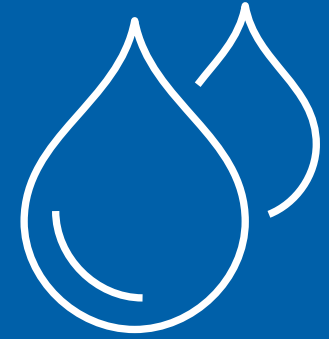


### Books Recycled

# Participating Schools



# WATER



New York City gets its high-quality water from over 2,000 square miles in the Catskill Mountains. With aging infrastructure that brings water to the city, the NYC Department of Environmental Protection (DEP) is preparing for the 2022 shutdown and repair of the Delaware Aqueduct. The DEP has set forth a goal to reduce citywide water consumption by five percent in order to perform necessary infrastructure work without compromising water access.<sup>iii</sup> With funding from DEP, the DOE is replacing inefficient fixtures to reduce water waste and installing water meters to collect usage data. The DEP's Education Office also advances curriculum and programming with DOE schools to inform staff and students about NYC's water and the importance of conservation.<sup>iv</sup>

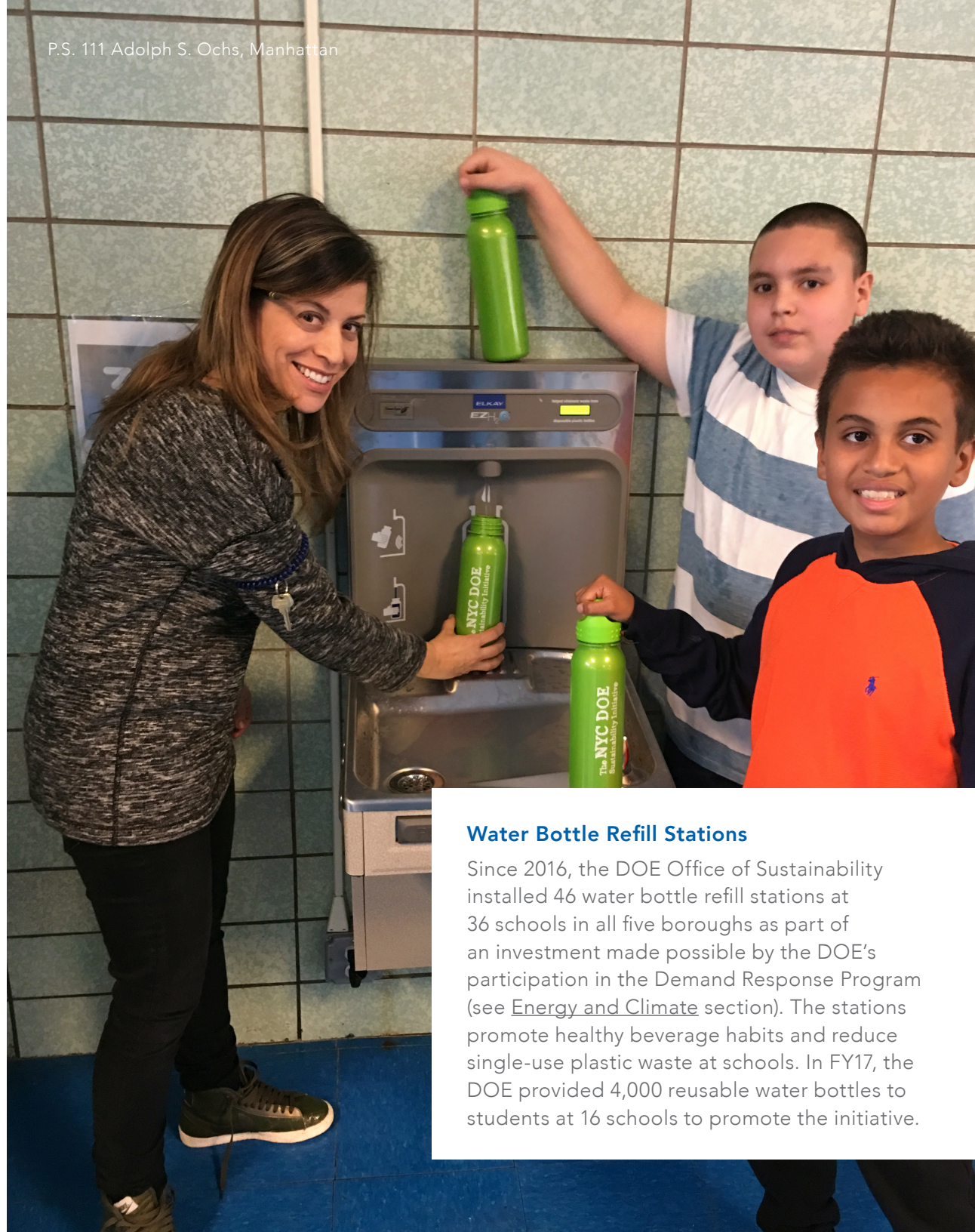
In FY17, the DOE replaced 5,711 bathroom fixtures and installed water meters in 60 schools.

## Water for the Future

The DEP's Water for the Future program supports water conservation across city agencies.<sup>v</sup> In 2013, 500 of the DOE's largest schools were selected to receive retrofit projects including high-efficiency bathroom fixtures and water meters.<sup>viii</sup> The project will reduce water consumption by approximately 70% at each school and save four million gallons of water daily.<sup>viii</sup> All 500 installations will be complete by 2019. To engage students in the program, participating schools receive lesson plans on topics such as water quality, infrastructure, and water stewardship from the DEP Education Office.<sup>ix</sup> In FY17, the DOE replaced 5,711 bathroom fixtures and installed water meters in 60 schools. To date, a total of 311 schools have received retrofits.

## National Grid Direct Install Program

Through the Direct Install Program provided by National Grid, a natural gas provider in Brooklyn, Queens, and Staten Island, schools receive plumbing fixture upgrades to reduce water consumption and lower water heating costs. In FY17, the DOE received 872 fixtures including high efficiency faucet aerators, showerheads and spray valves.<sup>x</sup>



## Water Bottle Refill Stations

Since 2016, the DOE Office of Sustainability installed 46 water bottle refill stations at 36 schools in all five boroughs as part of an investment made possible by the DOE's participation in the Demand Response Program (see [Energy and Climate](#) section). The stations promote healthy beverage habits and reduce single-use plastic waste at schools. In FY17, the DOE provided 4,000 reusable water bottles to students at 16 schools to promote the initiative.



# GREEN INFRASTRUCTURE



The City is committed to providing New Yorkers with useful, accessible and beautiful open spaces. Located within communities across NYC, schools play an integral role in meeting citywide green space and infrastructure goals.



## Stormwater Mitigation: A Big Deal in NYC

During storms, the city's wastewater treatment facilities get overwhelmed, causing stormwater and sewage to overflow into waterways. To prevent this, the NYC Department of Environmental Protection's goal is to capture 10% of rainfall from impervious surfaces such as roads and sidewalks. In support of this goal, the DOE works with partner organizations to install rain gardens, permeable pavement and synthetic turf field projects that capture stormwater.





## School Gardens

The DOE partners with GrowNYC’s Grow to Learn Program to fulfil the City’s mission to inspire, promote and facilitate the creation of sustainable gardens in public schools.<sup>3</sup> In FY17, over 100 school gardens across the five boroughs were installed, bringing the total number of school gardens to 678, impacting over half of all DOE buildings! In addition, Grow to Learn supports schools by providing mini-grants, technical assistance, and workshops.

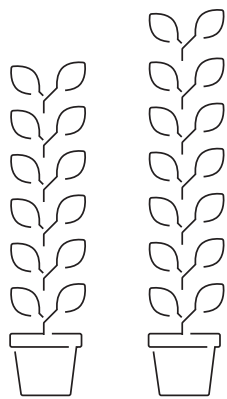
In FY18, Grow to Learn will pilot a podcast to discuss school and community garden topics in NYC. The School Gardens Program began in 2012 and is funded through the Mayor’s Obesity Task Force.

School gardens come in many shapes and sizes. Due to limited green space at DOE schools, some gardens are designed as classrooms hydroponic systems, rooftop gardens, or raised beds.

## Schoolyards to Playgrounds

Through the Schoolyards to Playgrounds Program, the NYC Department of Parks and Recreation and the Trust for Public Lands partner with the DOE to renovate schoolyards to increase community green space. In FY17, this transformative effort created six new schoolyards, adding playground equipment, trees, and benches. Since 2007, 255 schoolyards have been converted into public playgrounds.

**Total School Gardens**

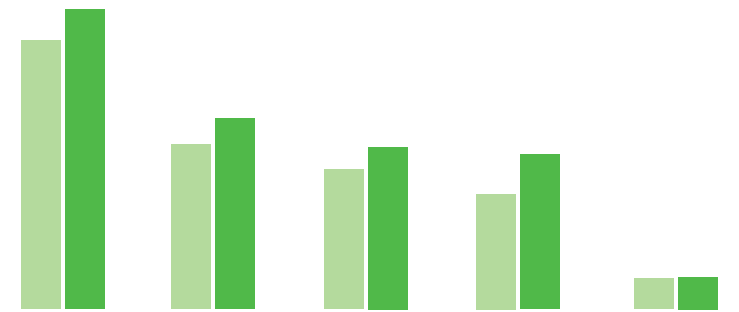


FY16  
**581**

FY17  
**678**

**School Gardens by Borough**

■ FY16 ■ FY17



Brooklyn 217 | 242

Bronx 133 | 154

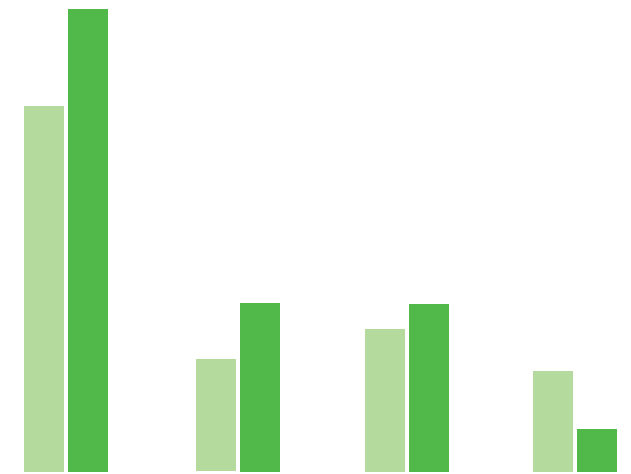
Manhattan 113 | 131

Queens 93 | 125

Staten Island 25 | 26

**School Gardens by School Type**

■ FY16 ■ FY17



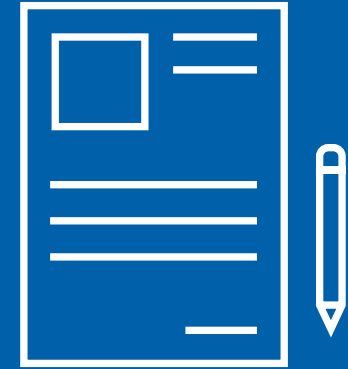
Elementary 295 | 373

Middle School 90 | 136

High School 115 | 135

Other (Pre-K) 81 | 34

# EDUCATION



Sustainability curriculum prepares students to be thought leaders on social and environmental issues that impact NYC and beyond. The DOE Office of Sustainability provides training and support to teachers and administrators to integrate sustainability topics into curriculum. We also partner with City agencies and nonprofits that provide technical support for projects, educational programming, and staff training.



## Partners

In order to reach more schools, including students, teachers, staff, and communities, we partner with numerous organizations across NYC. Partners worked with over 127,424 students at 416 schools throughout FY17. For a complete list of all our partners, please see [page 32](#). Below are highlights from the year:

### **Alliance for Climate Education (ACE)**

ACE educates students on the science of climate change and empowers them to take action. In FY17, ACE reached 6,899 NYC students through engaging assemblies.

### **Billion Oyster Project (BOP)**

BOP is an initiative of the New York Harbor Foundation that creates and supports a network of environmentally literate students, schools, and communities working to restore New York Harbor. In FY17, BOP brought together 250 students from all five boroughs to display research projects at the Billion Oyster Project Symposium.

### **Cafeteria Culture (CafCu)**

CafCu works to create zero waste schools and climate smart communities through education, arts, media and action. In FY17, CafCu piloted a new zero waste school curriculum and led their first international school

partnership between PS15 K in Red Hook, Brooklyn and a school in Tokyo.

### **Children's Environmental Literacy Foundation (CELF)**

CELF provides programs that prepare K-12 students with holistic thinking skills and motivation to become agents of change for a healthier and sustainable future. In FY17, 65 teachers and administrators attended the CELF's annual Summer Institute, a 4-day workshop that enables teachers to integrate sustainability into their existing curricula.

### **City Growers**

City Growers programs use urban agriculture to help kids in NYC explore the natural world and understand where food comes from. In FY17, City Growers engaged over 1,500 students through educational workshops on recycling, habitat restoration, growing food, and biodiversity.

### **City Parks Foundation**

The City Parks Foundation is dedicated to transforming parks into dynamic centers of urban life for all New Yorkers. The Foundation's environmental education programs inspire teachers and students to create meaningful relationships with parks, greenspaces, and the natural environment.

### **NYC Department of Health and Mental Hygiene (DOHMH)**

Active Design in Schools, a program of the DOHMH, supports design upgrades to promote healthy living in NYC schools. In FY17, DOHMH provided five DOE schools with school gardens, four schools with water filling stations and 20 schools with new healthy and active environments.

### **GrowNYC's Recycling Champions Program**

GrowNYC's Recycling Champions Program (RCP) works with the DOE's Zero Waste Schools to

educate students, faculty, and staff, and develop best practices for waste reduction. In FY17, RCP hosted 232 classroom presentations, 151 student assemblies and 106 faculty development sessions. Read more about the RCP partnership in the [Waste](#) section.

### **GrowNYC's Grow to Learn**

The Grow to Learn program creates sustainable gardens in public schools throughout NYC. In FY17, over 100 school gardens were installed across the five boroughs. Learn more about Grow to Learn in the [Green Infrastructure](#) section.

### **Lower East Side Ecology Center**

The Ecology Center works toward a more sustainable NYC by providing environmental education programs, recycling and composting programs, and developing local stewardship of green space. Through the NYC Compost Project, the Ecology Center engaged more than 460

students through presentations and activities covering indoor worm composting, earth day, and tree care.

### Materials for the Arts (MFTA)

MFTA offers teachers free recycled materials for reuse projects and conducts field trips and artist residencies with NYC schools. In FY17, MFTA provided 200 workshops to over 5,000 students including tours of reuse facilities, meetings with artists, and art projects linked to school curriculum. Learn more about MFTA in the [Waste](#) section.

### National Wildlife Federation (NWF) Eco-Schools

The NWF Eco-Schools program advances STEM education and connects NYC students to nature. FY17 was the second year of NWF's Greenpoint Eco-Schools program that places full time Sustainability Coaches at four schools in Greenpoint. The coaches each lead environmental-based education initiatives and STEM after school programming.

### NY Sun Works

NY Sun Works helps bring hydroponic science labs to NYC schools and trains K-12 teachers to integrate the labs into science curriculum. In FY17, NY Sun Works

built 45 hydroponic labs serving over 25,000 students.

### NYC Compost Project

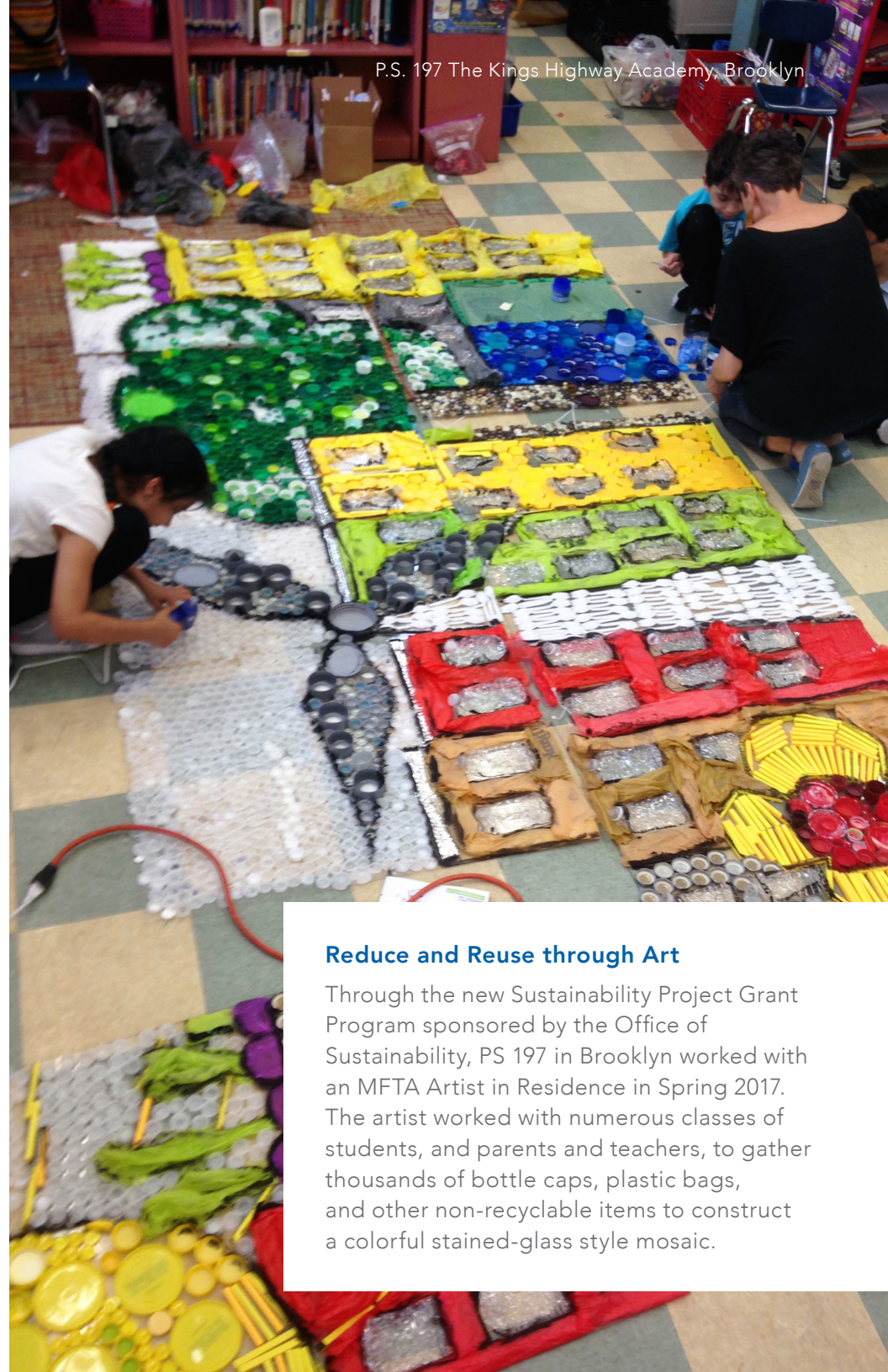
The NYC Compost Project helps to reduce waste in NYC and rebuild City soils by giving New Yorkers the knowledge, skills, and opportunities to produce and use compost. In FY17, the NYC Compost Project engaged nearly 1,500 students through workshops, events, and technical assistance.

### NYC Department of Environmental Protection (DEP)

In FY17, the DEP engaged over 11,000 students in water conservation education through field trips, classroom visits and assemblies. Learn more about the DEP in the [Water](#) section.

### Solar One

The Solar One Green Design Lab provides NYC students with environmental stewardship learning opportunities throughout the year. In FY17, Solar One reached over 1,900 students through the program. Additionally, Solar One and the DOE Office of Sustainability hosted a 3-month energy challenge in which 126 schools saved nearly 1.5 million kWh of electricity and avoided over 2 million pounds of CO<sub>2</sub>e.



### Reduce and Reuse through Art

Through the new Sustainability Project Grant Program sponsored by the Office of Sustainability, PS 197 in Brooklyn worked with an MFTA Artist in Residence in Spring 2017. The artist worked with numerous classes of students, and parents and teachers, to gather thousands of bottle caps, plastic bags, and other non-recyclable items to construct a colorful stained-glass style mosaic.



# APPENDIX

# DATA

## Our Strategy

Sustainability Coordinator Staff Roles in FY17		
Teacher	582	43.2%
Assistant Principal	396	29.4%
Counselor	60	4.5%
Parent Coordinator	51	3.8%
Operations/Business Manager	48	3.6%
Secretary/Administrative Assistant	35	2.6%
Dean	30	2.2%
Librarian	12	0.9%
Aide	11	0.8%
Para Professional	9	0.7%
Social Worker	4	0.3%
Other	95	7.1%
Unspecified	14	1.0%
Total	1347	

## Energy Management

Energy Use Intensity (EUI)			
FY15	153,224,400	75.4	3%
FY16*	155,916,000	59.2	-19%
FY17	156,649,200	62.8	-14%

\*In FY16, EUI dropped in part due to 45 new facilities (2,691,000 sq ft.) added to the portfolio. The facilities were only partially occupied and therefore used less energy.

## Energy Efficiency

ACE Energy Efficiency Projects in FY17			
Project type	Number of buildings implemented	GHG emissions prevented (metric tons CO <sub>2</sub> e)	Cost Savings
Vacancy Sensors	14	631	\$492,549
Steam System Optimization	37	1,160	\$288,913
Gas Fired Domestic Hot Water Heater	4	108	\$43,318
Dual Fuel Conversion	3	541	\$250,939
Steam Traps	3	244	\$66,164
Subtotal	61	2,684	\$1,141,885

ExCEL Energy Efficiency Projects in FY17			
Project type	Number of buildings implemented	GHG emissions prevented (metric tons CO <sub>2</sub> e)	Cost Savings
Install energy efficient showerheads	1	7.19	\$ 4,265
Install LED auditorium lighting	1	13.75	\$ 7,274
Install window A/C controls	1	78.23	\$ 41,375
Electric reheat via occupancy sensors	1	37.84	\$ 20,010
De-energize electric reheat coils	1	19.71	\$ 36,246
Install boiler feedwater treatment stations	1	151.71	\$ 43,317
Replace boiler feedwater pumps	1	439.6	\$ 67,990
Insulate steam boilers	Multiple	166.67	\$ 25,778
Optimize cooling systems	Multiple	114.99	\$ 65,049
Insulate steam boiler at K033	1	11.28	\$ 1,744
Insulate steam boiler at K304	1	34.41	\$ 6,356
LED lighting upgrade at K798	1	3.3	\$ 2,652
LED lighting upgrade at M440	1	6.86	\$ 5,895
Powertron treatment at M477 and X102	2	22.37	\$ 12,656
LED lighting upgrade at Q172	1	9.28	\$ 5,104
LED lighting upgrade at Q186	1	7.52	\$ 4,253
LED lighting upgrade at X876	1	2.85	\$ 2,291
LED lighting upgrade at K012	1	44.12	\$ 34,589
LED lighting upgrade at K660	1	12.51	\$ 7,877
Total	22	1184.19	\$ 394,721



## Energy Star Performance

Building Energy Star Scores						
Score	FY15		FY16		FY17	
	Number of schools	Percentage of school buildings	Number of schools	Percentage of school buildings	Number of schools	Percentage of school buildings
75 or higher	557	45%	659	52%	787	62%
50-74	384	31%	325	26%	250	20%
24-49	174	14%	154	12%	124	10%
24 or below	114	9%	96	8%	85	7%
No score available	6	1%	30	2%	26	2%
Total school buildings	1,235		1,264		1,272	

## Energy Competitions

Energy Competition Results					
Fiscal Year	Competition	Schools participated	Energy saved (kWh)	Emission reduction (metric tons CO <sub>2</sub> e)	Cost savings
FY16	NWF Cool Schools	13	327,856	84	\$ 52,457
	Solar One Energy Challenge	140	5,194,527	1,335	\$ 831,124
FY17	NWF Cool Schools	16	67,307	17	\$9,786
	Solar One Energy Challenge	126	1,464,054	376	\$ 212,873

## Demand Response Program

Demand Response Program Data Overview					
Fiscal Year	Schools enrolled	Capacity enrolled (KW)	Event length (hours)	Total energy saved (kWh)	Total cost saved
FY15*	101	7300	2 HR	29,903	\$4,784.52
FY16*	108	9750	2 HR	43,428.5	\$6,948.56
FY17	246	18755	23 HR	274,386	\$43,901.71

\*Data has been updated from previous reporting years due to the change from calendar year reporting to fiscal year reporting.

## PARTNERS

[Alliance for Climate Education \(ACE\)](#)  
[Billion Oyster Project](#)  
[Bronx Health Reach](#)  
[Bubble Foundation](#)  
[Cafeteria Culture \(CafCu\)](#)  
[Children's Environmental Literacy Foundation \(CELFL\)](#)  
[Climate & Urban Systems Partnership \(CUSP\)](#)  
[Citizens Committee of New York \(CCNY\)](#)  
[City Growers](#)  
[City Parks Foundation](#)  
[Clean Green Music Machine](#)  
[CORO](#)  
[Department of Sanitation New York City \(DSNY\)](#)  
[Earth Day Initiative](#)  
[Edible Schoolyard NYC](#)  
[Green City Challenge](#)  
[Green School Alliance](#)  
[Greening Forward](#)  
[GrowNYC Recycling Champions Program \(RCP\)](#)  
[Grow to Learn NYC](#)  
[Materials for the Arts \(MFTA\)](#)  
[Million Trees NYC](#)  
[National Wildlife Federation Eco-Schools USA](#)  
[NY Botanical Garden](#)  
[NY Sun Works](#)  
[NYC Department of Citywide Administrative Services \(DCAS\) – Energy Management](#)  
[NYC Department of Environmental Protection \(DEP\)](#)  
[NYC Department of Parks & Recreation](#)  
[NYC DOE – Office of School Wellness](#)  
[NYC DOE – SchoolFood](#)  
[NYC DOE – STEM](#)  
[NYC Department of Health and Mental Hygiene \(DOHMH\) – Healthy Living By Design](#)  
[NYC School Construction Authority](#)  
[NYS Department of Environmental Conservation \(DEC\)](#)  
[Power My Learning](#)  
[Queens Botanical Garden](#)  
[SIMS Municipal Recycling](#)  
[Solar One](#)  
[Teachers College, Columbia University](#)  
[United Federation of Teachers \(UFT\)](#)  
[Wearable Collections](#)

# POLICIES AND REGULATIONS

## Energy

**Local Law 84:** Requires owners of large buildings to measure (benchmark) energy consumption and submit the data to the city.

**Local Law 85:** Requires building renovation and alteration projects to meet New York City Energy Conservation Code (NYCECC).

**Local Law 86:** City-funded capital projects with construction costs of \$2 million or more must be designed to LEED Silver or higher ratings; projects with costs of \$12 million or more must reduce energy costs by 20-30% below ASHRAE standards.

**Local Law 87:** Buildings over 50,000 square feet or larger must undergo audits and retro-commissioning every ten years to determine energy consumption.

**Local Law 88:** Large non-residential buildings are required to upgrade lighting fixtures to NYCECC code and electrical sub-meters must be installed.

## Waste

**Local Law 41:** Outlines the recycling requirements for the Department of Education, including:

> All buildings owned and leased by the NYC Department of Education, including schools and administrative buildings are to recycle all recyclable materials.

> The chancellor must appoint a Director of Sustainability to oversee the recycling program, outline goals and policies to promote waste prevention, reuse, and recycling programs in all DOE Schools, charter schools, and other facilities and offices under their jurisdiction.

> All schools and administrative offices must prepare and submit a viable recycling plan, which at a minimum requires that every class have separate

and appropriately labeled bins for trash and 47 recyclable paper, and for school buildings to have recycling bins for metal, glass, and plastic materials as close to the school exit as possible without violating safety codes.

> The school principal or sustainability coordinator must participate in an annual survey conducted by the DOE Director of Sustainability; which helps review each school's and the City's progress on recycling activities.

> All primary and secondary schools that are not under the jurisdiction of the DOE, but receive department collection services must also appoint a Sustainability Coordinator and implement a waste prevention and recycling plan.

**Local Law 77:** requires the NYC Department of Sanitation to establish a voluntary residential organic waste curbside collection pilot program and school organic waste collection pilot program.

**Chancellor's Regulation A-850:** Outlines the roles of the CEO of Division of School Facilities (DSF), Director of Sustainability, Deputy Director of Recycling, Deputy Director of Energy, Principals, Custodian Engineers, and Sustainability Coordinators. All school building requests from the principal that would increase the energy consumption of the building must be submitted to the CEO of DSF, including equipment specific energy load information and how it complies with the energy conservation and reduction portion of the Sustainability Plan. Personal appliances that would unnecessarily increase school plug load, such as personal refrigerators and microwaves, are banned from DOE offices and classrooms.

> All school Principals must appoint a Sustainability Coordinator from the school staff. The Sustainability Coordinator cannot be the Principal or the Custodian Engineer.

## Green Procurement

**Local Law 118 (2005):** Mandated the creation of a Director of Citywide Environmental Purchasing to institute new purchasing standards as according to environmental guidelines. The Director must also update environmental legislative standards and submit an annual report on the City's purchasing of environmentally sound products.

**Local Law 119 (2005):** Reviews current usage of energy efficient merchandise and set the water and energy efficiency minimum standards for products purchased by the City.

**Local Law 120 (2005):** The law formed the standards for acquiring products comprising of hazardous materials, while also developing regulations on reducing the volume of hazardous materials produced from the goods purchased by the City. In addition to the hazardous materials policy, the law also mandates that the City set up a plan to reuse and recycle electronic goods.

**Local Law 121 (2005):** The law revised printer default settings for City offices to print double-sided, while also establishing the minimum recycled content standards for a number of goods set by the Federal Comprehensive Procurement Guideline.

**Local Law 123 (2005):** The law established that the City of New York develop a program to evaluate the practicability of green cleaning and implement a citywide green cleaning program by 2009.

**New York State Green Cleaning Law:** Enacted as Chapter 584 of the Laws of 2005, the State Green Cleaning Law requires elementary and secondary schools to obtain and utilize environmentally delicate cleaning and maintenance products. The New York State Office of General Services updated the law in 2010 to include state agencies and public authorities.



## METHODOLOGY

### Climate

To calculate greenhouse gas emissions, we examined energy bills received by the DOE. Electricity, natural gas and steam bills were obtained through the Department of Citywide Administrative Services (DCAS)'s online portal, EC3, under the assumption that all metered buildings were accurately reported and billed. Fuel oil and biodiesel was tracked through the number of orders placed in the Department of School Facilities' fuel tracking system, under the assumption that the amount of fuel ordered accurately reflects fuel usage during the year.

Greenhouse gases included in these calculations are carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O). Emissions factors for electricity and steam were obtained through the New York City Greenhouse Gas Inventory. Emissions factors for fuel oil and biodiesel were obtained through the U.S. EPA. They all were normalized into metric tons of carbon dioxide equivalent (CO<sub>2</sub>e), using Global Warming Potential (GWP) rates obtained through the World Resources Institute's Global Protocol for Community-Scale Greenhouse Gas Emissions Inventories.

The greenhouse gas profiles described in the Energy and Climate section refer to emissions from all buildings under DOE's operational control, meaning those under the supervision of a DOE Custodian Engineer and the Department of School Facilities.

### Energy

Energy data for electricity, natural gas and steam was obtained through DCAS's online portal, EC3, under the assumption that all metered buildings were accurately reported and billed. Fuel oil and biodiesel was tracked through the number of orders placed in the Division of School Facilities' fuel tracking system, under the assumption that the amount of fuel ordered accurately reflects fuel usage during the year. All energy data was converted into MBTUs for accurate comparison across energy types.

For energy efficiency projects, estimated energy, emissions, and cost savings were obtained through grant applications for ACE and ExCEL funding. Solar data was calculated based on capacity information and online dates provided by the DCAS Clean Energy and Innovative Technologies office. Demand response data comes from our program provider, NuEnergy, and energy competition information was provided by our partners at NRDC and Solar One.

## REFERENCES

- <sup>i</sup> <http://libertystreeteconomics.newyorkfed.org/2012/12/the-impact-of-superstorm-sandy-on-new-york-city-school-closures-and-attendance.html>
- <sup>ii</sup> [https://www.epa.gov/sites/production/files/2016-12/documents/electronic\\_products\\_generation\\_and\\_recycling\\_2013\\_2014\\_11282016\\_508.pdf](https://www.epa.gov/sites/production/files/2016-12/documents/electronic_products_generation_and_recycling_2013_2014_11282016_508.pdf)
- <sup>iii</sup> <http://www.nyc.gov/html/dcla/mfta/html/about/about.shtml>
- <sup>iv</sup> [SustainabilityReport201415\\_Final](#)
- <sup>v</sup> [http://www.nyc.gov/html/dep/html/press\\_releases/15-052pr.shtml#.WfUuBLpFxpZ](http://www.nyc.gov/html/dep/html/press_releases/15-052pr.shtml#.WfUuBLpFxpZ)
- <sup>vi</sup> [Annual Report 201516Final](#)
- <sup>vii</sup> [http://www.nyc.gov/html/dep/html/press\\_releases/15-052pr.shtml#.WfUuBLpFxpZ](http://www.nyc.gov/html/dep/html/press_releases/15-052pr.shtml#.WfUuBLpFxpZ)
- <sup>viii</sup> [https://www1.nationalgridus.com/files/AddedPDF/POA/NGrid%20Commercial\\_Direct\\_Install\\_Trifold\\_Brochure.EE5793.pdf](https://www1.nationalgridus.com/files/AddedPDF/POA/NGrid%20Commercial_Direct_Install_Trifold_Brochure.EE5793.pdf)
- <sup>ix</sup> [SustainabilityReport201415\\_Final](#)
- <sup>x</sup> <https://www.grownyc.org/grow-to-learn>