DRIVING ZERO WASTE FORWARD IN NYC PUBLIC SCHOOLS

THE EARTH INSTITUTE & SCHOOL OF PROFESSIONAL STUDIES
M.S. IN SUSTAINABILITY MANAGEMENT
FALL 2018 CAPSTONE PROJECT

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This report was prepared by graduate students from Columbia University’s Masters of Science in Sustainability Management co-sponsored by the Earth Institute and the School of Professional Studies.

The capstone workshop is a client-based consulting project that students undertake to address critical sustainability management issues. The workshop is designed to integrate the program’s distinct curriculum areas, including: integrative sustainability management, economics and quantitative analysis, environmental sciences, public policy and general and financial management.
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The team members of the Fall 2018 Sustainability Management Capstone would like to thank the New York City Department of Education’s Office of Sustainability for the opportunity to contribute to Zero Waste efforts through this report. Marisa Kaminski, Kathy Corradi and Meredith McDermott were enthusiastic partners and shared their time and expertise generously throughout this entire project.

We are grateful to the numerous subject matter experts who shared their knowledge and experience, enriching our understanding about sustainability within the NYC Department of Education as well as offering perspectives about research and analysis: Professor Oren Pizmony-Levy, Carine Verschueren, Erika Kessler, Melissa Mitchem and Raquel Vigil from Teachers College Columbia University, Professor Josh Fisher from Columbia University, Kevin O’Sullivan and Jennifer Kline from the NYC Department of Sanitation, Justin McAmmond from GrowNYC, Minelly De Coo from the NYC Office of the Deputy Mayor of Operations and Gillian Mollod from Columbia University.

We’d like to express a very special thanks to our faculty advisor Thomas Abdallah, whose support, insight and enthusiasm throughout the semester was greatly appreciated and made a difference.

Finally, we extend a heartfelt thanks to the teachers, sustainability coordinators, custodial engineers and principals who took the time to speak with us or complete our survey. Your contributions were valuable and insightful.
EXECUTIVE SUMMARY

In 2015, Mayor Bill De Blasio established a zero waste goal for New York City, joining other major U.S. municipalities in the fight against waste and consumption. Building on the work of past administrations, this goal is part of the city’s long-term strategy, titled “One New York City: The Plan for a Strong and Just City” (OneNYC). If this ambitious goal is achieved, it would mean diverting at least 90% of waste from landfill by 2030, from a 2005 baseline (The City of New York, 2018). Eight initiatives within OneNYC were introduced to support this goal, one of which includes making New York City public schools zero waste by 2030.

One of the first steps taken by the NYC Department of Education’s (DOE) Office of Sustainability (“the Office”) was to launch the city-mandated Zero Waste Schools (ZWS) program in 2015. This program is an inter-agency collaboration between the DOE, the NYC Department of Sanitation (DSNY) and the environmental nonprofit GrowNYC. One hundred and nine New York City public schools located in Manhattan, Brooklyn and Staten Island were selected to achieve zero waste within 5 years, by 2020.

The long-term goal is to take best practices from the pilot Zero Waste Schools and expand them to include all schools. The Office is continually investigating zero waste opportunities that can make an impact with the largest number of schools. Toward this effort, it recently launched three opt-in initiatives designed to build on the momentum of the city-mandated ZWS program. These initiatives include: Race Against Waste, Sustainable Schools Certification, and Zero Waste Pledge Schools. These programs offer multiple features and incentives for engaging more students and staff in zero waste activity.

The Office tasked the Capstone project team with interviewing program participants and developing diagnostic recommendations for zero waste expansion within the NYC public school system. For the three new Zero Waste opt-in programs, the Office wanted to know: What motivates participation? What challenges or obstacles do participants deal with? What program elements show potential for expansion throughout the school system?

Consuming less and recycling are not rocket science. But expanding zero waste throughout the NYC school system is no simple feat. The NYC public school system is the largest in the nation, comprised of over 1.1 million students, 140,000 employees and 1,843 schools across 5 boroughs. The sheer scale of the system, coupled with competing priorities and interests among students and staff, present a challenge for implementation and data collection.

After surveying participants, we found that increasing the ease through which sustainability and zero waste is incorporated into existing practices and curriculum to be critical. Our five recommendations were developed with the goal of heightening accessibility to information and building community within Zero Waste programs.

Recommendations include:
- New topic ideas for sustainability trainings
- Expanding the reach of surveys
- Piloting a sustainability committee
- Defining useful metrics & reporting
- Creating a website for DOE Zero Waste and sustainability activity

Achieving zero waste in New York City within the next eleven years will require future public policy that supports rapid expansion and compliance. We hope our project findings advance DOE and citywide zero waste goals but also bring about real change in how over a million students and staff, along with their families and communities, tackle the problem of waste and consumption.
GLOSSARY

**EPA**: United States Environmental Protection Agency

**Diversion rate**: The amount of waste diverted from landfill through recycling and composting.

**DSNY**: New York City Department of Sanitation

**NYC DOE**: New York City Department of Education

**OneNYC**: New York City Mayor Bill De Blasio’s long-term strategy for the city, focusing on five key areas: Growth, Equity, Sustainability, Resiliency and Diversity & Inclusivity.

**SIS**: Service in Schools. A partnership between NYC Service and the NYC Department of Education that promotes community service in schools.

**Solid Waste**: Discarded or abandoned materials (garbage or refuse) resulting from community activities or industrial, commercial, agricultural and mining operations.¹

**Sustainability**: Managing the availability of natural resources by present generations in a way that does not compromise the ability of future generations to meet their needs.²

**SY**: School Year

**Waste Stream**: Beginning at a domestic or industrial source, a waste stream is the flow of waste through to its recovery, recycling or final disposition.³

**Zero Waste**: Converting waste streams into valuable resources through reducing, reusing, and recovering waste, with zero solid waste sent to landfills over the course of a year.⁴

**ZWS**: Zero Waste Schools


INTRODUCTION
PROJECT SCOPE

The aim of this project is to develop recommendations for the DOE’s Office of Sustainability that support expansion of Zero Waste programs in NYC public schools. Achieving zero waste in the next five years is a mandate for 109 New York City schools and remains optional for a remaining 1,734 schools within the system. The Office recently initiated three zero waste opt-in programs with the goal of increasing citywide participation in zero waste. These programs are:

- Race Against Waste (launched SY 2017-18)
- Sustainable Schools Certification (launched SY 2018-19)
- Zero Waste Pledge Schools (launched SY 2018-19)

Race Against Waste, Sustainable Schools Certification and Zero Waste Pledge Schools provide different opportunities for schools to get involved, depending on features or incentives that interest them. The Office is continuously interested in what motivates participation in zero waste programs in order to strengthen future program design and growth.

For this project, the Office of Sustainability enlisted the assistance of our project team, 8 graduate students in Columbia University’s Master of Science in Sustainability Management program, to analyze and deliver a report with actionable recommendations. Recommendations were developed using information from survey results completed by program participants. They build on existing DOE programs, with the goal of being feasible to execute within the Office’s current budget and staff size. Although our sample size was small, participants had specialized knowledge based on their experience with these programs. Interesting points made by participants and trends that we observed in survey content informed our recommendations.
CLIENT PROFILE

The Office of Sustainability aims to integrate sustainability citywide at the DOE and to create a model for school systems around the country. Currently comprised of 20 staff members, this team is responsible for maintaining compliance with city policies and driving efforts in five key areas: energy and climate, waste, water, green infrastructure and environmental education.

CLIENT BACKGROUND

In response to an increasing number of local laws and policies, the Department of Education’s Office of Sustainability was established in 2009 (Office of Sustainability Annual Report, 2017). The Office oversees an array of initiatives that align with DOE and municipal sustainability targets. The Office also partners with over 50 nonprofit and public organizations in the management and execution of school sustainability programs.

The Sustainability Coordinator is a key role in executing sustainability within NYC schools. Local Law 41 “Recycling Practices,” Local Law 22 “New York City Climate Protection Act,” and Chancellor’s Regulation A-850 informed the creation of this position. This role manages the implementation and reporting of school sustainability practices and encourages student engagement in green initiatives.

It is an unpaid role but required of every school, often taken on by teachers as an additional responsibility. It is selected annually by each school’s principal, with a minimum tenure of one school year. Sustainability Coordinators develop an annual sustainability plan and work with students and school staff -- often in the form of student-led Green Teams -- to implement goals over the school year.

The Office is a key partner to Sustainability Coordinators as it facilitates many different sustainability trainings throughout the year. It also distributes the Annual Sustainability Coordinator survey that results in future program improvements.

The Office of Sustainability includes nine Zero Waste Coordinators, who directly engage with schools on issues related to waste and recycling. Zero Waste Coordinators help troubleshoot with Custodial Engineers, Sustainability Coordinators and other staff to improve recycling and waste reduction strategies (Office of Sustainability Annual Report, 2017).
The Zero Waste International Alliance describes zero waste as the approach through which resources can be reclaimed for social and economic benefit and promotes alternatives to landfill and incineration (Zero Waste International Alliance, n.d.). According to the U.S. Environmental Protection Agency’s Waste Management Hierarchy, source reduction (i.e. avoiding consumption in the first place) and reuse are preferred methods for reducing waste. The next approved methods are recycling and composting. Treatment and disposal are listed as final options (EPA, n.d. a.).

It’s worth noting that the terminology “zero waste to landfill” and “zero waste” are distinct. Reducing the amount of solid waste that goes to a landfill or an incinerator is critical. Disposal technology such as Waste-to-energy (WTE) incineration still destroys materials and doesn’t conserve natural resources or decrease waste (Lombardi, 2016). Our modern, globalized society is inherently wasteful. Even if fewer sodas and snacks in plastic packaging are consumed from school vending machines, there are still negative externalities and embodied energy associated with these products. As zero waste programs expand, it is important to incorporate lessons and definitions of zero waste that account for the far-reaching impacts of consumption.

The Office is committed that New York City schools achieve OneNYC’s goal of at least 90% diversion of waste from landfill by 2030, focusing on source reduction through education, composting and recycling.
To better understand zero waste within the New York City public school system, it’s necessary to contextualize these efforts within the larger citywide goals. New York City generates more solid waste than any other city in the world, generating 14 million tons of waste annually across sectors (PlaNYC, 2011). It has a recycling rate of about 17%, which is half of what it could be (GrowNYC, n.d.). Megacities such as New York City are home to more than half of the world’s population and produce nearly 13% of global waste (Kennedy, et al., 2015), so cities present an opportunity in developing and leading zero waste programs.

New York City’s OneNYC ambition to become a global leader in solid waste management would end the need for out-of-state landfills, reduce traffic congestion, associated carbon emissions from truck usage, improve air quality and save on the city’s expenses (C40 Cities, 2015). The city measures progress of Zero Waste through two OneNYC indicators for DSNY: reducing the volume of collected refuse and increasing curbside and containerized diversion (The City of New York, n.d.). Along with making public schools Zero Waste by 2030, the city launched the following initiatives to reduce the amount of waste generated and increase collection services among New Yorkers:

- Expand organics collection, sorting and processing to residents in all five boroughs by 2030.
- Decrease the use of non-compostable waste, such as plastic bags.
- Offer curbside single-stream recycling by 2020.
- Develop an equitable save-as-you-throw waste program to engage all residents in waste reduction while expanding markets for recycled materials.
- Incorporate recycling into all New York City Housing Authority (NYCHA) buildings and ensure public housing is compliant with recycling laws.
- Expand opportunities to reuse and recycle textiles and electronics.
- Reduce commercial waste disposal by 90 percent by 2030 through a variety of new program and mandates (New York City Mayor’s Office of Sustainability, n.d.).

**Z E R O W A S T E N Y C**

Along with making public schools Zero Waste by 2030, the city launched the following initiatives to reduce the amount of waste generated and increase collection services among New Yorkers:
Zero Waste - NYC Department of Education

All New York City schools are required to recycle. The Zero Waste School program seeks to divert all waste from landfill from 109 selected schools within five years through education, recycling and composting programs. It is the largest school waste diversion effort in the country (DOE Office of Sustainability, 2017). The ZWS program provides concentrated outreach and operational attention to the 109 pilot schools, documents best practices, works to bring about behavioral change and advances a culture of recycling and sustainability.

For the first time since 1990, a 2017 DSNY Waste Characterization study re-established a citywide baseline for school waste composition. It confirmed “schools have the potential to divert as much as 86% of their waste for recycling or composting through DSNY curbside collections” (NYC Sanitation, 2017). In SY 2016-2017, participating Zero Waste Schools achieved a waste diversion rate of 60%, redirecting over 15,000 tons of waste from landfill through recycling and composting (Office of Sustainability Annual Report, 2017).

One challenge for the Office in expanding zero waste programs throughout the DOE is the fact that the DOE is not a regulatory agency and cannot enforce compliance. Another challenge is the lack of information the Office has about program experience. Often what is available is largely anecdotal and is not collected regularly or systematically. For these reasons, gaining a deeper understanding of what inspires ongoing participation is central to the mission of the Office.
Based on available statistics, public schools appear to contribute a relatively small percentage of waste compared to other sectors in New York City (PlaNYC, 2011). Yet, the population of over one million students and DOE employees, along with their families and communities, offer a large population with great potential for education and transformation. The current and future influence of young people is vital to citywide Zero Waste initiatives.

Tracking the extent of waste production in NYC schools is difficult. This is in part due to the logistics of waste collection (Kaminski, 2018 & O’Sullivan, 2018). Schools with organics collection -- currently 725 schools, called “Organics” -- have solid waste that is picked up by trucks that also collect residential waste. Residential and school trash is therefore mixed together and solid waste contributions from schools cannot be weighed separately. The remaining 1,118 schools (called “Traditional” schools) have school-only trucks for waste collection and can therefore be accurately weighed in terms of the amount of solid waste they produce (Kaminski, 2018). DSNY states that schools produce more than 40,000 tons of solid waste annually (DSNY, NYC DOE, & GrowNYC, 2016). How much more than 40,000 tons is produced by schools annually is unclear.

The total amount of recyclables schools divert from landfill is easier to discern. This is because recycling and composting is collected by school-only “split-body” trucks. In SY 2016-2017, the 109 Zero Waste Schools (or 6% of total NYC public schools) diverted 15,000 tons of waste from landfill through recycling and composting efforts (Office of Sustainability, 2017). This amount, however, is nearly 38% of 40,000 tons (total annual waste produced by NYC schools) which highlights that schools likely produce much more waste than 40,000 tons, but logistical challenges exist in accurately measuring this information (See Appendix 5).

“Young people and public schools are two of our best partners in creating a sustainable New York. Students are the future of our city, and they have some of the most creative recycling and sustainability ideas”
- New York City Department of Sanitation Commissioner Kathryn Garcia (Waste360, 2018).
ZERO WASTE PROGRAMS
1. **Race Against Waste**

The Race Against Waste (RAW) program began in SY 2017 as a joint initiative between Service in Schools (SIS) program and the Office of Sustainability. It is an after-school program for teams of 15-30 students and is co-led by two teachers.

- RAW teams meet weekly from December through May (approximately 15 meetings for the program’s duration).
- Each RAW Team will plan, carry out, and document a service-learning project that serves a community need while learning from experts in the field of waste reduction.
- Teachers apply to present each team’s initiative at the Sustainability Showcase Expo event in May, which gives student representatives a chance to present their work to a wide audience of educators, students and other stakeholders.
- RAW teams are encouraged to track metrics around waste (for example, through the use of periodic waste audits).

The program can be used to launch a new Green Team (which are student-led school sustainability teams) or to extend the work of an existing Green Team to include a service-learning project targeting waste reduction in NYC. The SIS team conducts outreach to schools through targeted emails, social media, and intra-office communications to promote the program. Sixteen member schools completed the program in SY 2017-2018.

Teachers have an added incentive to be involved. On school days, the RAW program will cover the cost of per diem substitute coverage for all teachers in attendance. Participating teachers are eligible to receive up to 20 hours per session for time spent outside of regular school hours planning for and facilitating the after-school club.
2. SUSTAINABLE SCHOOLS CERTIFICATION

The Sustainable Schools Certification program aims to recognize a school's sustainability efforts and incentivize improvement of its sustainability performance by awarding a certification in one of three levels: gold, bronze and silver. To participate in this program, schools need to fulfill several criteria: designate a sustainability coordinator, complete an annual Sustainability Plan, establish a Green Team, attend at least one DOE sustainability training and submit an application for the annual Office of Sustainability Showcase Expo.

Schools receive a checklist organized by eight different categories: community outreach & school culture, education, energy, gardening, student leadership, water & green infrastructure, wellness/healthy schools and waste & recycling. Each checklist outlines specific actions that schools can complete in each category and updates to the checklist can be added to the Office's Google Classroom link. Examples of actions include the publication of a sustainability pledge poster, the integration of sustainability content into different grade levels, the implementation of energy and waste audits and establishing on-site composting.

Once schools upload evidence of implementation, a designated person from the DOE evaluates how actions demonstrate the required criteria and defines which level of certification the school should receive. Certification levels are determined by how a school fulfills requirements in each of the eight categories and the number of "innovation points" demonstrated by each school. As compensation for their efforts, schools receive a building walkthrough with a sustainability specialist from the DOE office, access to resources, and a medal certification that can be displayed in their facility.

This program is currently in a pilot stage that began October 1, 2018 and continues through April 1, 2019. During this period, schools have six months to perform and collect evidence of actions outlined in the checklist. The DOE will then have one month to review the information, determine points for the school and award the appropriate medal.
3. ZERO WASTE PLEDGE SCHOOLS

The Pledge School program provides an opportunity for any school to become a Zero Waste school. Pledge Schools were designed as an opt-in initiative to expand the number of Zero Waste Schools and to provide interested schools with the support needed to achieve this goal. It’s an opportunity to be an early adopter of an ambitious program and to be recognized citywide for waste reduction efforts. Schools that join the Pledge School program are offered the following incentives:

- Recycling infrastructure (bins and signage)
- Green Team swag (such as t-shirts)
- Recognition for being a Zero Waste School

Phased roll out allows schools to build behaviors among teachers, custodial engineers, students and parents, all of whom are critical to making a Zero Waste School self-sustaining. At the end of the initiative, the school receives the Zero Waste School status. The first cohort of Pledge Schools was accepted in November 2018.

Table 1
Timeline and activities for Zero Waste Pledge schools:

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<th>COMPONENT</th>
<th>DEADLINE</th>
<th>ACTIVITIES</th>
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<tr>
<td>Completed application</td>
<td>October 26th, 2018</td>
<td>- Signed and returned</td>
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<tr>
<td>Pledge Agreement</td>
<td>November 9th, 2018</td>
<td>Presence at the training</td>
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<tr>
<td>Required Training for Pledge School Representative and Custodial Engineer</td>
<td>November 16th, 2018</td>
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<tr>
<td><strong>Phase 1</strong> Benchmarks: Getting Started</td>
<td>December 19th, 2018</td>
<td>- Conduct Bin Inventory</td>
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<td></td>
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<td>- Set up cafeteria stations</td>
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<tr>
<td></td>
<td></td>
<td>- Complete cafeteria stations</td>
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<td></td>
<td></td>
<td>- Conduct kickoff meeting</td>
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<td></td>
<td></td>
<td>- Conduct operational check in with Custodial staff</td>
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<td></td>
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<td>- Form/continue a Green Team</td>
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<td><strong>Phase 2</strong> Benchmarks: Plan for Success</td>
<td>March 15th, 2019</td>
<td>- Conduct Waste investigation</td>
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<tr>
<td></td>
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<td>- Implement a monitoring system</td>
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<td></td>
<td></td>
<td>- Educate students and faculty</td>
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<tr>
<td><strong>Phase 3</strong> Benchmarks: Beyond the Bin</td>
<td>May 10th, 2019</td>
<td>- Engage school community in zero waste efforts</td>
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<td></td>
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<td>- Create plan for next year</td>
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METHODOLOGY
OVERVIEW

To develop recommendations for expanding zero waste programs in the NYC DOE, our project team focused on gaining a better grasp of existing sustainability programs within the DOE as well as New York City. To achieve this, our team conducted research, spoke to subject matter experts, attended events, and distributed surveys to participants involved in Race Against Waste, Sustainable Schools Certification and Zero Waste Pledge Schools.

RESEARCH & DATA COLLECTION

Desktop research was conducted about the history and current state of the DOE’s sustainability efforts, the role of nonprofits and public agencies in supporting and disseminating sustainability education within the school system and the logistics of waste management in New York City.

We spoke with staff members at the DOE Office of Sustainability, the DSNY Bureau of the Recycling and Sustainability, GrowNYC, and Teachers College Columbia University to gain more knowledge about existing programs. Our project team attended two events about DOE sustainability. The first event was hosted by Teachers College and the second by the Office of Sustainability; each event allowed us to observe first-hand how trainings are delivered and goals are communicated among stakeholders.

CASE STUDY ANALYSIS

We also examined case studies on sustainability and zero waste practices in other U.S. and international school systems. Given the scale of the NYC school system, there are challenges to benchmarking NYC with other systems. The second largest school system in the U.S. is Los Angeles, at 640,000 students (LAUSD, n.d. a). In total, we looked at six case studies, including programs in major US cities such as San Francisco, Los Angeles and Washington, D.C. (see Appendix 3). These offered perspectives on how other cities have attempted to scale zero waste initiatives and allowed us to gather fresh insights into how cities implement zero waste programs and tackle associated challenges.

In one case, we examined a study from the University of Edinburgh, Scotland, that similarly sought to understand motivations for recycling among stakeholders on the university campus. Scotland has established a target of achieving a 70% waste diversion rate by 2025. The school system is working under the same motives as the NYC DOE in achieving an eventual municipal zero waste goal. The case study offered a framework for understanding the relation between human behavior and waste, but also emphasized the need for feedback from a larger pool, more involvement and connectivity between stakeholders.
Obtaining regular information through interviews and surveys about participation in DOE sustainability initiatives continues to be a challenge for the Office, so our surveys provided material to learn more about participant motivations. Our project team and partners at the Office of Sustainability began this process with the assumption that certain constraints would inevitably shape the amount and quality of information we could collect and analyze from program participants.

The surveys we used were comprised of open-ended questions aimed at eliciting a broad range of answers about motivation, challenges and best practices (see Appendix 2). Surveys were tailored to different stakeholders (such as teachers or sustainability coordinators), because certain positions are often more involved in the details of program implementation than others. Although telephone or in-person interviews were considered optimal for getting a deeper view of participant motivations, the majority of responses were through written surveys, sent via email. A few program participants who we spoke with requested confidentiality, so we elected to keep survey results anonymous to encourage candid sharing of experience.

Responses were uploaded into the qualitative software Nvivo and coded for content. Four members of the Columbia project team read through all responses and highlighted relevant themes. A word frequency analysis was used to identify possible trends and the processes we used supplied helpful insights that guided analysis.

PROGRAM STAKEHOLDERS

Given the relative newness and of these programs, our contacts were people who had first-hand knowledge about the initial roll out and were often leaders in shaping the programs in question. Program participants were comprised of Teachers, Principals, Custodial Engineers and Sustainability Coordinators. We also contacted staff members from the Office of Sustainability, including Zero Waste Coordinators and Program Managers who were directly involved in program development.

Formally interviewing students, unfortunately, was beyond the scope of this project. Students should be considered the most important stakeholder group as their inclusion and leadership is vital to affecting change in schools and within families and larger communities. Empowering students in zero waste will help foster current and future sustainability leaders.

We did speak to a few parents who have children in the New York City school system and it should be noted that parents can play an important role in driving zero waste and sustainability initiatives through supporting activities at home and volunteering. An analysis of parent perspectives, however, was not possible within the scope of this project.

SURVEYS & INTERVIEWS

Obtaining regular information through interviews and surveys about participation in DOE sustainability initiatives continues to be a challenge for the Office, so our surveys provided material to learn more about participant motivations. Our project team and partners at the Office of Sustainability began this process with the assumption that certain constraints would inevitably shape the amount and quality of information we could collect and analyze from program participants.

The surveys we used were comprised of open-ended questions aimed at eliciting a broad range of answers about motivation, challenges and best practices (see Appendix 2). Surveys were tailored to different stakeholders (such as teachers or sustainability coordinators), because certain positions are often more involved in the details of program implementation than others. Although telephone or in-person interviews were considered optimal for getting a deeper view of participant motivations, the majority of responses were through written surveys, sent via email. A few program participants who we spoke with requested confidentiality, so we elected to keep survey results anonymous to encourage candid sharing of experience.

Responses were uploaded into the qualitative software Nvivo and coded for content. Four members of the Columbia project team read through all responses and highlighted relevant themes. A word frequency analysis was used to identify possible trends and the processes we used supplied helpful insights that guided analysis.
PARTICIPANT OVERVIEW

We contacted participants from 120 schools and received surveys from 25 participants, for a response rate of 21%. Survey participants work in 20 different schools in Brooklyn, Manhattan and Queens. Of the 25 responses received, 10 had participated in Race Against Waste, 6 in Sustainable Schools Certification and 9 in Zero Waste Schools.

One challenge to Zero Waste Pledge Schools in particular is that participants in this program were selected partway through the semester (in November 2018). We did speak to a Program Manager and Zero Waste Coordinator involved in the Pledge School roll out to collect initial feedback. We also spoke with faculty that belong to existing Zero Waste Schools. Although their school participation was mandated (and therefore intrinsic motivation may not have played a role in their engagement), we nonetheless gleaned insight into best practices and challenges they’ve faced.

Graph 1 illustrates who we received responses from by percentage. Table 2 shows the number of responses received from each program and the position and location of respondents. All Program Managers and Zero Waste Coordinators are DOE Office of Sustainability staff and are listed as being in Queens (given that is where DOE offices are).

Table 2

Responses by program, position and location

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Graph 1

Percentage of responses by role
RESULTS OVERVIEW

The benefit of our survey design lies in the collection of specialized knowledge from program participants and where possible, analysis of patterns that emerged.

There are a few limitations to our study results worth noting. For example, our survey sample size was small and the 21% response rate attests to the many competing priorities faced by DOE employees. In addition, some respondents provided very thorough answers, while others were vague or less specific in what they wrote. In some instances, respondents did not answer all survey questions. Due to time constraints, our team was not able to follow up with respondents when further clarification would have been useful. Compared to multiple choice or rating-scale questions, our project team and the Office of Sustainability felt open-ended questions would provide more valuable information about program experience. This meant that results required qualitative analysis which is subjective and can be time-consuming.

Within a semester time frame, our analysis was limited to larger trends among respondents versus more detailed explanations, such as how roles or locations may shape participant views. Partway through our semester, our team decided certain questions should be rephrased to elicit more detailed information. Although many interesting perspectives were gathered, all of these factors made systematizing content challenging.

The following pages present eight topic areas that were examined in surveys and interviews, a brief summary of findings, and a sampling of quotes from participants related to each topic.
**MOTIVATIONS**

Participants were asked what inspired their participation in zero waste programs and what they considered to be intrinsic and extrinsic motivating factors. Several shared their desire to empower students to make a difference in their communities. Others wrote that zero waste programs were a natural fit within their teaching subject area. They felt passionately about the topic and wanted to spread this knowledge. The quality of sustainability and zero waste training offered to DOE employees by the Office of Sustainability was also an incentive for participating.

"I wanted to expand the school community’s participation in recycling and sustainability efforts ... [and] develop [student] leadership skills."

"...my motivation was to see the impact of helping students become advocates in their community."

"The students were highly motivated to conduct in-class recycling bin usage audits, develop and perform a skit to educate the school community and observe community needs on a neighborhood walk."

"Specific aspects that motivated my participation was being able to get hands on training. I feel that others were motivated by gaining more knowledge on how to better serve our students. The environment is something that I feel strongly about and I feel my students need to become aware."

"For the Sustainable Schools Certification Program, I have found that schools are motivated by the list of sustainability related actions they can take. It’s a clear goal, with defined rules, and allows some flexibility with ‘innovation actions.’"

"This Pilot program (which first of all, seems amazing) was a way to further the school’s effect on the environment. Simply put, I felt that this would get the principal on board and then maybe I would get more support."

"The checklist of actions that could be completed gave realistic ways to start getting staff on board with doing this, and ways to show how it can connect to what students are learning."

"I have a background in childhood science and environmental studies and felt a natural inclination to be part of sustainability since its beginning in NYC."
“Since NYC is so large, having everyone on board is going to be extremely difficult. Having different programs that encourage interdisciplinary teams such as teachers, students and custodial staff will help provide everyone with accountability.”

“Schools would need to provide the teachers with a dedicated period to do this work with students during the school day. We conducted our program after regular school hours. Sometimes students could not stay after school. It was tiring for the teachers as well.”

“Having professional development for sustainability coordinators AND administration could lead to a better flow of information into schools.”

“There isn’t enough time in the day to teach a curriculum based around sustainability. It needs to be squeezed in, and many projects are done during my personal time...”

“People in the school feel that all sustainability related things are the responsibility of the coordinator and not on the whole staff.”

“I just think that incorporating this into the curriculum is hard at the high school levels when most classes are working towards tests. And one or two lessons is not enough to effect real change.”

“Time to work on a project after school since the school day is very busy and it is harder to get students together because we either have to pull them out of class or use lunch time (both ours and theirs).”

“I think time and stakeholder investment are the biggest obstacles schools face. There is a lot that is asked of participants in the certification program, and most participants are full time teachers, with lunch and maybe a prep period during the day. Their schedules are already incredibly busy, and they are trying to make time for this initiative because they care. It is also hard at times to inspire others in the building to perform at their level.”

“Teachers who chose to focus on school-based waste issues often were confronted with administrative and/or custodial challenges that went beyond the scope of what their students could accomplish.”

**Obstacles and Misconceptions**

Time and effort are required to work on sustainability and zero waste initiatives and is often done on top of full time duties. Sometimes teachers are allotted extra time but often this work is completed after school, on teachers own time without additional compensation. It is understood that zero waste and sustainability lessons are important but they can occur as extraneous to existing activities or lacking a clear pathway for integrating into curriculum. In addition, sustainability efforts are sometimes viewed as the job of only the Sustainability Coordinator versus the entire school community.
Even though Race Against Waste, Sustainable Schools Certification and Zero Waste Pledge Schools are relatively new programs, we asked participants what achievements they had witnessed so far. Some respondents expressed that education and training have increased ownership among students and teachers alike in recycling and that waste reductions efforts had improved. Students are educating other students through presentations, workshops, and by being lunchroom monitors. Students are also given opportunities to speak to wider audiences, such as the Office of Sustainability Showcase. This develops public speaking and leadership skills among students, which is considered an important achievement by program participants.

"I have students who have graduated and gone on to be environmental activists in their high schools. Students have told me my course has motivated them in careers. This year, there seem to be more students who are concerned."

"I have my students select an environmental problem to solve. They research the problem and create a solution to educate their targeted audiences. Then, in January the students have to reassess the efficacy of their solutions. Students want to save the world so any opportunities that get them closer is exciting."

"This is a new program but I think getting roughly 200 schools to fill out the interest form [for ZW Pledge Schools] is a great accomplishment. Especially since these schools were not schools we always interact with."

"I have seen conversations sparked, and targeted goals set to achieve gold [for Sustainable School Certification]. Many people are trying to go for gold. Whether or not that’s feasible, it is still challenging them to do more than they may have before."

"Students became more engaged in school and enjoyed educating and performing for the school community."

"My RAW team delivered bins to all classrooms and educated students on how to use them. I can see a difference this year in how they are being used. I consider that to be an outstanding achievement."

"Student representatives from each Green Team presented their work to a wide audience of educators and other stakeholders at the Office of Sustainability’s Showcase and Expo. In feedback surveys, participating teachers expressed that the program led their students to take greater ownership over waste issues and that the resources provided were helpful."

"Students are really invested and want to make a difference."

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**Drivers of Success**

Gaining buy-in and collaboration among key stakeholders such as school administration, custodial engineers and students is an important driver of success. Custodial engineers (who provide necessary logistical support) and school administration are partners that can determine how much traction a program makes. Incentives like awards and public acknowledgement make a difference with school zero waste and sustainability efforts.

“The drivers of success for zero waste programs are the same drivers that contribute to any successful program in NYC schools: administration and staff buy-in, student engagement through curriculum that has real-world application and draws on their interests, and the logistical savviness of the program participants. Additionally, I believe wide scale policy changes need to be in place for zero waste initiatives to move beyond small groups of committed individuals and become a way of life for New Yorkers.”

“Getting the students on board is important as they will be the change agents, holding the adults responsible, and hopefully spreading the message to their parents and future homes.”

“Coordinating key players like the custodial staff and the kitchen staff. Having leadership on board helps, as I can motivate people and let them know this is important.”

**Programs Areas of Improvement**

Potential areas of improvement shared by participants include: education for school administrators about how to more effectively support and acknowledge the work of zero waste and sustainability initiatives; finding ways to increase the organization of resources and tools; and effectively sharing sustainability in ways that engage more people. Similar to program drivers of success, structures that help to develop partnership among other school stakeholders is identified as needing improvement.

“We have been working very hard to do this, but it’s important to continue to expand our reach and include people who may not originally be drawn to sustainability and explain it in a way that inspires them.”

“It would be helpful to have a required meeting with administration or a member of the custodial staff for them to understand initiatives better.”

“There are many aspects to this program and a more organized presentation may be necessary so as not to make others feel overwhelmed by so many differentiated ideas being ‘thrown at them.’”

 “[In terms of feeling recognized] Yes. I do...from the Office of Sustainability, but not from my administration. I feel like I’m just a checked box to them...‘oh, we need a Sustainability Coordinator...oh, great...we have one. Done.’”

“I have no input in school curriculum but I think it must be ... mandatory for staff and kids.”
Participants revealed a multitude of methods for tracking performance. Some use tools such as Google Forms, Microsoft Excel, Facebook groups or keep checklists, logs and take pictures. Others have thought about tracking performance but are uncertain about what to use and some respondents don’t do anything yet to measure results. Given the variety of answers provided on this topic, there is an opportunity to establish best practices so that classrooms and schools are speaking the same language in terms of metrics and methodology.

“I would like all schools to conduct periodic waste audits as well as a survey of relevant stakeholders on attitudes and practices before and after their Green Team has implemented their zero waste initiative. Google Sheets/Forms or Excel would suffice for this work.”

“Yes, google classroom. Not sure what else is available!”

“Our crew created a “Scorecard” that the teachers can use as a planning document for program success for the Sustainable Schools Certification Program. It is an excel sheet that calculates the points they need to achieve their level based on which actions they marked as completed.”

“Schools track student attendance at Green Team meetings and are encouraged to track metrics around waste (e.g. through periodic waste audits)...”

“We will be doing waste audits, but they are mostly anecdotal data not systematically collected data...”

“We use the student collected data to track their work. We usually use a tally but have not yet used excel.”

“Schools in the pledge program are self-reporting on the Zero Waste Schools website (they have to complete benchmarks within three phases throughout the year).”

“[Am I tracking methods] For Zero Waste? No. Yes, there are tools I would like to have. At the Taconic Outdoor Environmental Center, the fifth graders were given information on food waste daily (and liquid waste too).”

“No, I do not track the performance at this point.”

“The students are supposed to be keeping a record of the station scores but I am not sure if that has happened.”

“So many moving parts right now, it’s not very organized. Was considering Asana but it’s taking time to add tasks, and there’s a 15 person limit. Also the other teachers may not be on board. So, there’s tons of room for improvement.”

“We took surveys and conducted recycling bin audits on paper and took photos.”
Participants were asked how they learned about the Office of Sustainability, if they knew about the support and resources offered, and what improvements could be made in the future. In general, responses about support from the Office were enthusiastic. Sustainability trainings and newsletters provided by the Office are welcome and provide an opportunity to stay abreast of programs, point-people, and what sustainability-related initiatives are taking place within schools.

“I think that more people should be exposed to the work that is going on through the Office of Sustainability so that [it’s] not just Coordinators or those searching for these types of extensions. [Others] could understand not only [about] their work, but how it is connected to their own lives and the city that we live in.”

“The resource portal with ideas and lessons is helpful so that schools feels like they are supported in the endeavor.”

“The people in the office care and are working hard to get the kids, staff and parents to follow these new steps for a cleaner future but there isn’t enough enforcement.”

“The Office of Sustainability has been and continues to be a valuable partner in the Race Against Waste program. They provide expertise on school-based structures for sustainable practices to all of our participants, as well as the Service in Schools team.”

“I think that the Office of Sustainability is a really fantastic department. Even though this is my first year being involved with them, the support that they are giving as well as the resources (i.e. lessons, outreach) is great.”

“I didn’t know about the logistical support until this year.”

“I was asked by my assistant principal along with my colleague. I was aware of the logistical support ... they let us know during the emails.”

“I was] unaware about ‘sub days.’”

“Please send more info!”

“They should focus more on the wellness component ... food is something we are afraid to talk about ... it [effects] global warming [and] is kind of a controversial topic but we should discuss ... less meat, less diary.”

“They are awesome!”
Participants were asked whether they think achieving Zero Waste by 2030 is possible or not and why. Some respondents feel hopeful about the future, given that young people are at the helm of sustainability efforts. Others feel achieving Zero Waste by 2030 may be possible, but is perhaps unlikely without large-scale policy change. Behavior change alone is challenging and zero waste and sustainability efforts are not necessarily viewed as a priority within the DOE.

In addition, several comments underscore the intersection between environmental issues and other socio-economic inequities. The Equity pillar of Mayor DeBlasio’s OneNYC plan highlights that strategies for expanding zero waste must address systemic inequality and cannot be viewed as separate from efforts toward social, racial and economic justice.

“I think [Zero Waste 2030] is possible, especially because the younger generations are more conscious of and concerned with environmental issues.”

“I think this could happen, but it is extremely difficult to change behaviors. Teachers in my school recycle only to find out that every bin is mixed together at the end of the day. It has been a struggle having conversations with stakeholders in changing this - working on it! In addition, it can be difficult to monitor classes and offices without the motivation and examples of leaders in the school.”

“I think it is possible but not probable, given the fairly low importance of Zero Waste in the hierarchy of school initiatives. If Zero Waste is a priority, principals should be given incentives to give time and monetary resources to Green Teams.”

“... there needs to be further education as to why this is even a goal. People are often short term in their thinking—if they do not see an immediate outcome, many tend not to be interested; especially communities that are disenfranchised ... ”

“I think largescale policy changes (e.g., single-use plastic bans, tax incentives for circular economy) combined with drastic lifestyle changes are necessary to achieve Zero Waste. Given the slow rollout of organics recycling in the city, the ongoing struggle to prevent recycling contamination, and the lagging public and political will to alter policy, I do not see these changes happening in the next twelve years.”
RECOMMENDATIONS
OVERVIEW

Expanding zero waste and sustainability initiatives from 109 schools to include a remaining 1,734 schools over the next decade will require a fundamental shift in culture at both the DOE and within New York City. Many visionary leaders, communities, and programs will be required to drive such an unprecedented shift. Although Race Against Waste, Sustainable Schools Certification, and Zero Waste Pledge Schools are new programs, implementation and best practices will continue to emerge over time.

The scope of this specific project was to identify best practices and challenges faced by participants among these three new zero waste programs. Based on the feedback received, we identified five recommended stepping stones aimed at supporting this larger mission. The overarching theme is one of improving access to information and building community. We sought to provide recommendations that could be executed within the current budget and staff size of the Office, with the exception of two recommendations that will likely require further feasibility analyses if pursued.
NEW TOPICS & FORMATS FOR SUSTAINABILITY TRAINING DAYS

Develop an “open forum” format that gives program participants opportunities to dialogue about best practices, work through challenges, and learn from experts.

There are a number of existing trainings offered by the Office of Sustainability that focus on different aspects of sustainability. These include “Sustainability 101,” which is provided to Sustainability Coordinators at the beginning of each school year, and other trainings on specific topics. In the Fall of 2018, for example, two trainings took place: “Urban Ecology” and “Advocacy & Environmental Justice.” Topic ideas are often taken from the annual DOE End of Year Sustainability Survey (completed by Sustainability Coordinators) and also from surveys completed by participants at the end of each training (which are open to all DOE employees).

Of the participants surveyed from the three Zero Waste programs, one stated, “There should be more opportunities to create professional learning communities, where coordinators can share best practices and successes.” Regarding curriculum, another participant expressed that sustainability integration should be “mandatory,” but it “needs to be done in the right way and it takes time for teachers to know how to do that.”

The Office is continually looking for ways to make trainings dynamic. An “open forum” format could be a way through which certain leaders or groups of leaders (i.e. Teachers, Sustainability Coordinators, Custodial Engineers, etc.) can lead the training conversation and contribute best practices related to topics such as engaging and surveying students, tips for measuring progress, integrating sustainability across different subjects and overcoming challenges. This provides advice from people who can speak from their experience “on the ground” and allows DOE employees to network with each other.

To increase knowledge about approaches to curriculum integration and also to stay abreast of zero waste and sustainability ideas and discussion, thought-leaders and experts on these topics could be invited to speak at these events. Speakers could come from different sustainability backgrounds in order to spur new thinking about topics. This provides rich professional development opportunities for employees and can inspire teachers to share new ideas with students across many subjects.
EXPAND REACH OF SURVEYS

In partnership with Teachers College Columbia University, the Office currently distributes an annual survey to all Sustainability Coordinators. Through our interactions with Zero Waste program participants, we have found that DOE employees across many backgrounds (Teachers, Principals, Custodial Engineers, etc.) have valuable contributions to make related to zero waste and sustainability programs.

Many survey responses from the Zero Waste programs emphasized the necessity of collaboration. The success of programs depends on the efforts of all stakeholders including, but not limited to, Sustainability Coordinators. A formalized annual or bi-annual survey (perhaps as an extension of the existing Sustainability Coordinator survey) of different stakeholder perspectives could inform the development of a more holistic and collaborative strategy. Recognizing the importance of interdisciplinary perspectives, collecting insights on best practices, challenges, and perceptions about current and future efforts can unearth key insights necessary to strengthening programs.

A DOE Office of Sustainability staff analyst currently works in partnership with Teachers College to disseminate annual survey information. Teams would need to determine what additional positions to include and modify material specific to each group. Questions could inquire into how different roles define zero waste and sustainability, extrinsic and intrinsic motivations and areas of improvement. Depending on how much larger the survey project becomes, further assessment of funding and partnership opportunities with Teachers College would need to be evaluated. This survey would gather important insights for collaboration and acknowledge the necessity of diverse perspectives.
PILOT A SUSTAINABILITY COMMITTEE

As previously discussed, the designation of a Sustainability Coordinator in each school is required by Local Law 41 and Chancellor’s Regulation A-850. This role is viewed by many as the primary person accountable for sustainability programs in each school and is a valuable role for implementing zero waste activities. Yet, because the position is done on top of a full time job and is also unpaid, there are challenges to managing this work as an individual.

A lack of buy from school administration can also hinder program success. One Sustainability Coordinator stated, “One huge misconception is that we are given adequate time to fulfill our responsibilities. Much of the work is completed on personal time and there is no compensation for that. People in the school feel that all sustainability related things are the responsibility of the coordinator and not on the whole staff.” Another shared the misconception that “...it is the job of one or a few people to manage the sustainability program...it is the responsibility of the entire school community to do this work if we are going to be successful.”

In reviewing examples of other zero waste school programs, we learned about the introduction of recycling committees in Washington D.C. schools, comprised of principals, administrators, teachers and custodians. The intention of the committee is to share staff responsibility in leading recycling and zero waste efforts in schools. It recognizes that sustainability teams require school buy in from roles in Leadership, Operations and Education (Department of General Services, n.d.).

One potential challenge to this committee is that it would not have the same level of political backing as Sustainability Coordinator (i.e. mandated through current policy), at least to begin with. For this reason, we recommend piloting this committee with a school that has leadership enthusiastic about zero waste and sustainability. The school’s Sustainability Committee would chart the sustainability vision and strategy for their school. This would help align staff members from different departments and foster accountability among DOE employees in the management of zero waste as well as coordinate the student-led Green Teams that they support.
DEFINE USEFUL METRICS & REPORTING

As previously mentioned, Zero Waste survey participants shared a wide variety of answers when asked about metrics that are used for tracking progress on initiatives. Some take advantage of various free software tools, make spreadsheets and take pictures to capture information. One participant mentioned looking at websites of different companies (such as PepsiCo) to learn about metrics that could be used. Others expressed uncertainty regarding what to use and resources that are available.

Given the variety of techniques discussed among participants, we recommend evaluating effective practices among teachers and developing formalized metrics and methods that would enable participating schools to monitor outcomes. This would allow separate classrooms, schools and Green Teams to connect using the same language for evaluating the status of zero waste programs.

An evaluation of methods used by city agencies and organizations (such as DSNY and GrowNYC) could be a useful place to start in terms of linking classroom progress to citywide goals. For example, OneNYC DSNY indicators for Zero Waste include citywide diversion rates from landfill and the volume of solid waste collected from curbside service and different sectors. Defining how school actions can be broken-down and measured could assist classrooms and schools in understanding how school initiatives fit within city goals. It would create tangible and student-driven methods for measuring the real difference that students make.
CREATE A WEBSITE FOR ZERO WASTE & SUSTAINABILITY ACTIVITY

Several platforms are used by the Office of Sustainability and DOE employees to exchange information about events, trainings, and contests related to DOE zero waste and sustainability. These platforms include the Zero Waste Schools website as well as other useful (and free) resources such as Google Classrooms, Facebook or WhatsApp.

The Zero Waste Schools website is currently managed by the Bureau of Recycling & Sustainability at DSNY and offers a way for students and teachers to learn about contests and share photos of green projects and initiatives. In partnership with the DOE and GrowNYC, DSNY funded and designed the ZWS website as an evolution of DSNY’s Golden Apple Awards (O’Sullivan, 2018). While contest and award info is publicly available, photo-sharing on the ZWS website is only allowed to registered DOE staff and their students to ensure, importantly, the security and safety of student information (see Appendix 6).

Google Classroom has also been a useful tool for the Office and teachers alike. The Office created a Google resource link that they share with new Sustainability Coordinators. One constraint with Google Classroom is the class size limit (250 per class). While 250 is much larger than the average class, it’s a still a constraint when it comes to disseminating information across the entire New York City school system.

In addition, research by Teachers College has confirmed that 66% of Sustainability Coordinators surveyed are interested in online training (Pizmony-Levy, 2018). One Zero Waste survey participant stated, “I think the most critical driver of success is education ... how do we reach as many people as possible so that more people could connect and participate.” Another participant shared about the importance of having “schools ... connect to one another more.” The range of official sources is high and can lead to confusion and delays in implementation.

Building an internal website or portal for DOE employees (or perhaps expanding certain functionalities of the existing Zero Waste Schools website) for zero waste and sustainability efforts would greatly increase the reach and ease in which information is accessed, including professional development and training.

As more public schools become involved in Zero Waste, the importance of streamlined information accessibility will grow. Most city agencies do not have the same technological agility as say, a private company, so creating a new website for DOE sustainability (or even expanding an existing platform) would be a large undertaking requiring further analyses in terms of cost and management feasibility. The logistical challenges of expanding zero waste efforts, however, from 109 to 1,734 schools in the next eleven years will nonetheless demand unprecedented shifts in information sharing and training capabilities.
CONCLUSION

Making schools in New York City zero waste is an important goal for the both the school system and the city. This extraordinary commitment by NYC and the DOE has the potential to foster a new culture that confronts thoughtless consumptive behavior and transforms waste streams. Zero waste can reduce carbon and methane emissions, enhance air quality, decrease city costs associated with waste management, and provide valuable raw materials for reuse by industry. This is a win-win program and it’s the right thing to do!

Race Against Waste, Sustainable Schools Certification and Zero Waste Pledge Schools are three new programs that will continue to increase awareness and engagement in zero waste among schools throughout New York City. Participant feedback that we received about these programs brought to light new insights and also underscored some of the challenges to expansion. The five recommendations we’ve provided are grounded in building community and increasing information accessibility, two tenets that we believe will be central to the work of growing zero waste from 109 schools to over 1700 schools in the coming decade. These recommendations are stepping stones that we hope will benefit the DOE and city in reaching their targets.

The challenges to achieving zero waste in New York City and cities around the world remain formidable. According to a recent report by the World Bank, over the next thirty years (and by 2050) the current path of global waste production will outpace population growth by more than double unless drastic measures are taken (Kaza et al. 2018). China’s recent ban on U.S. recyclables, once the largest market for U.S. recycled plastics and paper, also forces a reevaluation by the United States of the global systems that allow us to offshore waste (Thornton, 2018). North American countries produce the highest average amount of waste per capita, but unlike other regions, they have nearly universal waste collection systems (Kaza et al. 2018). The efficiency of waste collection is a feat of technology and management but can also serve, ironically, to disconnect us from the local, regional and global impacts of collective consumption and waste production.

Indeed, the scale of modern consumption places unprecedented demands on systems of waste management. As previously mentioned, the DOE’s impact on the total volume of solid waste produced in New York City is dwarfed by other sectors. Yet, education and aspirational goals are key tools for transforming actions. Sustainability within the New York City DOE is an opportunity to connect the dots for students among environmental, social, economic and racial justice issues, situating sustainability as integral to student’s lives and futures. Aspirational goals for students and communities will continue to spur new thinking, innovation and results. Imbedding zero waste and sustainability into curriculum will serve as a pathway to transforming the school system, the communities they belong to, and to creating future leaders who are vital to paving a new way forward.
APPENDICES
APPENDICES

APPENDIX 1
Zero Waste School Map & Zero Waste School Selection Criteria

Zero Waste School Map:

Criteria for Zero Waste School Selection:
Schools that are part of the Zero Waste Schools program that began in 2015 as a city mandate were selected using several criteria. These include:

- Being a current recipient of organics collection, which allows schools to increase the amount of waste diverted.
- Schools that are on the same waste collection routes, to better track tonnage and diversion rates.
- A mix of school type including different grade levels, different types of facilities (standalone versus shared buildings), and city-owned spaces versus leased buildings, to gauge how school differences impact waste diversion (DSNY, 2016).
APPENDIX 2

Survey / Interview Questions

1. Which program(s) are you participating in?

2. What attracted you to this program? Are there specific aspects of the program that motivated your participation? What do you think motivated other people’s involvement?

3. What are the intrinsic and extrinsic motivating factors?

4. If these programs were to expand to schools citywide, what elements lend themselves to expansion / scalability?

5. Do you have any recommended best practices that encourage ongoing engagement?

6. Where are there obstacles to expansion and how can they be alleviated?

7. What are the outstanding achievements within the programs?

8. Which areas do you think may require improvement?

9. Who are the key stakeholders that affect change in a school?

10. What are common misconceptions (e.g. roles, responsibilities, goals, resources, etc.)?

11. Both NYC and DOE have a goal of achieving Zero Waste by 2030. Given constraints (such as lack of time, funding, etc.), do you think it’s possible to achieve this goal through behavior change spreading across the city? If yes, can you share your thinking? If no, can you share your thinking?

12. Do you track your program performance? What tools (i.e. excel spreadsheet) and metrics do you use? What tools would you like have?

13. What do you believe are going to be the most critical drivers of success for Zero Waste programs in New York City schools (1-3 drivers)?

14. Are there aspects of this specific program (and Zero Waste in general) that you think could be better incorporated into the school curriculum?

15. How did you learn about the DOE Office of Sustainability? Are you aware the Office can provide logistical support related to your participation (i.e. helping to get sub days approved for teachers)?

16. Do you feel recognized for the work that you and your team does around Zero Waste? If not, what would make you feel more acknowledged for this work?

17. What do you think the Office of Sustainability is doing best now? Is there anything you think could be done better in the years ahead?
Appendix 3

Case Studies

The size of the New York City public school system makes it challenging to benchmark against other municipalities. We nonetheless examined zero waste programs (both large and small) in cities and school systems nationally and internationally. These offered unique insights into how waste diversion is managed, incentivized, and expanded within different environments.

Los Angeles, CA

City Description:
Los Angeles is the largest city in California with a population of approximately 4 million (U.S. Census Bureau, 2017). Within the city, around 640,000 are school students attending the LA unified school district (LAUSD), comprised of over 1,000 public and charter schools. This student population and school number are second only in size to New York City (LAUSD, n.d. a).

City Targets:
Los Angeles has set a target to divert 1 million tons of waste (of the total 3 million produced annually) from landfills by 2025. Furthermore, they plan to reduce waste produced by 65% within that timeframe (Councilmember J. Huizar’s Office, 2017).

School Program:
The Campus Waste Reduction program under LAUSD’s sustainability initiatives has two main targets: to raise awareness (through Reduce, Reuse, Recycle and Rot) and increase the diversion rate of schools to 70% by 2020. The current diversion rate is about 25% for schools (LAUSD, n.d. b). The program is holistic and provides a framework and guide for schools to follow, including training opportunities and an educational program called Garbology.

Washington, D.C.

City description:
The U.S. capital has a population of nearly 700,000 (Executive Office of the Mayor, 2017), although the larger metropolitan area of Washington has recently climbed to over 6,000,000 inhabitants (Clabaugh, 2018). 48,000 students are enrolled into the district’s public schools (DCPS, 2018).

City Targets:
In conjunction with the district’s goal of diverting 80% of waste from landfill by 2023, a number of initiatives have been launched. One of these initiatives is managed by the Department of General Services (DGS) which oversees the DC public schools Recycles! Program. This program seeks to integrate zero waste into public schools (DPW, 2016). The program hosts citywide competitions with the aim increasing awareness and monitoring school performance.

School Program:
As of 2016, 52 schools were recognized through the Honor Roll for establishing a paper recycling program. An additional 23 schools were recognized with distinction as they incorporated organics recycling into their programs. Instead of only one person acting as a sustainability coordinator, the school system has set up committees in each school. This was identified as a best practice stemming from Burroughs elementary school (DPW, 2016).
Each committee includes several teachers and school leadership staff and recently cooperated with custodians to visit classrooms to explain the importance of recycling. As part of the initiative, the Department of Public Works (DPW) has come up with an education program called the Solid Waste Education and Enforcement Program for Youth (SWEEP Jr.). SWEEP Jr. works to build a recycling culture through activities such as cafeteria skits and educational workshops for students. Similar to NYC, the program started with a pilot project of just over 100 schools and has since expanded. In 2016, they also started a Food Waste Program in 17 schools that has grown to 64 schools in 2018 (DPW, 2016).

SAN FRANCISCO, CA

City Description:
San Francisco’s population is estimated to be around 884,000 (Brinklow, 2018). The public school system has a total of 136 schools with just over 54,000 enrolled (SFUSD, n.d.).

City Targets:
An early adopter of ambitious waste diversion goals, in 2002 San Francisco created the goal of 75% diversion from landfill by 2020 (EPA, n.d. b). In 2012, they achieved a nearly 80% diversion rate. This is the highest diversion rate achieved by any US city, but the city was not able to maintain this rate year-over-year and conceded that the 2020 targets would not be met. The city has since reestablished new targets, including reducing each city inhabitant’s waste generation 15% by 2030. The city has also encountered challenges associated with attempting to recycle products that are not designed for recycling (Airhart, 2018). For this reason, the city has shifted focus to work with manufacturers in making products more recyclable in order to increase waste diversion.

School Program:
The San Francisco Department of the Environment runs a program that promotes sustainability practices, including recycling within schools (SF Environment, n.d.). They currently reach 20,000 students annually (37% of total school student population). The program acts as a resource for schools, delivering information about recycling and strategies that can implemented. They provide curriculum for teachers, host assembly presentations, field trips and a platform for schools to form partnerships with local community NGOs.

BOULDER, CO

City Description:
Boulder has just over 100,000 inhabitants including 30,000 students enrolled at the University of Colorado (bouldercoloradousa.com, n.d.) and another 30,000 students in their K-12 school system. The city population is therefore predominantly students! (Boulder Valley School District, 2018).

City Targets:
The city has a goal to divert waste from landfill and “generate new materials from 85 percent of waste by 2025” (City of Boulder Colorado, n.d.). The city has currently reached a 51% diversion rate from landfill and aims to achieve a 100% diversion rate through expanding their recycling facility and increasing recycling and composting opportunities for all residents. The city’s strategic plan does not include a program for schools, however, they work with the organization Eco-Cycle to deliver zero waste programing to schools (City of Boulder Colorado, n.d.).
School Program:
Eco Cycle is a non-profit with the mission of promoting recycling in schools (Eco-Cycle Solutions, n.d.). Eco-Cycle's Green Star Schools initiative aims to help schools achieve zero waste status. The 'We Are Zero Waste' program seeks to make every school a Green Star School and works to address the unique challenges faced by larger schools. The program has a variety of ways to achieve Green Star status, including educational programs and training for both staff and students and special waste reduction projects. The program focuses on recycling "typical" waste such as plastic containers, paper and cardboard, but also composts food waste and non-recyclable paper. The project has yielded promising results and currently works with 50 Green Star Schools, with plans to expand to additional schools in Boulder County (Eco-Cycle Solutions, n.d.).

LITCHFIELD, NH

City Description:
Litchfield is a small town in New Hampshire with a population of approximately 8,000, including 1,300 students enrolled in the district's public schools. The state has no official campaign or program for zero waste.

School Program:
The Campbell Recycling Advocacy Program (CRAP) is a school recycling program developed in Campbell High School. The program collects various waste items including paper and aluminum (Bellamente, 2017). What is interesting about this program is how it was initiated and able to self-sustain as well as promote a recycling and sustainability culture among students. The program began as a group of students and one teacher working to manage paper collection and recycling. It later expanded to recycle plastics, cardboard and eventually to stripping copper wires and obtaining clean metal resources for reuse.

Since the program is not tied to town or state initiatives, the school had control over all aspects of decision-making. The student group was empowered to make decisions that catered to school's needs and promote the program internally. Generating cash from the items recycled through their local recycling facility helped grow interest. They used funds from recycling and grants to buy new equipment to meet the increasing participation rate. To address growing interest in sustainability, the school developed an Economics of Sustainability class (Bellamente, 2017).

EDINBURGH, SCOTLAND

University Description:
The University of Edinburgh is located in Edinburgh, Scotland and has over 35,000 students, from both its undergraduate and graduate programs (The University of Edinburgh, 2018).

Country Targets:
Scotland has a target to recycle 70% of waste by 2020. For the country's waste targets to be achieved, recycling rates have to improve. This study focused on recommendations that could help recycling on campus, addressing student engagement and the challenges or habits that prevent students from recycling.
Methodology:
The team identified and interviewed key stakeholders to gain a better understanding of student experiences and to delve into the specific motives that drive people to recycle. They had the chance to experiment through the use of different signage and posters and to observe behavioral changes that occurred. This provided data that the student project team used to substantiate findings.

Behavior vs. Principle Approach:
Their findings provided insight into the types of recommendations and actions that need to be enforced to stimulate student engagement. They discussed the effectiveness of clear messaging that focuses on what, how, where to recycle. This type of signage is more conducive to action than explaining “the why,” for example linking the problem to climate change and issues that may be abstract to individuals.

The ISM Model:
Lastly, the case discussed behavior change through the ‘Individual, Social and Material (ISM)’ model. This model argues that for behavior to be affected, the following three elements have to be addressed:

- **Individual**: personalized messaging for the individual, teaching them how to recycle and reminding them that everyone needs to do their part to fix the problem.
- **Social**: making recycling feel like a normal practice around campus. This could include communication strategies and spreading the message by making recycling posters and procedures more ubiquitous. This creates positive social pressure that unconsciously encourages recycling behavior.
- **Material**: addressing infrastructure and physical items related to recycling, such as the bins. Ensure consistency in placement throughout campus.

Study Recommendations:
The study emphasized the need for feedback from a larger pool, more involvement and connectivity among stakeholders. They recommended setting up student and staff focus groups to deepen understanding of motives and to provide participants a chance to communicate more feedback. They also emphasize the need for a reward or performance-based feedback system. According to their research, 50% of students said they would recycle more if they were given some sort of reward (such as positive feedback). A verbal rather than a tangible reward is desired, as the incentives end with tangible rewards as soon as the reward has been expended (The University of Edinburgh, 2018). This case study information was published by students of the 2014 Participation in Policy and Planning class (Mackie et al., 2014).
A P P E N D I X  4

Case Study Selection Criteria
The below criteria was used when reviewing different school and city initiatives.

1. General information about area/organizations:
   - Type of organization
   - System size
   - Population served
   - Geographical region
   - Waste diversion rate
   - Waste composition

2. Motivation and Engagement Best Practices:
   - Current incentives and reward system
   - Current compliance rules
   - Communication network between decision makers and those implementing the program
   - Resources available for schools

   - Law/regulations and existence of zero waste targets
   - Who collects the waste?
   - How is it collected?
   - Current practices for paper/cardboard/plastic recycling
   - Current practises for organic waste
   - Current practices for electronic waste
APPENDIX 5

School Waste Collection Information

Two types of schools (those with Organics compost collection and those without) have distinct DSNY waste collection services. This information is current as of December 2018 and was provided by the DOE Office of Sustainability.

Organics (currently 725 schools)

- Organics collection everyday
- Trash collection 2-3x per week
- Recycling: MWF = Paper, T,Th = Plastic
- Recycling and Organics are collected in the afternoon by a school-only truck
- Trash is collected in the morning by a residential truck, along with residential waste
- The school waste from these routes cannot be weighed as it is co-mingled with residential waste

Traditional (currently 1,118 schools)

- Trash collection every day
- Recycling: MWF = Paper, T,Th = Plastic
- All school waste is collected in the afternoon by a school-only truck
- This waste can be weighed and accurately accounted for

Split-body truck used to collect recycling and organics:
A P P E N D I X 6

Zero Waste Schools Website Information

The below information was provided by the Bureau of Recycling & Sustainability at the New York City Department of Sanitation and is current as of November 30, 2018.


1. ZWS Website Statistics, current as of 11/30/2018:

<table>
<thead>
<tr>
<th>Date (as of)</th>
<th>Total # of users:</th>
<th>Total # of posts:</th>
<th>Total # of Schools</th>
<th># of Teachers</th>
<th># of Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>11/30/18</td>
<td>1,763</td>
<td>5,099</td>
<td>613</td>
<td>866</td>
<td>844</td>
</tr>
</tbody>
</table>

2. Number of Schools per Borough registered on ZWS website:

<table>
<thead>
<tr>
<th>Borough</th>
<th>Numbers of Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bronx</td>
<td>103</td>
</tr>
<tr>
<td>Brooklyn</td>
<td>211</td>
</tr>
<tr>
<td>Manhattan</td>
<td>128</td>
</tr>
<tr>
<td>Queens</td>
<td>141</td>
</tr>
<tr>
<td>Staten Island</td>
<td>30</td>
</tr>
</tbody>
</table>
APPENDIX 7

Events Attended

Over the course of the semester, we attended two events pertaining to sustainability in NYC schools. The first event, “Parents Making Sustainable Change in NYC Schools,” was a half-day fair hosted by Teachers College, Columbia University on October 13, 2018. With panel discussions and mini-workshops, the event focused on how parents can engage schools and communities to reduce waste and energy consumption (Teachers College Newsroom, 2018). The panel was made up of key stakeholders in the sustainable school ecosystem, including speakers from the DOE Office of Sustainability, Green School Group, and Zero Waste Initiatives from selected districts.

Following panel discussions were mini-workshops covering different sustainable school topics, such as Zero Waste Initiatives, Sustainability Coordinators in Action, and Parent Group for Sustainability 101. Some of the key themes from the event include:

- Lack of resources and administrative will to carry out sustainable school initiatives.
- How socio-economic factors shape schools ability to execute sustainability goals.
- The importance of NGOs and other grassroots organizations in filling the resource gap.

The second event we attended was “Urban Ecology” on Oct 31, 2018, hosted by the Office of Sustainability. It focused on ecological diversity within urban environments. Several NGOs - including Audubon Society, World Wildlife Fund, and Newtown Creek Alliance - provided background on the work they do in urban ecology. The event was open to all DOE employees (not just Sustainability Coordinators). The Office of Sustainability shared about programs they are working on such as Zero Waste, solar power installations in school buildings and citywide distribution of reusable water bottles for students. They also discussed resources that are available, including the Sustainability Coordinator mentorship program.

This event provided an additional environment where we could observe interactions among the Office and school staff. We spoke with a few teachers at the event and many shared enthusiasm at the prospect of discussing their experiences as well as challenges they’ve faced with zero waste and sustainability programs.
How School Leaders Can Help Grow Green Programs

During my three decades in education, I've worked with all kinds of school leaders. The best ones inspired me to become a better teacher and advocate for children. Some gave me room to innovate in the classroom--as long as I could show that using approaches like indoor gardening to teach across the curriculum was good for children.

1. Everyone’s watching.
School leaders are highly visible. They’re the face of the school. Simple things like knowing students (and teachers) by name help build a positive school culture. So do frequent classroom visits--and not just when it’s time to evaluate teachers. Leaders who support green programs show up often. They show an interest in what students are growing and learning. They ask questions that prompt students to reveal their thinking. Sometimes they even get their hands dirty. They taste and sample everything. They always ask “Why?” Leaders need to be seen doing work.

2. Share the game plan.
Effective leaders communicate the vision that guides their decision making. This shouldn’t be a secret. A shared vision means that everyone’s pulling in the same direction. If the leader is transparent about the vision, then teachers who want to introduce a green curriculum or gardening program will know from the outset whether and how this aligns with the school’s vision. Sharing is service. Service is a great form of leadership.

3. Be selfless.
Effective leaders acknowledge others (even if they did much of the heavy lifting themselves). They catch people doing positive work and celebrate those efforts. That recognition is equally important for students, teachers, parents and community volunteers who are supporting gardening projects.

4. Welcome attention.
Green school projects are still so novel that they attract public interest. Wise leaders don’t fear media attention; they welcome it. They know how to use social media strategically to communicate success.
5. Invite [the right] partners.

Schools don’t thrive in isolation. Like any organism, they do best when they are part of a healthy ecosystem and are encouraged to evolve. Connections with community partners build and strengthen that ecosystem, creating access to expanded resources and increased opportunities for student and community success. Visionary leaders are strategic when it comes to forming partnerships to grow green programs. The right partnerships add value to both sides, just like a balanced math equation. When considering a collaboration, leaders need to look beyond a potential partners website or glossy brochure.

They must be wary of being used as a photo opportunity to support a partner’s fundraising efforts. Effective leaders also know that they can’t say yes to everything that comes along or they will overwhelm their staff. Asking the right questions will help leaders build strong partner relationships. Understanding who will be doing the actual work is critical. Here are my opening questions to ask potential partners:

- What will our combined effort look like--how can we make sure one plus one equals more than two?
- Where else have you worked with schools?
- Which partnerships didn’t work out? Why?
- How often are you committed to being here at our school?
- How do you screen and/or train your volunteers and staff? What data do you plan to collect?
- How flexible are you willing to be to meet our unique needs?

Once they have done their due diligence about partners, wise leaders need to make the call by asking themselves: Will this partnership help us achieve our vision for our students? Will it support and inspire our teachers, or overwhelm them? Who’s excited about moving forward, and why?
REFERENCES


LAUSD (n.d. a). 'About the Los Angeles Unified School District'. Retrieved from https://achieve.lausd.net/about


Conversation with Kevin O’Sullivan and Jennifer Kline, DSNY Bureau of Recycling and Sustainability, November 30, 2018

