

SUSTAINABILITY ASSESSMENT: EAST SIDE COMMUNITY HIGH SCHOOL NY, NY

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Executive Summary

Mayor Bloomberg's PlaNYC, the master sustainability plan for New York City, is one of the most aggressive blueprints to reduce greenhouse gas (GHG) emissions in any U.S. city, and has been upheld worldwide as a model for its rigor. Unveiled in 2007 and updated in April of this year, PlaNYC set a goal to address climate change by reducing New York City's GHG emissions 30% by 2030 to address climate change. Upon PlaNYC's launch, Mayor Bloomberg challenged all New York City municipal agencies to set a precedent for New Yorkers by reducing their emissions 30% by 2017.

New York City's public schools consume 25% of energy used by the City's public facilities,¹ not a surprising proportion given many of the Department of Education's (DOE) 1,700 schools are housed in older facilities that predate present-day energy efficiency construction standards. The Department of Citywide Administrative Services (DCAS) and the DOE plan to audit every NYC public school by the end of 2013 to determine which schools are eligible for capital energy efficiency investments that would facilitate meeting the 2017 benchmark.² As of fall 2011, the East Side Community High School (ESCHS) was not on the DCAS/DOE energy audit docket.³

Meanwhile, last October the Mayor's Office of Management and Budget asked the DOE and other City agencies to cut 2% from the 2011-2012 fiscal year budget and 6% from the 2012-2013 budget.⁴ DOE agency funding—let alone individual school funding—for critical efficiency upgrades is increasingly scarce.

The DOE has instituted the Environmental Protection Agency's (EPA) ENERGY STAR Portfolio Manager energy usage tracking system, which designates an Energy Performance Rating for every school. The rating system is scaled from 0 to 100. Seventy-five is considered "acceptable" by the DOE from an energy efficiency standpoint; above 75 is considered "exceptional."⁵ The East Side Community High School's "current" Energy Performance Rating for the yearlong period ending June 30, 2011 was 2.⁶ ESCHS' annual electricity costs for that time period were \$254,158.38; to attain a rating of 75 with electricity conservation alone, ESCHS would have to shrink costs 59% to \$104,765.83. (The national

¹ Press release: "School Facilities CEO John Shea, City Sustainability Deputy Director Adam Freed and Actor Matthew Modine Call on Schools to Reduce

² Interview with Liliya Shames, Deputy Director of Optimization, DOE.

³ Ibid.

⁴ David Chen, "City Agencies are told to Cut Costs by \$2 Billion," *The New York Times*, October 4, 2011.

⁵ Interview with Ozgem Ornektekin, Director of Sustainability, DOE.

⁶ Electricity bill for ESCHS, Appendix VI.

median electricity cost for an individual school is \$132,810.36.)⁷ Portfolio Manager measures a facility's electricity usage and fuel consumption from utility records. According to the DOE's Deputy Director of Optimization, Liliya Shames, a school can improve its Energy Performance Rating by "addressing any and all energy generating equipment and operations."⁸

The NYC DOE also grades schools (A through F) for overall performance, a calculation that will soon factor in evidenced progress on school Sustainability Plans, documentation of which will be required in the principal's annual compliance reporting.⁹ According to Ozgem Ornektekin, the DOE's Director of Sustainability, a school's performance grade may be elevated with efforts to reduce its carbon footprint such as waste stream minimization or educating for sustainability by infusing the core curriculum with the STEM (Science, Technology, Engineering & Mathematics) framework.¹⁰ ESCHS has received A's since the grading rubric was implemented.¹¹ However, if the ESCHS Portfolio Manager status quo remains the same, when school facility sustainability performance is reflected by DOE institutional grades, ESCHS' stellar track record will surely be negatively impacted.

This assessment uses both qualitative and quantitative data to help ESCHS determine how to raise its Energy Performance Rating. In order to bridge the significant gap between its "current" rating of 2 and an "acceptable" rating of 75, and reduce emissions 30% over the next 5 years. The goal of this assessment is to offer ESCHS affordable short and middle term strategies for raising its Energy Performance Rating and improving overall sustainability by identifying opportunities for GHG reductions, energy conservation, cost savings and social change.

East Side Community High School Profile

The East Side Community High School (P.S. 60) is located at 420 East 12th Street in the heart of Manhattan's East Village. The school's small student body includes grades ranging in size from 80-100 students and reflects the diversity of the neighborhood, a blend of Latino, African American, Asian and Caucasian communities.

The 5-floor brick, horseshoe-shaped building, a standard configuration for early 20th century NYC public schools, was constructed in 1924 and is 144,175 square feet. The building houses both ESCHS and The Girls Prep Lower East Side

⁷ Appendix VI.

⁸ Liliya Shames, Deputy Director of Optimization, DOE, email to author, 1/12/12.

⁹ Interview with Ozgem Ornektekin, Director of Sustainability, DOE.

¹⁰ Ibid.

¹¹ Erica Ring, ESCHS Sustainability Coordinator, email to author, 2/18/12.

Middle School, a charter school. The school's square footage is split 50-50 but the two schools share the building's only kitchen and cafeteria. For the purposes of this report, data for the entire facility's energy usage and kitchen/cafeteria waste stream was obtained, however the computer electronics research conducted pertains only to ESCHS.

Consistent with the building's age, there is no central ventilation or air conditioning (AC) system. The building has central heating, which frequently generates so much radiator heat in the winter that windows must be opened, and individual AC units in most classrooms and offices. Since the AC units are installed in the upper windows and require two men and significant labor to de-install, the units are not removed during the winter months.¹² Both of these factors drive up electricity costs significantly however costs were not quantified for this assessment due to ESCHS' limited financial resources to address the problem.

The kitchen, replaced in 1996, is a non-cooking facility for preparation, reheating and refrigeration only, and there is no dishwasher. (Only 30 of the DOE's 1,200 school buildings have dishwashers due to the high cost for purchase and electricity as well as water use.)¹³ Within the last 15 years, ESCHS upgraded its boiler from #6 to #2 oil per DOE mandate; replaced all windows with contemporary energy efficient models; repaired and grey-rocked the roof, and switched out magnetic T12 ballasts for electronic T8 ballasts per DOE mandate.

ESCHS custodians have received training on environmental practices from Local Union 94 and ESCHS cleaners have had similar training through Local Union 32BJ; these trainings vary in content.¹⁴ All cleaning supplies come from the Burke "ecological" product lines.¹⁵ The school principal rates custodians annually only on recycling practices.¹⁶

ESCHS has a Sustainability Coordinator, a Green Team, a student environmental committee with 25-30 members annually, and a Sustainability Plan.¹⁷ Goals stated in the 2011-2012 Sustainability Plan primarily focus on continued commitment to recycling, participation in the MillionTreesNYC initiative, energy conservation by encouraging staff to turn off classroom lighting and Earth Day programs on climate change, including a school-wide assembly, relevant film screenings and field trips.

¹² Interview/tour with chief custodian, Ronald St. Hillaire.

¹³ Styrofoam Out of Schools, sosnyc.org.

¹⁴ Interview with Helen Bielak, Environmental Stewardship, Columbia University.

¹⁵ Interview/tour with ESCHS chief custodian, Ronald St. Hillaire.

¹⁶ Interview with Mark Federman, Principal, ESCHS.

¹⁷ ESCHS Sustainability Plan, Appendix VII.

Progress on the Sustainability Plan is evident throughout classrooms in the placement of recycling bins for cans, bottles and paper, including Pratt cardboard boxes provided by GrowNYC. According to the Sustainability Coordinator, climate change programs were implemented leading up to and on Earth Day 2011. Also cited in the Sustainability Plan for 2011-2012 are the energy and waste audits conducted for this report.¹⁸

Based on discussions with the ESCHS Principal and Sustainability Coordinator, the Green Team's goals for this assessment are:

- Strategies for greater resource efficiency on a limited budget;
- Strategies for greater integration of sustainability into the curriculum;
- School garden deployment;
- Behavioral uptake programs for the entire community—students, staff, teachers, parents;
- Student involvement in data collection.¹⁹

Challenges to Enhancing Sustainability at ESCHS

Upon the January 2010 launch of the Green Cup Challenge, a privately funded energy reduction program in NYC schools, School Facilities CEO John Shea said, "Our schools are positioned to make a big difference in helping New York City meet its GHG reduction goals."²⁰

NYC schools are not well positioned to meet the Mayor's goals until Sustainability Coordinators are empowered to enact significant reform. While Sustainability Coordinators are mandated by the City and, according to Ozgem Ornektekin, DOE Director of Sustainability, "getting more and more authority,"²¹ Sustainability Coordinators have no allocated budget unless schools raise money from the Parents Association or apply for private grants. This lack of funding poses a significant barrier to schools in meeting the DOE's sustainability goals. Ornektekin's office has no dedicated budget either; she raises funds through partnerships with nonprofit organizations on specific initiatives or applies for private grants.²²

¹⁸ Though there is no date on the ESCHS Sustainability Plan, it indicates that energy and waste audits were conducted prior to this assessment, which is not the case.

¹⁹ Interview with ESCHS Principal and Sustainability Coordinator.

²⁰ Press release: "School Facilities CEO John Shea, City Sustainability Deputy Director Adam Freed and Actor Matthew Modine Call on Schools to Reduce Energy Consumption by Joining the Green Cup Challenge," NYC DOE, 1/13/10.

²¹ Interview with Ozgem Ornektekin, Director of Sustainability, DOE.

²² Ibid.

Even if Sustainability Coordinators had funding, ECSHS and other schools have no financial incentive to change the status quo because the Department of Citywide Administrative Services (DCAS) pays for both school electricity bills and waste hauling costs. (Before this assessment, ESCHS principal Mark Federman had never seen his school's electricity bill.) Schools are not held accountable for costs associated with their energy consumption and waste output practices. This absence of accountability points to an inherent disconnect in the design of the DOE's sustainability program: Energy Performance Ratings will only have leverage when low ratings and poor performance have consequences. Why should a school save energy or reduce waste if it does not have real incentives? To be fair, PlaNYC states that it will eventually incorporate incentives for waste stream reduction: "Long-term, [the Mayor's Office] will hold agencies accountable for waste generation and give credit to those that are taking quantifiable steps to reduce their solid waste footprint."²³

PlaNYC asserts, "By 2013, every public school will have a Sustainability Plan that identifies a strategy for greening its operations and maintenance, and includes a clear recycling plan."²⁴ While ESCHS has a recycling program, the Sustainability Coordinator is hamstrung in developing the Plan further without financial resources and, more fundamentally, by the absence of regular communication channels with the DOE. The DOE claims that its sustainability division and facilities, "reach out to the Sustainability Coordinator on a regular basis, including periodic emails, information distribution, trainings and a regularly updated website."²⁵ However ESCHS' Sustainability Coordinator appeared not to be apprised of a central agenda or the upcoming energy audit.

While ESCHS' want for details on a central DOE sustainability agenda may not reflect standard agency communication practices, it points to the criticality of consistent contact between the two parties, Sustainability Coordinators and the DOE Sustainability team, system-wide. Without knowledge of the DOE's short, middle and long-term plans for evaluations of or methodologies for emissions reduction in schools,²⁶ the Sustainability Coordinator is at a severe disadvantage in meeting the DOE's aggressive GHG emissions reduction goals; with such information in hand, however, Coordinators might plan complementary energy audit activities, initiate new user practices, and lay the groundwork for the greening of all school operations. Sustainability Coordinators are both change agents and catalysts.

Additionally, the ESCHS Sustainability Coordinator lacks authority over school employees whose domains directly impact the school's Energy Performance

²³ *PlaNYC Update April 2011: A Greater, Greener New York*. The City of New York.

²⁴ *Ibid.*

²⁵ Liliya Shames, Deputy Director of Optimization, DOE, email to author, 1/12/12.

²⁶ Interviews with Peter LaBarca and Ozgem Ornektekin, DOE.

Rating, such as Facilities, IT and School Food teams, and over staff, whose behavioral practices contribute to the school's low Portfolio Manager rating. Over the course of this assessment, this power dynamic—specifically the Coordinator's lack of authority over other school departments—became apparent as the Coordinator contacted departments to make informational requests on my behalf without success. While the principal's occasional intervention with the custodial department resulted in action, we were reluctant to involve him in logistics given the demands of his job.

Outside of school-wide recycling, science classes and elective participation in the student environmental committee, sustainability has not been infused into the ESCHS curriculum or community. As a result, ESCHS faces a major cultural hurdle to achieve actionable sustainability awareness. When asked what her classmates who are not members of the environmental committee thought of sustainability and environmental stewardship, ESCHS 11th grader Sophia Yu said, "Other students think that green initiatives mean nothing for them," and 11th grader Kevin Duarte said of the same query, "They think it doesn't affect them." These and other responses suggest that, at ESCHS the mental frame²⁷—the foundation for sustainability education—has yet to be built.

The final major barrier to enhanced sustainability at ESCHS is practitioner bandwidth. Every ESCHS teacher and administrator is overstretched with day-to-day responsibilities. Effective sustainability initiatives require time to develop, implement and adapt yet, at ESCHS, time to bridge its performance gap is in short supply.

Budgetary restrictions, zero financial incentives, little empowerment of key change agents, the mental frame of the school community from facilities to students, and the paucity of time are the greatest challenges to ESCHS in achieving its sustainability goals.

Study Design & Methodology

This assessment is designed to identify the greatest opportunities to lower ESCHS GHG emissions and raise its Portfolio Manager Energy Performance Rating while:

- Keeping costs as low as possible;
- Achieving ESCHS' desired outcomes for this assessment;
- Maximizing fiscal and social benefits of GHG reduction initiatives;
- Minimizing the time investment for implementation.

²⁷ Center for Research on Environmental Decisions (2009). *The Psychology of Climate Change Communication*, New York.

This assessment's primary GHG emissions data collection concentrated on waste stream diversion and electricity conservation. Food waste from the cafeteria was audited onsite, separated and foot-printed with PlaNYC and DOE metrics. The assessment cites secondary data demonstrating how to further reduce the ESCHS waste stream by switching from Styrofoam cafeteria trays to biodegradable trays. Over-the-counter energy use meters were employed to gather primary data on the electricity consumption of school computers, while secondary data reveals potential energy savings through monitor and "whole computer" power management settings and lighting occupancy sensors. Lastly, this assessment examines a range of education for sustainability and behavioral uptake models.

Research for this assessment was conducted September-December, 2011 over the course of:

- Numerous ESCHS site visits;
- Interviews on and observation of school-wide energy usage practices;²⁸
- A kitchen & cafeteria waste audit conducted with students;²⁹
- Meter readings for computers;
- Literature review of PlaNYC, DOE and other institutional green initiatives, case studies for benchmarking methodologies, and programmatic models;
- Site visits to schools with environmental missions.

Data Analysis: Food Waste Audit

According to the New York Department of Sanitation (DSNY), "food waste is the second largest category of municipal solid waste sent to landfills in the United States, accounting for approximately 18% of the waste stream."³⁰ Food waste also produces methane gas, estimated by the EPA to be 21 times more potent a greenhouse gas than carbon dioxide.³¹ Yet, as of 2010, less than 3% of food waste was being diverted from landfills.³² Food waste diversion from the solid waste stream, and the reduction of GHG emissions from landfilling and associated transportation, is an enormous, low cost-high social return opportunity for ESCHS.

²⁸ Interview Log, Appendix V.

²⁹ Waste audit modeled after Oregon Green Schools template, http://www.oregongreenschools.org/waste_audits.cfm.

³⁰ New York City Department of Sanitation. *New York City MSW Composting Report*, January 2004.

³¹ U.S. Environmental Protection Agency, "Basic Information About Food Waste," <http://www.epa.gov/osw/conserve/materials/organics/food/fd-basic.htm>.

³² New York City Department of Sanitation. *New York City MSW Composting Report*, January 2004.

While there are no direct financial incentives for ESCHS to undertake a food waste diversion program, plate-scraping food for composting in the garden would positively impact ESCHS' DOE sustainability grade, generate significant social benefits through student and community engagement, and prepare ESCHS for the City's eventual accountability mechanisms for solid waste stream reduction.

FINDINGS

Potential benefits of plate scraping and composting programs at ESCHS:

- Divert more the 14,000 lbs. of solid waste annually from the municipal waste stream;
- Eliminate 1.2 tons of CO2 emissions in landfilling;
- Teach best sustainability practices to community;
- Save the DSNY approximately \$500 annually.

Data Analysis: Styrofoam vs. Biodegradable Trays

According to the Sierra Club, non-biodegradable Styrofoam can take up to 500 years to decompose,³³ during which time chemical components such as Styrene leach from landfills into the water table. Last June, the California State Senate voted to ban the use of Styrofoam trays by restaurants, food vendors and grocery stores; if passed by the State House, the law would go into effect in 2016.³⁴ There are a number of initiatives afoot in New York State as well including NYC Public Advocate Bill de Blasio's campaign to end the use of Styrofoam in City agencies, and Styrofoam Out of Schools' Trayless Tuesdays, a parent-driven program adopted by the DOE's School Food that substitutes standard Styrofoam trays with paper food boats. Food boats are a paper product and therefore less damaging to the environment than Styrofoam, but they only work with certain types of solid foods like sandwiches, pizza, and hamburgers;³⁵ wet food with high liquid content tends to overwhelm the structural integrity of food boats.

At approximately 3 cents per tray,³⁶ Styrofoam trays may make sense for ESCHS from a financial standpoint, but they do not make ecological sense when taking into account the life cycle analysis of the trays, which examines the carbon footprint of source materials and the production and disposal process of a

³³ Green Home, www.sierraclubgreenhome.com/featured/Pop!-Goes-the-Polystyrene:-Styrofoam-is-no-friend-to-our-environment.

³⁴ Greenspace, "California Senate votes to ban foam takeout containers," *Los Angeles Times*, June 3, 2011, <http://latimesblogs.latimes.com/greenspace/2011/06/foam-takeout-containers-ban-styrofoam-california.html>.

³⁵ Interview with Marianne Abreu, Director of School Food, ESCHS.

³⁶ Styrofoam Out of Schools (SOS), www.sosnyc.org.

product. Nor are reusable trays at ESCHS—and most schools—a viable alternative as they require a capital outlay to purchase a dishwasher and, since the NYC Department of Health requires that reusable trays and plates to be washed at 180 degrees,³⁷ a significant amount of energy to heat the water per wash cycle.

A handful of schools, including P.S. 9 on Manhattan’s Upper West Side, have switched to plant fiber trays, or Bagasse, which are biodegradable, compostable, made from renewable resources such as sugarcane or wheatstraw, and therefore less of an environmental burden. Finally, unlike food boats, Bagasse trays are structurally sturdy.

Compared to the social costs of petroleum-based Styrofoam, at relatively low additional expense ESCHS could further advance the City’s GHG emissions reduction goals and enhance its own DOE grade by switching from Styrofoam to biodegradable trays. Operationally, the shift would be simple as NYC schools can purchase biodegradable trays from their current supplier.³⁸

Whether or not ESCHS switches to Bagasse trays, the school can continue to reduce its waste output with a “Flip-Tap-Stack” system, also advocated by Styrofoam Out of Schools, whereby trays are stacked after being scraped and then disposed of en masse to reduce trash volume before bags are placed curbside. “Flip-Tap-Stack” has reduced the number of trash bags generated by NYC school cafeterias by up to 50%.³⁹

FINDINGS

Ecological food trays present GHG reduction opportunity for ESCHS:

- ESCHS throws away over 44,000 Styrofoam trays annually;
- Styrofoam is not recyclable and sits in landfills for up to 500 years;
- By volume, plastics use 25-30% of space in landfills;⁴⁰
- Bagasse can be purchased for 7 cents per tray (compared to 3 cents) resulting in a cost differential of \$2,849.59;⁴¹
- DOE will pay up to the cost of current trays; ESCHS must pay difference;⁴²
- Other NYC schools raised supplemental funding from the PA.⁴³

³⁷ Styrofoam Out of Schools (SOS), www.sosnyc.org.

³⁸ Ibid.

³⁹ Ibid.

⁴⁰ Foundation for Advancements in Science and Education, Los Angeles, California, “Polystyrene Fact Sheet,” <http://www.earthresource.org/campaigns/capp/capp-styrofoam.html>.

⁴¹ Appendix II.

⁴² Interview with Ozgem Ornektekin, Director of Sustainability, DOE.

Data Analysis: Computer Usage

ESCHS has over 298 computers on site, an inventory comprised of 6 brands and 20 models ranging in age from 1 to 10 years old. According to the EPA, the average lifespan of an ENERGY STAR (a moniker for electronics and appliances that meet government-mandated energy efficiency standards) computer is 4 years.⁴⁴ Computers are replaced at ESCHS—and all NYC public schools—when they can no longer be repaired rather than for energy conservation purposes.⁴⁵ Ozgem Ornektekin, the DOE's Director of Sustainability, said, "I cannot direct schools to replace working computers with ENERGY STAR computers," citing the 75,000 computers used by NYC DOE teachers, let alone computers used by 1.1 million students. She continued, "wholesale [replacement] would not be feasible without funding."⁴⁶

While Ornektekin indicated that DOE-wide power management strategies would, most likely, be developed at present, she said, there is, "no management buy-in" from central administrators at the Division of Instructional and Informational Technology (DIIT). Another DOE representative said, "The only guide on [personal computers in schools] is that they should be ENERGY STAR rated and teachers should unplug them when not in use [some computers draw power through plug adaptors], not just turn them off or, even worse, not turn them off at all."⁴⁷ Indeed, when collecting data for this assessment on Election Day 2011, a school holiday, all machines in the computer lab were found on.

According to Peter LaBarca, Computer Systems Manager at the DOE,⁴⁸ there are no power management practices conveyed to school IT departments. Instead, all new computers are set to a designated power management "image"—or profile—when shipped out by the vendor to facilities. Clearly, the power management image on ESCHS computers had not been subsequently tailored to school usage patterns, hours and calendars.

The EPA reports, "Whole-computer power management [hard drive and monitor] can save \$15 to \$45 annually per desktop computer; while managing only monitors can save \$10 to \$30 per monitor annually. A computer monitor can use two-thirds of the total energy of a desktop system, so it is important to power

⁴³ P.S.9 100 West 84th St, NY, NY 10024.

<http://www.ps9.org/index.php/pa/parent-involvement/87-green-team>.

⁴⁴ ENERGY STAR, "Household Emissions Calculator, Assumptions and References", www.epa.gov/climatechange/emissions/ind_assumptions.html.

⁴⁵ Interview with Rene Betances, Computer Technician, ESCHS.

⁴⁶ Interview with Ozgem Ornektekin, Director of Sustainability, DOE.

⁴⁷ Liliya Shames, Deputy Director of Optimization, DOE, email to author, 10/13/11.

⁴⁸ Interview with Peter LaBarca, Computer Systems Manager, DOE.

down monitors whenever they are not in use.”⁴⁹ The North Thurston Public Schools in Washington State already used monitor power management settings when they installed ENERGY STAR's free EZ GO network software to apply whole-computer power management. The school district is now saving \$45,000 per year on 4,000 computers, which calculates to \$11.25 per computer!⁵⁰

ESCHS' computer technician never turns off computers or advises users to do so because the computers receive updates regularly from software providers.⁵¹ However, according to LaBarca, these updates stay in cue for 30 days in case a computer is turned off when the updates are dispatched. In fact, all ESCHS PCs with Windows 7 (the majority) are on a central school server and could be easily programmed to power down automatically.⁵² The only computers exempt from such power down settings are those on the DOE central server and those in the custodial, School Food and transportation offices—a small percentage overall.⁵³

The IT function at ESCHS is currently a defensive role authorized to repair and dispose of computers.⁵⁴ However, IT should, without question, be an offensive energy efficiency enforcement role. Active Design research, a methodology that promotes physical activity through design, shows that even point-of-decision prompts such as signage reminders to save energy and turn off computers can be extremely effective in changing behavior.⁵⁵ ESCHS has an enormous opportunity to craft a school-wide computer power management policy and enforce new user practices to maximize energy savings.

⁴⁹ The ENERGY STAR Power Management program provides free software that can automatically place active monitors and computers into a low-power sleep mode through a local area network (www.energystar.gov/index.cfm?c=power_mgt.pr_power_management)

⁵⁰ U.S. Environmental Protection Agency, *ENERGY STAR Building Manual*, Chapter 10: “K-12 Schools,” Revised November 2006.

⁵¹ Interview with Rene Betances, Computer Technician, ESCHS.

⁵² ESCHS has 298 computers total (20 Apples/278 PCs); the Computer Service Technician did not know exactly how many PCs had Windows 7, but believed it to be a majority.

⁵³ Interview with Ozgem Ornektekin, Director of Sustainability, DOE.

⁵⁴ Interview with Rene Betances, Computer Technician, ESCHS.

⁵⁵ *Active Design Guidelines, Promoting Physical Activity and Health in Design*, 2010, City of New York.

FINDINGS

ESCHS Computer Energy Consumption Could Be Dramatically Reduced:

- Computer energy consumption ranges from .012 to .47* KWH per hr;
- Annual electricity cost per machine ranges from \$2.64 to \$103.47*;
- Annual lbs of CO2 emissions per machine ranges from 18.87 to 571.33*;
(EPA ENERGY STAR computer is 78.66 lbs of CO2 emissions),⁵⁶

Data Analysis: Lighting Sensors

For the most part, teachers at ESCHS use daylighting instead of artificial lighting consistently when there is sufficient natural light, and turn off classroom lights when they leave the classroom or when students leave for the day.⁵⁷ However, from 4:30 to 10 pm Monday through Friday, when ESCHS is still open for afterschool programs and cleaning, hallway lights remain on. These 5.5 hours a day account for 42% of total hallway lighting usage. Given the school's volume of corridors, approximately 1/5 of total school square footage, hallway lighting represents significant potential cost savings for ESCHS.

Without access to the exact square footage of the hallways or electricity used by hallways in proportion the rest of the facility, there was not enough primary data to do a cost benefit analysis of energy consumption reduction potential specific to ESCHS hallways in this assessment. However, an EPA case study excerpted in Appendix IV⁵⁸ details that, compared to the old T12 lighting standard in schools, occupancy sensors afford more than a 300% decrease in energy costs.

The EPA recommends occupancy sensors, "for spaces where people move in and out frequently in unpredictable patterns," which characterizes the hallways after class hours at ESCHS.⁵⁹ In fact, the national building energy efficiency gold standard, American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) requires occupancy sensors in new construction under Standard 90.1-2010. (For public spaces like corridors and restrooms, ASHRAE

⁵⁶ U.S. Environmental Protection Agency. "Household Emissions Calculator, Assumptions and References," www.epa.gov/climatechange/emissions/ind_assumptions.html.

⁵⁷ Interview with Erica Ring, Sustainability Coordinator, ESCHS.

⁵⁸ U.S. Environmental Protection Agency, *ENERGY STAR Building Manual*, Chapter 6: "Lighting" Revised November 2006.

⁵⁹ Ibid.

recommends the full automatic ON/automatic OFF occupancy devices, which combine two technologies, passive infrared and ultrasonic.⁶⁰⁾

The U.S. Department of Interior put dollars to these savings in a case study where two thirds of a 188,000 square foot state-owned building in Connecticut was retrofitted with occupancy sensors, resulting in savings of \$24,000 annually in direct utility costs and a payback of just over 2 years (initial investment, \$51,000.)⁶¹ To estimate the cost per sensor unit, California State's energy efficiency program reports, "Depending on wattage, size of area to be sensed, and other features, the cost [of sensors] can range from \$50 to \$150 per unit. Photocells, which are sensors used to help compensate for fluctuations in daylight, cost an average of \$10 to \$50."⁶² Occupancy sensors save money by reducing electricity costs and reducing maintenance demand by lengthening the intervals between light bulb replacements; (turning fluorescents off for long periods can extend the expected bulb life significantly.)⁶³

Though occupancy sensors are thought by some to negatively impact security cameras by obscuring the camera view when lights are turned off,⁶⁴ the High School for Environmental Studies,⁶⁵ which invested in hallway occupancy sensors three years ago, has had no issues since installing security cameras. A custodian there pointed out that with occupancy sensors, if lights are off, there is no trigger or activity in the immediate area to capture on footage, hence no security threat.⁶⁶

⁶⁰ American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. *Advanced Energy Design Guide for K-12 School Buildings: Achieving 50% Energy Savings Towards net Zero Energy Building*, 2011.

⁶¹ Ibid.

⁶² CA.gov, "Building Maintenance - Lighting and Occupancy Sensors," www.green.ca.gov/EPP/building/sensors.htm.

⁶³ U.S. Environmental Protection Agency, *ENERGY STAR Building Manual*, Chapter 10, "K-12 Schools," Revised November 2006.

⁶⁴ Interview with Ozgem Ornektekin, Director of Sustainability, DOE.

⁶⁵ Interview with Mike Hajnacki, YES club director/Former Sustainability Coordinator, High School for Environmental Studies.

⁶⁶ Interview with custodian, High School for Environmental Studies.

FINDINGS

Lighting occupancy sensors are a cost/energy saving strategy for ESCHS:

- EPA shows sensors to boost energy savings over standard T12 by more than 300%;⁶⁷
- EPA estimates savings w/occupancy sensors to range from 30-80%;
- EPA estimates payback in energy savings on investment to be approximately 3 years;⁶⁸
- Occupancy sensors in ESCHS hallways alone could result in savings of \$4,956.09 annually (conservative estimate).

Behavioral Uptake Models

There are several schools in New York City that have adopted environmental missions and infused education for sustainability into their curricula. This assessment looks at two schools that differ stylistically but have achieved complete integration of sustainability into their teaching methodologies and school cultures, The Alain L. Locke Magnet School for Environmental Stewardship, a middle school in Harlem, and the High School for Environmental Studies on Manhattan's Upper West Side.

This assessment also profiles two external consultancies that design programs on education for sustainability, The Cloud Institute for Sustainability Education, which aligns state standards and performance indicators with the principles of sustainability, and New York Sun Works, which applies the STEM curriculum (Science, Technology, Engineering & Mathematics) through the installation of greenhouse labs in classrooms. NYC-based and national school greening competitions, and school-focused grants are also spotlighted as examples of short-term, rapid deployment and low cost behavioral uptake programs.

The Alain L. Locke Magnet School for Environmental Stewardship

Alain L. Locke (P.S. 208) applied for magnet designation in 2009 under the leadership of Principal Susan Green. Since then, all P.S. 208 science and homeroom teachers, numerous administrators, the Sustainability Coordinator and the Environmental Stewardship program director have participated in workshops in Education for Sustainability curriculum design with the Cloud Institute for Sustainability Education. As a result, the P.S. 208 curriculum is

⁶⁷ U.S. Environmental Protection Agency, "*ENERGY STAR Building Manual*," Revised November 2006.

⁶⁸ Appendix IV.

infused with sustainability concepts and themes, including Social Studies research projects on deforestation in South Africa and English class essay writing exercises on watersheds.

To actively foster the values of environmental stewardship, P.S. 208 implemented The Bucket System, an incentives-based educational game modeled after the children's book *How Full is Your Bucket?* By Tom Rath and Mary Reckmeyer, to reward students for exhibiting behaviors that characterize stewardship. Respect, safety and responsibility are some of the qualities rewarded and encouraged by P.S. 208 teachers and administrators in The Bucket System.

P.S. 208 initiated a range of partnerships, including with New York Sun Works which installed a hydroponic greenhouse lab in the school and trained the community how to use it, and with the Children of the Earth Foundation, which regularly takes students to Central Park to conduct field research. P.S. 208 works with Terracycle to collect cell phones, potato chip bags and more for recycling, with Nike to convert donated old sneakers into playground mats, and with the Lower East Side Ecology Center to compost the school's kitchen food scraps.

High School for Environmental Studies

The High School for Environmental Studies (HSES) was founded in 1992 to "promote an environmentally literate citizenry."⁶⁹ HSES combines "environmentally-infused college preparatory courses with applied-learning experiences and hands-on activities,"⁷⁰ including trips to sites relating to PlaNYC priority areas such as wastewater treatment plants and brownfields, and environmental camp. In addition to showing freshmen Mayor Bloomberg's PlaNYC launch speech and requiring all students take an environmental seminar, every student participates in month-long research projects on a facet of PlaNYC.⁷¹ Students can also opt to join ecology-focused outdoors clubs or take thematic electives, including a SUNY Environmental Science and Forestry program course called the Global Environment, an English course with a syllabus comprised of environmental literary works, or an environmental chemistry class. The HSES YES club, Young Environmental Stewards, participated in the 2010-2011 Green Cup Challenge, manages the rooftop garden, conducts independent scientific research, participates in the national Canon Envirothon annually and other science fairs.

⁶⁹ High School for Environmental Studies, "History," http://envirostudies.org/apps/pages/index.jsp?uREC_ID=148190&type=d&pREC_ID=285771.

⁷⁰ Ibid.

⁷¹ Interview with Mike Hajnacki, AP Biology and Science Teacher; YES Club Director, HSES.

The SURDNA foundation funds Friends of High School for Environmental Studies, which organizes 100-hour internships for sophomores enrolled in the elective program—about one third of the 10th grade class—at 31 organizations including Friends of Hudson River Park, The Museum of Natural History, Transportation Alternatives, The River Project, the Wildlife Conservation Society, and other organizations without environmental missions. The goal of these internships is to foster a sense of responsibility to a larger community and an understanding mission-based work. Friends of HSES also arranges partnerships with organizations such as the Sierra Club, the Nature Conservancy, Outdoor Nation and NOLS.

The Cloud Institute

Based in New York City, The Cloud Institute “prepares K-12 school systems and their communities to educate for a sustainable future by inspiring educators and engaging students through meaningful content and student-centered instruction.”⁷² Their Schools Learn program has collaborated with schools across the country and in NYC, including Baruch College Campus High School, Chelsea High School, High School for Environmental Studies, and others. Over the course of a 3-5 year collaboration, The Cloud Institute works with educators and administrators on the implementation of Education for Sustainability systems in the classroom, institutionally and in the community. Cloud’s “whole systems” approach aligns curricula with Sustainability Education Standards and Performance Indicators, including:

- Dynamics of Systems Change,
- Responsible Local and Global Citizenship,
- Cultural Preservation and Transformation,
- Sustainable Economics,
- Healthy Commons,
- Natural Laws and Ecological Principles,
- Inventing and Affecting the Future,
- Multiple Perspectives,
- Sense of Place.⁷³

⁷² *EfS Curriculum Design Workbook*, The Cloud Institute for Sustainability Education, 2011.

⁷³ Ibid.

New York Sun Works

New York Sun Works, the 501(c)3 responsible for the well-received Science Barge in the New York Harbor, supports the STEM (Science, Technology, Engineering & Mathematics) framework by providing innovative science programming⁷⁴ through the Greenhouse Project. The Greenhouse Project, sited in 8 NYC school communities as of December 2011, uses recirculating hydroponic technology to grow vegetables in classrooms, “giving students year-round access to complex physical systems and hands-on pedagogy”. Students learn water resource management, plant science, habitat development, climate change, land use, and nutrition.⁷⁵ The vegetables grown in New York Sun Works’ classroom labs can be utilized by School Food through the DOE’s Garden-to-Café program. New York Sun Works’ hydroponic systems come offline during the summer when school is out.

Competitions & Grants

The behavioral uptake models above require planning and time to implement. For a “plug and play” sustainability program to launch culture change at ESCHS, there are several sponsored competitions and grants to consider like the Green Cup Challenge, the Solar One Green Design Lab Challenge, and the City’s Grow to Learn mini garden grant initiative, all of which offer a low cost/high community engagement points of entry for school-wide sustainability education programs. They also offer strategies to raise ESCHS’ Energy Performance Rating and reduce GHG emissions.

The Green Cup Challenge is a national program that invites all schools to measure and reduce electricity use and GHG emissions. The goal of the 2010 Green Cup Challenge was for all participating schools to work to achieve an aggregate energy use reduction of at least 7%; the winner in the New York Metropolitan area was PS 166, which reduced electricity use by 15,380 KWH and saved 20,609 lbs. of CO2 emissions.⁷⁶

Thirty NYC schools are participating in the **Solar One Green Design Lab Challenge** 2011-2012, which furnishes schools with a 10-week energy module curriculum, the National Standards Aligned Curriculum and Guide, designed to provide “comprehensive hands-on learning opportunities such as building performance and energy efficiency, indoor and outdoor air quality, waste conservation, schoolyard habitats and non-toxic cleansers.” The school that

⁷⁴ New York Sun Works’ current school partners: www.nysunworks.org/projects.

⁷⁵ Greater detail on New York Sun Works’ methodology: www.nysunworks.org/education/teacher-training-at-the-sun-works-center.

⁷⁶ www.Greencupchallenge.net/nyc/index.html.

reduces its energy use the most during the competition is eligible for a \$30,000 grant.⁷⁷

Finally, ESCHS can jump start its garden program in 2012 by joining **Grow to Learn/ NYC's Citywide School Gardens Initiative**, which offers expert assistance and mini grants of \$2,000 to schools for plant bed materials.⁷⁸

These programs are just a sampling of stand-alone sustainability education modules, and each could serve as a starting point for ESCHS in shifting its paradigm to sustainability awareness and proaction.

⁷⁷ www.solar1.org/education/greendesignlab.

⁷⁸ www.growtolearn.org.

Final Recommendations:

Facility:

- Adopt student plate scraping and composting program to divert food waste from the solid waste stream, increase garden use;
- Adopt Flip-Tap-Stack system to further reduce solid waste volume;
- Switch from Styrofoam to biodegradable Bagasse trays to reduce ecological impact and GHG emissions;
- Implement school-wide computer power management settings optimized to ESCHS' calendar and user patterns;
- Enforce computer power-down practices across user base w/point-of-decision signage;
- Conduct a cost-benefit analysis of occupancy sensors for hallway lighting, consider same for restrooms;
- Custodial staff time permitting, remove AC units from windows during the winter;
- Seek guidance on available resources from the DOE Department of Sustainability.

Behavioral:

- Engage ESCHS Parents Association in fundraising for Bagasse trays;
- Form student teams to circulate building at the end of each school day to turn off computers, lights;
- Initiate partnerships with environmental organizations;
- Join the Green Cup Challenge in 2012;
- Apply for the Solar One Green Design Lab Challenge for 2012-2013;
- Join Grow to Learn & apply for mini garden grant;
- Create committee to determine timeline for full integration of sustainability into curriculum;
- Broaden ESCHS' private and nonprofit partner network to build a funding stream, laying the foundations for change.

Agency:

- Improve communications with Sustainability Coordinators;
- Allocate budget for Sustainability Plans;
- Determine and publicize sustainability performance percentage in school performance grades;
- Establish mechanisms for holding schools accountable for electricity consumption and waste output practices to incentivize conservation measures;
- Work with unions to streamline environmental trainings;
- Establish & enforce agency-wide computer power management best practices;
- Empower Sustainability Coordinator by granting greater authority to advance school's Sustainability Plan.

Conclusion:

With an Energy Performance Rating of 2, ESCHS is facing an uphill battle between now and 2017. Bridging the wide gap, between 2 and the DOE's "acceptable" rating of 75, will require a new environmental paradigm at all levels of school operations, from fostering students' mental frame for sustainability education, to empowering the Sustainability Coordinator, training the facilities team in new practices, and creating innovative partnerships with the Parents Association. In order to get to where the DOE requires ESCHS to be in 5 years and reconcile ESCHS' Energy Performance Rating, the school has no choice but to cultivate a culture of sustainability.

Administrators and staff at ESCHS, like all NYC public schools, are stretched too thin and pulled in too many directions. With little fiscal incentive, these recommendations may feel burdensome and untimely. But the public cost of continuing the ESCHS status quo in GHG emissions, and the inevitability of being held accountable by the City and the DOE for energy efficiency and waste stream performance in the future are compelling reasons to overhaul the ESCHS operational philosophy and methodology.

Mayor Bloomberg did not come to office planning to be a green mayor. PlaNYC grew out of statistics presented to the Mayor early in his tenure projecting a surge of 1,000,000 in population over the course of one generation. In order to guarantee a healthy, prosperous quality of life to New Yorkers, becoming a sustainable mayor became a necessity.

ESCHS has an obligation to its students and their communities to cultivate leaders in sustainability for the next generation, to the DOE to shrink its carbon footprint, and to the City to do its part. Most importantly, ESCHS has an enormous opportunity to rise to this challenge.

APPENDIX I. KITCHEN & CAFETERIA FOOD WASTE DIVERSION COST-BENEFIT ANALYSIS⁷⁹

Assumptions:

- 1) DOE/DCAS CO2 emissions factor, Mlbs158.02830.⁸⁰
- 2) 37 weeks per school year.⁸¹
- 3) Every lunch generates approximately same percentage of food waste to overall solid waste for kitchen/cafeteria.
- 4) Solid to food waste quantity and proportion held constant w/student head count.
- 5) Friday lunch for 190 students calculated as 48% of standard 340-lunch audit findings.

	T Bfast for 50; Lunch for 340	M,W,TH Bfast for 50; Lunch for 340	FR Bfast for 50; Lunch for 190	M-FRI
# Garbage bags	14	14	6.72	
Garbage bags, lbs.	949	949	493.48	
Food waste, lbs.	105	105	44.41	
Food as % of total	9.04	9.04	9.04	
Food waste per week				386.05
Food waste lbs. per year				14,283.85
CO2 Emissions				2,257.25
DSNY annual savings @ \$70 per ton for hauling⁸²				\$499.93

⁷⁹ Data from waste audit conducted with student environmental committee on 11/8/11; audit conducted with curbside school garbage outside cafeteria at 3:30pm, containing breakfast and lunch; interview with Marianney Abreu, Director, School Food, ESCHS.

⁸⁰ DOE/DCAS emissions factors provided by Liliya Shames, Deputy Director of Optimization, DOE.

⁸¹ 37-week school year based on 2011-2012 ESCHS online calendar.

⁸² The City of New York Department of Sanitation. *DSNY Annual Report 2010: Making New York Cleaner and Greener*, 2010.

APPENDIX II.

COST COMPARISON: STYROFOAM LUNCH TRAY⁸³ VS. BIODEGRADABLE ALTERNATIVE

Assumptions:

- 1) Breakfast: Food Boat #3; M-F; number of students served daily averages 50; 500 trays per case.
- 2) Standard Lunch: Styrofoam tray; M, W, TH, F for 340 students(M-TH); 190 students F; 500 trays per case.
- 3) Trayless Tuesdays Lunch: Food Boat #4; 340 students; 500 trays per case.

Status Quo ESCHS food tray supply model:⁸⁴

Tray type	Cost per case (500)	# Required per week	# Per 37 wk. school yr.	Total cost	Cost per unit
Styrofoam lunch	\$13.01	1210	44,770	\$1164.91	.026
Food Boat bfast, #3	\$15.05	250	9250	\$278.42	.03
Food Boat lunch, #4	\$18.27	340	12,580	\$458.67	.036

Alternative Bagasse food tray supply model:

Tray type	Cost per case (500)	# Required per week	# Per 37 wk. school yr.	Total cost	Cost per unit
Food Boat bfast, #3	\$15.05	250	9250	\$278.42	.03
Bagasse tray, 10.2x5.1x2.3 inches	--	1550	57350	\$4,014.50	.07 ⁸⁵

⁸³ Food boats (paper) and Styrofoam (polystyrene) currently in use.

⁸⁴ Interview with Marianne Abreu, School Food Director, ESCHS.

⁸⁵ Lowest cost per bagasse sugarcane tray sourced at supplier URL: zongxun.en.alibaba.com.

APPENDIX III. COMPUTER ELECTRICITY USAGE⁸⁶ COST-BENEFIT ANALYSIS

Assumptions:

- 1) DOE/DCAS CO2 emissions factor for KWH / 0.77304.⁸⁷
- 2) 8.5-hour school day; 37 weeks per school year.⁸⁸
- 3) Electricity rate of \$.14 per KWH includes demand, which is not reflected on ESCHS electricity bill.⁸⁹
- 4) Data represents 46% sample of 298-computer inventory.⁹⁰

Computer Model	Quantity @ ESCHS	KWH per hr.	24/7 x 37 wks./ emissions	School day, M-F x 37 wks./ emissions ⁹¹	Annual emissions per computer model en masse ⁹²	Annual cost per single computer	Annual cost per model en masse
Dell Latitude E6500, laptop	68	0.012	74.59 / 57.66	18.87 / 14.59	3920.88	\$2.64	\$179.52
Dell Optiplex GX620	23	0.04	248.64/ 192.81	62.9 / 48.62	5718.72	\$8.81	\$202.63
Dell Optiplex 760	26	0.47	2921.52/ 2258.45	739.075/ 571.33	58,719.7	\$103.47	\$2690.22
Maxsuma Generic	19	.46	2859.36/ 2210.39	723.35/ 559.18	10,624.42	\$101.27	\$1924.13
Energy Star home computer standard ⁹³	1	N/A	287.28/ 222.08	101.75 / 78.66	N/A	\$14.24	N/A

⁸⁶ Data collected by "Kill-A-Watt" device during weekly Tuesday student environmental committee meetings.

⁸⁷ DOE/DCAS emissions factors provided by Liliya Shames, Deputy Director of Optimization, DOE.

⁸⁸ 37-week school year based on 2011-2012 ESCHS online calendar.

⁸⁹ Interview with Ozgem Ornektekin, Director of Sustainability, DOE.

⁹⁰ Sourced from ESCHS electronic inventory provided by Rene Betances, Computer Technician ESCHS.

⁹¹ Assumption: school power management settings are used and on weekends, computers are shut down.

⁹² Based on 24/7 x 37 wks./emissions figures.

⁹³ EPA. "Household Emissions Calculator, Assumptions and References", www.epa.gov/climatechange/emissions/ind_assumptions.html, adjusted per 37 wk. school year.

APPENDIX IV. COST COMPARISON: LAMPS W/ELECTRONIC BALLASTS VS. LAMPS W/OCCUPANCY SENSORS⁹⁴

Table sourced from the EPA's *ENERGY STAR Building Manual*⁹⁵

Retrofit option	Base case: Energy-saving T12 lamps with magnetic ballasts	Case 1: T8 lamps with electronic ballasts	Case 2: High-performance T8s with electronic ballasts	Case 3: Case 2 + specular reflector + lens + 50% delamping	Case 4: Case 3 + occupancy sensing and daylight dimming
Average maintained foot-candles	25	30	28	25	26
Power per fixture (W)	156	116	90	45	49
Annual energy use (kWh)	7,507	5,568	4,320	2,160	1,275
Energy savings (%)	NA	26	42	71	83
Annual operating cost (\$)	826	612	475	238	175
Upgrade cost (\$)	NA	1,165	1,320	1,560	2,150
Simple payback (years)	NA	5.5	3.8	2.7	3.3

Notes: kWh = kilowatt-hour; NA = not applicable; W = watt.

Courtesy: *E SOURCE Lighting Technology Atlas* (2005)

Assumptions:

1. Fixture cleaning occurs at end of the rated life, base case. Assuming burn hours of 4,000 hours per year and a 20,000-hour rated life, that works out to five years between cleanings and a total dirt loss of 30 percent.
2. The specular reflector retrofit kit is designed to maintain the same spacing ratio.
3. The existing diffuser has yellowed and gathered sufficient adhesive dirt (which isn't easily removed during routine cleaning) to reduce transmittance by another 10 percent.
4. Energy costs: demand = \$10 per kilowatt per month (all 12 months of the year); consumption = 7¢ per kWh (all times of day).

⁹⁴ U.S. Environmental Protection Agency, *ENERGY STAR Building Manual*, Chapter Six, "Lighting," Revised November 2006.

⁹⁵ Ibid.

APPENDIX IV. (Continued)

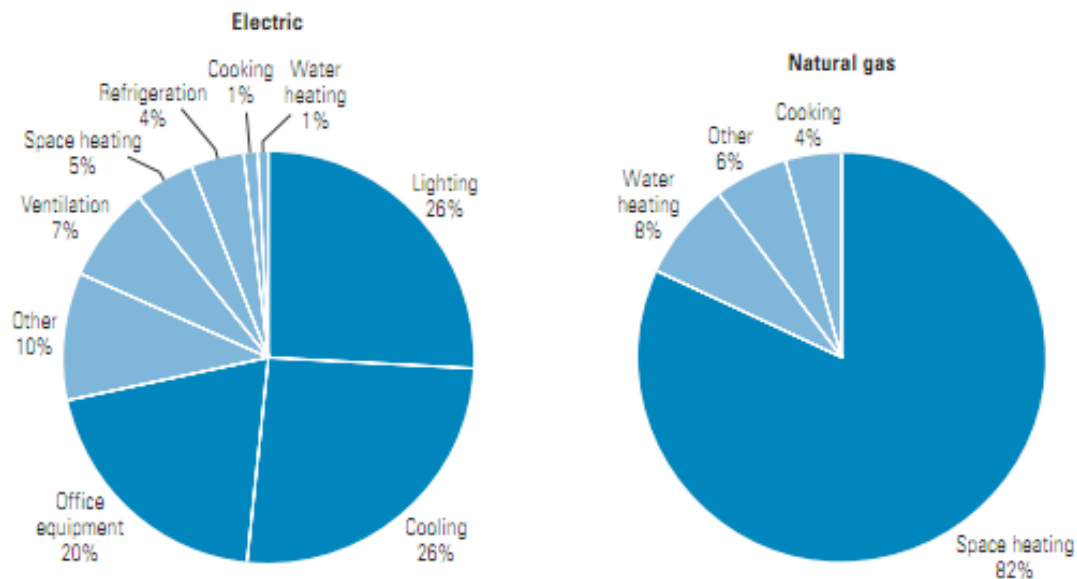
Additional Calculations, Occupancy Sensors:

Based on the EPA's *ENERGY STAR Building Manual*, Chapter 10, "K-12 Schools," 26% of electricity in schools is used by lighting which, for the purpose of a potential savings demonstration, when applied to ESCHS' "current" electricity costs (\$254,158.380) in Appendix VI., amounts to **\$66,081.18 for ESCHS lighting.**

Assuming ESCHS' hallways are 15% of all lighting (likely a low assumption given width), annual **hallway lighting electricity costs would total \$9,912.18.**

According to EPA averages,⁹⁶ occupancy sensors alone could cut those costs in half to **hallway lighting savings of \$4,956.09.** (EPA estimates payback in energy savings on investment to be approximately 3 years.)⁹⁷

Charts sourced from the EPA's *ENERGY STAR Building Manual*⁹⁸



Courtesy: E SOURCE; from Commercial Building Energy Consumption Survey, 1999 data

⁹⁶ U.S. Environmental Protection Agency, *ENERGY STAR Building Manual*, Chapter Six, "Lighting," Revised November 2006.

⁹⁷ Ibid.

⁹⁸ U.S. Environmental Protection Agency, *ENERGY STAR Building Manual*, Chapter 10, "K-12 Schools," Revised November 2006.

APPENDIX V. INTERVIEW LOG

East Side Community High School:

10/31/11, Marianne Abreu, School Food Director
11/09/11, Rene Betances, Computer Technician
09/15/11, Mark Federman, Principal
Various, Erica Ring, Sustainability Coordinator & 11th Grade Science Teacher
09/23/11, Ronald St. Hillaire, Chief Custodian
12/12/11, Jim Wallace, Director, Procurement
12/22/11, Mark Federman

High School for Environmental Studies:

12/07/11, Rachel Santiago, Assistant Principal, Mathematics and Science
12/07/11, Mike Hajnacki, Teacher, AP Bio and Science; YES club director
12/07/11, Jenn Hezel, Operations & Finance Manager, Friends of the High School for Environmental Studies
12/13/11, Chief Custodian

Alain L. Locke Magnet School for Environmental Stewardship (P.S. 208):

10/24/11, Susan Green, Principal
10/24/11, Ms. Adebisi, Director, Environmental Stewardship

Columbia University:

10/21/11, Helen Bielak, Manager, Surplus Reuse Program, Department of Environmental Stewardship
Emails sent to author, 10/5-10/13/11, Kathy Callahan, Associate Director, Columbia Water Center, The Earth Institute
Emails sent to author, 11/12/11, Nancy Degnan, Executive Director, Center for Environmental Research and Conservation, The Earth Institute
10/06/11, Sabine Marx, Managing Director, Center for Research on Environmental Decisions
09/22/11, Nilda Mesa, Assistant Vice President of Environmental Stewardship

Department of Education:

12/13/11, Ozgem Ornektekin, Director of Sustainability
10/12/11, Liliya Shames, Deputy Director of Optimization
12/19/11, Peter LaBarca, Computer Systems Manager

New York Sun Works: 11/11/11, Laurie Schoenman, Director

GrowNYC: 11/14/11, Robbie Locke, Recycling Champions Coordinator

Earth Matter: 10/21/11, Marisa DeDominicis, Earth Matter Coordinator

APPENDIX VI. ESCHS "Statement of Energy Performance"⁹⁹

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

Please keep this Facility Summary for your own records; do not submit it to EPA. Only the Statement of Energy Performance (SEP), Data Checklist and Letter of Agreement need to be submitted to EPA when applying for the ENERGY STAR.

Facility
0100070
420 East 12th Street
Manhattan, NY 10009

Facility Owner
N/A

Primary Contact for this Facility
N/A

General Information

0100070	
Gross Floor Area Excluding Parking: (ft ²)	144,175
Year Built	1923
For 12-month Evaluation Period Ending Date:	June 30, 2011

Facility Space Use Summary

MDF/Server Room		M060 (JHS 60)	
Space Type	Data Center	Space Type	K-12 School
Gross Floor Area(ft ²)	175	Gross Floor Area(ft ²)	144,000
IT Energy Configuration	IT Energy is not currently metered at this facility - Apply estimates.	Open Weekends?	No
		Number of PCs	397
Annual Source IT Energy (kBtu)	0	Number of walk-in refrigeration/freezer units	0
		Presence of cooking facilities	No
		Percent Cooled	0
		Percent Heated	100
		Months ^a	11
		High School?	No
		School District ^b	New York City Schools

Energy Performance Comparison

Performance Metrics	Evaluation Periods		Comparisons		
	Current (Ending Date 06/30/2011)	Baseline (Ending Date 01/31/2007)	Rating of 75	Target	National Median
Energy Performance Rating	2	18	75	N/A	50
Energy Intensity					
Site (kBtu/ft ²)	100	62	41	N/A	52
Source (kBtu/ft ²)	148	102	61	N/A	78
Energy Cost					
\$/year	\$ 254,158.38	\$ 188,467.25	\$ 104,765.83	N/A	\$ 132,810.36
\$/ft ² /year	\$ 1.76	\$ 1.31	\$ 0.73	N/A	\$ 0.92
Greenhouse Gas Emissions					
MtCO ₂ e/year	1,127	783	465	N/A	589
kgCO ₂ e/ft ² /year	8	5	3	N/A	4

More than 50% of your building is defined as K-12 School. Please note that your rating accounts for all of the spaces listed. The National Median column presents energy performance data your building would have if your building had a median rating of 50.

Notes:

a - This attribute is optional.

b - A default value has been supplied by Portfolio Manager.

⁹⁹ Statement provided by the DOE and generated by ESCHS Sustainability Coordinator 11/23/11.

APPENDIX VII.

ESCHS SUSTAINABILITY PLAN (Pages 30-34)

1. SCHOOL GREEN TEAM CONTACT INFORMATION

Name	Title	Phone	Email
Mark Federman	Principal	212-460-8467	MFederm@schools.nyc.gov
Erica Ring	Sustainability Coordinator	347-684-4860	ericar@eschs.org
Danielle Sadaphal	Teacher Rep.	212-460-8467	danielles@eschs.org
Joselyn Pena	Student Rep.	212-460-8467	ericar@eschs.org
Ronald St. Hillaire	Custodian Engineer	212-460-8467	rons@eschs.org
Martha Villaran	Parent Rep.	212-460-8467	marthav@eschs.org
Nathalie Elivert	UFT Chapter Leader	212-460-8467	nathalie@eschs.org

2. DEPARTMENT OF EDUCATION AGENCY SUSTAINABILITY GOALS

In order to continue to be the leader in sustainable education and operation of sustainable facilities, DOE plans to increase annual recycling rate by 2013, to reduce green house gas emissions by 30% by 2017 from DOE buildings and operations, to provide sustainable curriculum resources to principals and teachers, to participate in citywide PlaNYC initiatives and to set up programs to increase water efficiency.

3. LIST OF CURRENT SUSTAINABILITY PRACTICES

Green Team Action Items	Responsible Party	Progress to date
Energy and waste audit. Cost/benefit analysis. Implementation of new environmental practices.	Erica Ring	Energy audit complete. Waste audit complete.

4. SCHOOL SUSTAINABILITY GOALS AND ACTION ITEMS

ENERGY CONSERVATION

2011 - 2012 School Year Goal: 10% energy reduction/savings

Green Team Action Items	Responsible Party	Timeline
Create a program to turn off lights when not in use	Erica Ring	Custodians - implement immediately Student and teacher participation - 2nd semester

RECYCLING

2011 - 2012 School Year Goal: 50% of all waste to be separated as recyclables

Green Team Action Items	Responsible Party	Timeline
Have recycling bins in each classroom	Erica Ring	Pratt donated paper bins for every room and classroom. They are currently in use. Glass/plastic containers are set up in every room. By end of semester - double check signage above each sign.

ECOLOGY (PlaNYC Initiatives)

2011 - 2012 School Year Goal: Environmental Committee to get donations of high oxygen producing plants. Tree planting.

Large scale composting to be established in garden.

Bi-annual garden clean ups

Green Team Action Items	Responsible Party	Timeline
Sign up for Million Trees to get trees planted	Erica Ring	do tree planting during Earth Week or Arbor day.

GREEN CURRICULUM

2011 - 2012 School Year Goal: Provide Green Curriculum for the following grades: , 6, 7, 8, 9, 10, 11, 12

Green Team Action Items	Responsible Party	Timeline
Integrate Curriculum Resources from Sustainability Website	Erica Ring	Weekly environmental committee meetings. Annual climate change day: climate change labs in each science class followed by climate change assembly.

FY12 SCHOOL / BUILDING RECYCLING PLAN

Geographic District 1 Borough Manhattan
 Building Code M066 School Code M450

PLAN TO BE FULLY IMPLEMENTED BEFORE DECEMBER 31, 2011

Every member of the school community has both an ethical and legal responsibility to recycle in accordance with the following:

Local Law 19 (1989) Local Law 41 (2010) DSNY Recycling Rules Chancellor's Regulation A-850

MIXED PAPER & CARDBOARD

Recycling:

- Each classroom, office, entranceway, and common area maintains a separate receptacle, container or bin appropriately labeled or decorated with recycling information for the collection of designated recyclable paper including: all white, colored, and glossy paper; any envelopes, smooth cardboard (small boxes, tubes, paper packaging); paper bags; pizza boxes (empty – no food scraps); newspapers, magazines, soft cover books, comic books, and catalogs; phone books; and corrugated cardboard (flattened boxes).
- NOTE:** Staples, paper clips, tape, or glue are acceptable. Spiral bindings, hardcover books, and soft paper (issues, towels) are **NOT** acceptable.
- Paper recycling receptacles are clearly marked "Mixed Paper ONLY" or labeled with a GREEN decal from DSNY (NYC Department of Sanitation). Paper recycling receptacles are left unlabeled or lined with a CLEAR bag only.
- All unused corrugated cardboard boxes are flattened, and either tied in a bundle or placed in CLEAR bags, and stored for pick-up in an area designated by the Custodian Engineer / Building Manager.

Waste reduction:

- Waste reduction efforts include double-sided printing, format changes (such as narrower margins, smaller fonts, or printing two-pages-per-sheet), and spellchecking before printing. Remove names from duplicate or unwanted mailing lists. Wherever feasible, paper materials are reused by staff, teachers, and students as scrap paper or for Arts & Crafts projects, and corrugated cardboard boxes received through deliveries are reused as mixed paper recycling containers or other purposes.

BEVERAGE CARTONS, BOTTLES, CANS, METAL & FOIL

Recycling:

- School entrances (where feasible) and all locations where food and/or beverages are consumed (cafeteria, teachers lounge, and kitchen, other common areas, offices) maintains separate receptacles, containers or bins appropriately labeled or decorated with recycling information for the collection of designated metal, glass and plastic (MGP) including: milk & juice cartons and drink boxes; plastic bottles & jugs; glass bottles & jars; and any metal or foil items.
- MGP receptacles are clearly marked "Bottles & Cans ONLY" or labeled with a BLUE decal from DSNY. Labeled lids may be cut with a circular hole to reduce contamination. These recycling receptacles are lined with a CLEAR plastic bag.
- All food and beverage containers are EMPTY, and rinsed if possible, prior to being placed in the designated recycling receptacle. A separate bucket to collect liquids may be placed next to MGP bins in the cafeteria, and emptied frequently.
- NOTE:** The following items are **NOT** acceptable: any plastics OTHER THAN bottles & jugs; any glass OTHER THAN bottles & jars (e.g. NO Styrofoam, dinnerware, deli tubs, yogurt containers, plastic toys or other items; NO plate glass, mirrors, dishware, ceramics, or light bulbs).

Waste reduction:

Wherever feasible, staff and students are encouraged to consider reducing packaging waste, purchasing items made with recycled content, and using reusable and/or recyclable rather than disposable items such as cups and bottles.

E-WASTE

- Disposal and recycling of owned computer and multifunctional machines is done through the PCS (Personal Computer Services) contract free of charge. The vendors (ASi or Dell) are responsible for proper disposal of broken or obsolete DOE equipment (PCs, laptops, printers, servers and monitors), as well as updating of DOE inventory databases. Each school is responsible for contacting its current specific vendor (ASi or Dell, regardless of the brand name of the equipment being disposed or recycled).
- For BASIC plan subscribers, schools may dispose of a minimum of 20 pieces of obsolete equipment twice a year (October and April); STANDARD plan subscribers may dispose of a minimum of 20 pieces of obsolete equipment at any time during the year.

PRINCIPAL-APPOINTED SUSTAINABILITY COORDINATOR WILL:

- Ensure that teachers and staff receive a copy of this plan.
- Post this plan in the main office, cafeterias and on bulletin boards where appropriate.
- Promote recycling practices and support teachers in ensuring their students are following and practicing Recycling Rules.

CUSTODIAN ENGINEER WILL:

- Provide a copy of this plan to each of his/her employees and train them on recycling collection rules on this plan. Ensure all designated recycling and waste receptacles are lined with clear bags as needed. Keep designated recyclable materials separated as they are collected from recycling receptacles throughout the building and placed into larger CLEAR plastic bags (as needed) for DSNY pick-up.
- Ensure that school collects and disposes three separate streams in separate CLEAR plastic bags: (1) Mixed Paper, (2) Metal Glass and Plastic and (3) Garbage, and that each stream is set out in distinct separate piles for DSNY collection at designated time and days for this building.
- Set out bulk/scrap metal waste (large items) for scheduled metal, glass and plastic collection.
- Notify the Sustainability Coordinator(s) and Principal(s) of any non-compliant rooms, areas or staff.

DOE Director of Sustainability, Ozgen Ormektekin at: sustainability@schools.nyc.gov may be contacted for assistance with custodial, Sanitation, or school concerns as related to any recycling issues. DSNY school recycling info, decals, signage, and educational materials are available at: www.nyc.gov/recycle

Mark Federman _____ Angela Iannicello _____ JEFF BRADY _____
 Principal (print name) Sustainability Coordinator (print name) Custodian Engineer (print name)

 Signature/Date Signature/Date Signature/Date



Division of School Facilities

Monday, November 21, 2011 Welcome Angela Ianniello

Final Sustainability Plan Application

COORDINATOR ROLES AND RESPONSIBILITIES

HELP

LOGOUT

Welcome to Final Sustainability Plan Entry Page

Bldg ID: M060

Location Code: M450

Please note: You need to complete all Green Team Contact Information and at least one goal and action item for Energy Conservation and Recycling before you can submit the Final Sustainability Plan to DSF.

Green Team Contact Information (required)

Please note: You need to complete all Green Team Contact Information and click the Save Green Contact Info button. Not doing so will result in data loss!

Title	First Name	Last Name	Phone	Email
Principal	Mark	Federman	212-460-8467	MFederm@schools
Sustainability Coordinator	Erica	Ring	347-684-4860	ericar@eschs.org
Teacher Rep.	Danielle	Sadaphal	212-460-8467	danielles@eschs.org
Student Rep.	Joselyn	Pena	212-460-8467	ericar@eschs.org
Custodian Engineer	Ronald	St. Hillaire	212-460-8467	rons@eschs.org
Parent Rep.	Martha	Villaran	212-460-8467	marthav@eschs.org
UFT Chapter Leader	Nathalie	Elivert	212-460-8467	nathalie@eschs.org



Save Green Contact Info.

Current Sustainability Practices

Click Add new Current Sustainability Practices button to add recycling, energy conservation, ecology, or green curriculum activities currently ongoing in your school.

		Current Practices	Responsible Party First Name	Responsible Party Last Name	Progress To Date
		Energy and waste audit. Cost/benefit analysis. Implementation of new environmental practices.	Erica	Ring	Energy audit complete. Waste audit complete.






Add new Current Sustainability Practices

Energy Conservation (required)

Click Add new Energy Conservation Action Item button to add action items that your school will undertake to achieve this goal.

2011 - 2012 School Year Goal: 10% energy reduction/savings

 Update

		Green Team Action Items	Responsible Party First Name	Responsible Party Last Name	Timeline
		Create a program to turn off lights when not in use	Erica	Ring	Custodians - impliment immediately Student and teacher participation - 2nd semester





Add new Energy Conservation Action Item

Recycling (required)

Click Add new Recycling Action Item button to add action items that your school will undertake to achieve this goal.

2011 - 2012 School Year Goal: 50% of all waste to be separated as recyclables

		Green Team Action Items	Responsible Party First Name	Responsible Party Last Name	Timeline
		Have recycling bins in each classroom	Erica	Ring	Pratt donated paper bins for every room and classroom. They are currently in use. Glass/plastic containers are set up in every room. By end of semester - double check signage above each sign.




Add new Recycling Action Item

Ecology (PlaNYC Initiatives)



Click Add new Ecology Action Item button to add action items that your school will undertake to achieve this goal.

2011 - 2012 School Year Goal:

Environmental Committee to get donations of high oxygen producing plants. Tree planting.

 Update

		Green Team Action Items	Responsible Party First Name	Responsible Party Last Name	Timeline
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		Sign up for Million Trees to get trees planted	Erica	Ring	do tree planting during Earth Week or Arbor day.
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

 Add new Ecology Action Item


Green Curriculum

Click Add new Green Curriculum Action Item button to add action items that your school will undertake to achieve this goal.

2011 - 2012 School Year Goal: Provide Green Curriculum for the following grades:

☐ Pre- ☐ K ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ 6 ☒ 7 ☒ 8 ☒ 9 ☒ 10 ☒ 11  Update
☒ 12

		Green Team Action Items	Responsible Party First Name	Responsible Party Last Name	Timeline
		Integrate Curriculum Resources from Sustainability Website	Erica	Ring	Weekly environmental committee meetings. Annual climate change day: climate change labs in each science class followed by climate change assembly.

 Add new Green Curriculum Action Item

Submit Final Sustainability Plan To DSF