NEW YORKERS' CONTRIBUTIONS TO A GREENER, GREATER CITY: A BEHAVIORAL IMPACT STUDY

SMALL STEPS, BIG STRIDES.

greeNYC

The City of New York
NYC Mayor's Office

New Yorkers' Contributions to a Greener, Greater City: A Behavioral Impact Study

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Executive Summary

New York City is one of the first and largest cities in the United States to recognize the importance of reducing ***greenhouse gas (GHG)***[1] emissions and to commit to leading by example. In 2007, the City launched an unprecedented effort to make New York City a greener, greater city and prepare for the economic opportunities and environmental challenges ahead. At the heart of the plan is a commitment to reduce the city's greenhouse gas emissions 30 percent below 2005 levels by 2030. Through the work of more than 25 City agencies in developing policy, enhancing infrastructure, and making capital investments, remarkable progress has already been made toward fulfilling the plan's goals. The City has planted 750,000 new trees, developed hundreds of acres of new parkland, created better access to public transportation, and enacted the country's most ambitious green building laws. Already the city's GHG emissions have shrunk by 16 percent.[2]

The individual actions of over eight million New Yorkers can also drive significant environmental change. The countless decisions New Yorkers make every day, e.g. whether to drive or take public transit, and which kind of light bulb to buy, add up—fast. In 2011, residential energy use and driving activities accounted for more than half of the city's GHG emissions.[3] Significant environmental change cannot happen without the support and engagement of New Yorkers. For example, compliance with laws such as the one that prohibits car idling is inherently an individual action that is essential to achieving the policy objective of reducing air pollution. Apart from laws and policies, residents can also drive positive change through voluntary actions.

Recognizing the importance of individual behavior in reducing GHG emissions, the City launched ***GreeNYC***. GreeNYC seeks to catalyze and harness the power of ordinary New Yorkers to help reduce the city's GHG emissions and improve environmental quality. To do so, GreeNYC conducts strategic education campaigns utilizing several channels, including out-of-home media, digital communications, radio, events, City-owned assets, and partnerships with City agencies and private sector companies. With a strong brand supported by the recognizable "Birdie" mascot, GreeNYC's strategic education campaigns include encouraging residents to switch to energy-efficient light bulbs, stop car engine idling, and drink tap water.

To enhance the effectiveness of its outreach, GreeNYC sought to better understand how New Yorkers think about and behave toward the environment, which actions have the potential for the most impact, and what would motivate residents to engage in those actions. The Mayor's Office of Long-Term Planning and Sustainability (OLTPS) commissioned research by consulting firms Dalberg Global Development Advisors and GlobeScan. The main questions addressed by the research and this study here:

- What are the most impactful actions New Yorkers can take to reduce the city's GHG emissions and improve environmental quality?
- What messaging would motivate New Yorkers to take these actions?
- How can GreeNYC assess its effectiveness and measure the contribution of residents toward the City's sustainability goals?

The study quantified the environmental benefits of more than 200 individual actions—such as recycling more paper, insulating windows, changing dishwasher settings—and highlighted those with the greatest potential for helping reduce the city's GHG emissions and improving environmental quality. A supporting survey of more than 2,000 New Yorkers provided a fascinating glimpse into current environmental behavior and outlined what messages or incentives would motivate residents to do more. The findings are an unprecedented study of urban environmental behavior, motivation, and actions that can guide GreeNYC's campaigns. They also provide undeniable confirmation of the potential of ordinary New Yorkers to make their city a greener, greater place.

[1] Words in bold and italics are defined in glossary section of appendix, page 27.
[2] 68% of the city's GHG reductions are a result of the reduced carbon intensity of the city's electricity supply.
[3] 37% from residential energy use and 145 from passenger car use, Inventory of New York City Greenhouse Gas Emissions December 2012

Key Findings

New Yorkers understand the importance of environmental problems and believe in their own power to solve them.

- New Yorkers identify themselves and their local government as the most powerful agents of environmental change.
- 43 percent of New Yorkers surveyed reported a high level of concern and a relatively low level of skepticism about environmental problems.
- New Yorkers already engage in activities to increase energy and transportation efficiency.
- New Yorkers want to do more. They reported a high intention to increase energy efficiency in the home, consume ***sustainable food***, recycle more paper, and purchase gasoline-hybrids or electric vehicles.

By engaging in the ten highest-impact actions, New Yorkers can reduce the city's ***carbon footprint*** by 7.5 percent—achieving one-quarter of the City's target.

- High impact actions in New York City include those that increase energy efficiency, induce a shift toward ***renewable energy*** supply, increase the efficiency of vehicle-based transportation, and shift food purchase patterns toward sustainable alternatives.
- These top-ten actions would together eliminate four million metric tons of CO_2e and achieve one-quarter of the city's emissions reduction goal.
- Engaging residents to reduce their carbon footprint has the potential for emissions reductions comparable to those of two other important city initiatives - greening the City's codes (6.2%) and sustainable transportation (6.3%) (see Fig. 1).

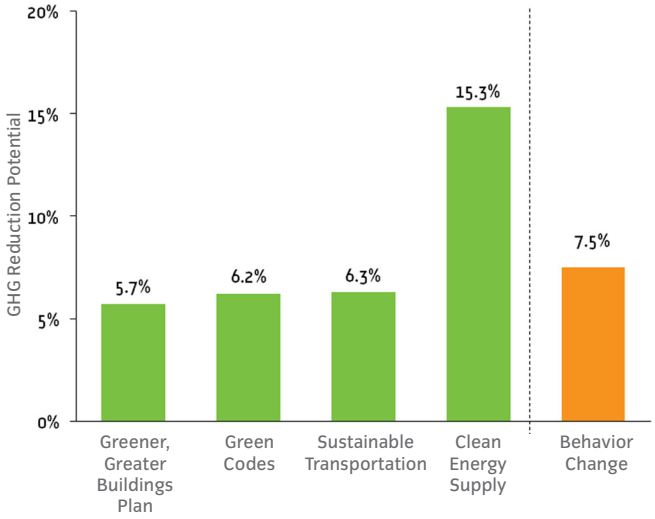
New Yorkers can improve environmental quality[4] by reducing their use of fossil-fuel based transport, switching to renewable energy, and reducing and recycling waste.

- Residential waste currently comprises 25% of the New York City waste stream, the largest components of which are paper (30%) and organics (39%).[5] By engaging in simple actions that reduce paper, textile and food waste, New Yorkers could eliminate over 200,000 tons per year from the waste stream.

The prime motivator of sustainable behavior is the potential for cost savings. However, New Yorkers' motivations vary widely based on the type of action.

- Cost savings were the primary motivation for the majority of actions (especially for those actions relating to energy efficiency), with concern for the environment ranked as the second most important motivation.
- Other important considerations included comparable cost if the action impacted a purchasing decision (e.g., light bulbs), health if the action impacted eating habits, and convenience and personal comfort if the action required a change in behavior (e.g., adjusting the thermostat setting).

Figure 1: Top PlaNYC Levers for Reducing NYC GHG Emissions



[4] For the purpose of this study, environmental quality is defined in terms of ***particulate matter*** in air tonnage of solid waste generated, tonnage of recycling, and tonnage of composting.
[5] 2004-2005 Waste Characterization Study, The City of New York Department of Sanitation (DSNY)

New York residents are a diverse set of individuals. The study labeled five segments of New Yorkers, with varying attitudes toward environmental issues and levels of inclination to engage.

A segmentation analysis identified the common traits and demographics for five relevant groups of New York residents:

- **Inadvertent Greens** have the highest current environmental engagement but lowest intention for future engagement. They tend to be affluent and young or middle-aged.

- **Pragmatic Homeowners** are average in current behavior and moderately willing to change. They tend to be older married homeowners in Queens and Staten Island.

- **Young Urbanites** are average in current behavior and report a high willingness to change. They tend to be young apartment dwellers in Manhattan.

- **Aspiring Greens** are average in current behavior, but report the highest willingness to change. They tend to be middle-aged and long-time New Yorkers.

- **Skeptics** are the least environmentally active, with minimal intention to change. They tend to be younger and renters.

GreeNYC can considerably enhance the effectiveness of its outreach by understanding the characteristics of, and media use patterns associated with, two segments of residents in particular: those currently engaged in green behaviors and those most likely to change behavior.

Moving Forward

Poised at the intersection of residents and local government, GreeNYC is ideally positioned to engage residents to drive long-lasting environmental change in New York City. This in-depth study has validated the potential impact residents can have through voluntary actions and has provided GreeNYC with the tools to take a data-driven approach to critical marketing elements of content, messaging, and media planning. GreeNYC now has the means to measure the success of its campaigns and quantify the environmental impact of resulting behavioral change. GreeNYC is well positioned to use its strong brand, combined with the quantitative approach exemplified here, to better target fundraising efforts and partnerships.

GreeNYC should focus its efforts on the two segments of New Yorkers with the highest intention to improve behavior as identified by the segmentation analysis. Together, these segments (Pragmatic Homeowners and Aspiring Greens) represent nearly half of the city's population. The study also shows that efforts to increase awareness and leverage good intentions by individuals must be accompanied by the government providing the necessary infrastructure and resources. As such, it is critical to continue implementing PlaNYC, whether by securing access to recycling bins and composting resources for NYC residents or developing a policy framework for energy efficiency in smaller buildings. Policy-makers must simultaneously provide the opportunities for residents to exercise good behavior and the education and motivation for them to actually do so.

As cities around the world look to meet the environmental challenges of today and tomorrow, this study demonstrates the often untapped potential that lies in combining City-led initiatives with motivational campaigns directed at urban residents. Educating, empowering, and enabling urban residents to make their cities greener will yield quantifiable benefits when combined with the appropriate municipal actions. Understanding residents behavior, motivations, and potential impact is a first step to leveraging their very real power to make and contribute to reduce GHG emissions and contribute to long-lasting environmental change.

Credit: GrowNYC

Introduction to GreeNYC

GreeNYC is the public education arm of NYC's sustainability strategy. GreeNYC's mission is to encourage New York City residents to adopt sustainable practices in their daily lives. GreeNYC's campaigns seek to present a compelling case for behavior change at the individual level using simple, action-oriented messages. By addressing individual actions, GreeNYC is able to use voluntary behavior change as a lever to address important components of sustainability that complement or fall outside the realm of policy & legislation.

GreeNYC's Approach

A strong brand: The GreeNYC brand was conceived with the intention to shift away from using the shaming, guilt, and fear-inducing approaches that have been commonly used to drive environmental behavior change, and thereby increase engagement and appeal beyond those already inclined toward green behaviors. To increase the accessibility of the brand, the mascot "Birdie" was created (see Fig. 2). Birdie is designed not as an authority on all things environmental, but instead as a New Yorker, engaging in the behaviors he is encouraging. In addition to being featured graphically in GreeNYC materials, Birdie also represents GreeNYC at events in the city to build awareness and participation. A recent survey of New Yorkers found that 40 percent were familiar with the mascot's image, a demonstration of Birdie's success as representative of GreeNYC.

Focus on impact through a 'single' behavior at a time: Encouraging individuals to change behavior is a long-term process. GreeNYC's goal is to catalyze an eventual shift in the mindset and decision-making processes of individuals while at the same time bringing about specific behavior change in the short term. To maximize the benefit and impact of its outreach, GreeNYC aims to identify the most impactful actions residents can engage in based on the city's GHG emissions and environmental quality challenges (air pollution, solid waste generation and recycling, litter, and water pollution), and encourage a shift in those behaviors. Residents are often bombarded with multiple messages when asked to engage in sustainable behavior. "Top 10" lists and "How to Guides" typically contain multitudes of recommendations ranging from energy use patterns, e.g., using smart strips and changing thermostat settings, to recycling more or shifting toward public transit. By contrast, GreeNYC asks individuals to engage in a single action at a time, optimized as something New Yorkers can easily do. By promoting simple and singular actions, GreeNYC allows individuals to experience the benefits of sustainable behavior and increases the likelihood of future engagement.

Strategic messaging: GreeNYC's campaigns are supported by multiple motivating messages to maximize uptake and appeal. These often include cost savings, health benefits, environmental benefits, etc. supported by facts and visuals. For example, the messages in the "Turn it Off" campaign, which targeted New York drivers, carried underlying motivations for turning off their engines, including reducing negative effects on health, wanting to prevent waste, reducing negative impacts on the environment, and the fear of being fined. As a tool for measuring engagement with this campaign, advertising managers also asked New Yorkers to call 311 to report idling. During this campaign, calls reporting idling to 311, NYC's non-emergency telephone line, rose by 111 percent.

Media strategy: Based on the target audience, GreeNYC uses multiple media platforms to reach New Yorkers, including out of home locations (subways, buses, billboards, etc.) radio, and digital media. As part of the New York City Mayor's Office, GreeNYC also has access to unique City assets, such as highway message boards and space on City fleet vehicles.

Unification of the "City's Voice": To maximize the effectiveness of communication, GreeNYC has made a strong effort to work with existing and new programs across multiple city agencies. The goal of these efforts is to allow the City to have one "Green" voice for communicating with residents. For example, Birdie has appeared as the face of MulchFest, a New York City Department of Parks and Recreation and Department of Sanitation initiative to recycle Christmas trees. Birdie has worked with the Department of Citywide Administrative Services to create signage in every City-owned building to promote energy efficiency, and partnered with the Department of Transportation to promote cycling.

Private sector partnerships: GreeNYC campaigns are often structured in collaboration with private sector entities such as national retailers or foundations. These partnerships include funding for specific outreach. Partnerships enable GreeNYC to execute visible campaigns in what is a heavily media saturated market. GreeNYC has partnered with Bank of America, The Home Depot, Best Buy, Con Edison, Macy's and Whole Foods among others. These partnerships have enabled GreeNYC to generate over 1.5 billion media impressions for its campaigns. Through this partnership, GreeNYC was able to achieve over 500 million ***media impressions***.

Figure 2: GreeNYC's mascot Birdie appears visually in advertising materials, promotional items and physically at events.

Case Study: "Switch and Save"

Campaign Content

Improving New York City's energy efficiency is a pillar of PlaNYC as it will lead to lower energy costs, a more reliable grid, cleaner air and a smaller carbon footprint. While PlaNYC has focused on creating incentives and mandates for energy efficiency in institutional, commercial and industrial buildings, GreeNYC complemented those efforts by reaching out directly to New York City's 8.4 million residents and encouraging them to reduce their household energy usage. Lighting accounts for roughly 5% percentage of residential greenhouse gas emissions. Most New Yorkers are not aware of the simple steps they can take to shrink their lighting-related energy costs and help reduce New York City's energy consumption. Thus, GreeNYC, with the help of its partner The Home Depot, developed a public service campaign to educate New Yorkers about the financial and environmental benefits of CFL usage while empowering New Yorkers to Switch and Save. The goal of the campaign was to educate New Yorkers about the substantial energy and financial savings of using CFLs while addressing barriers of higher initial bulb cost and perception of unflattering lighting. In order to do so, GreeNYC's objective was to reach the greatest number of New Yorkers possible through its strategic media campaign and smart messaging.

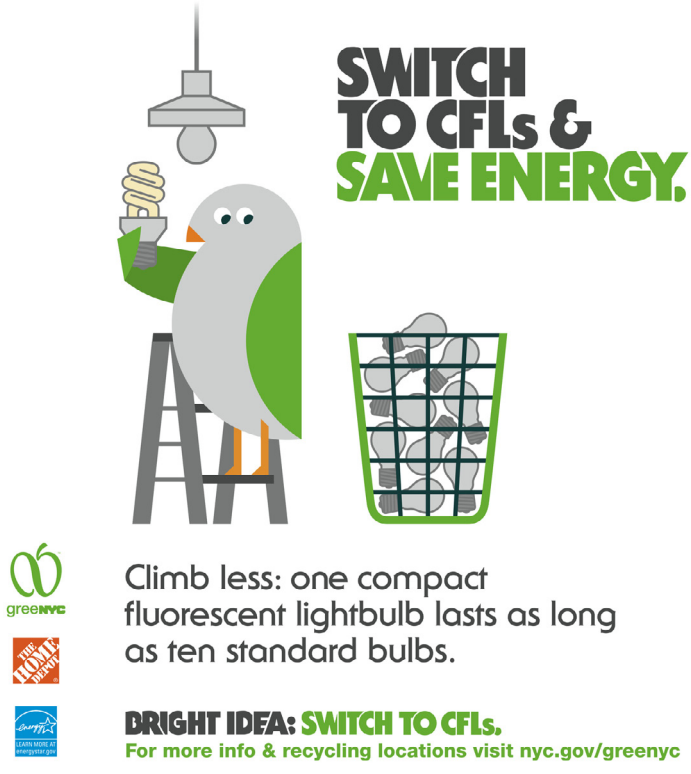
Media Strategy

GreeNYC's overarching media goal in any PSA campaign is to affect behavior change by maximizing impressions with New Yorkers in the most targeted and cost-effective manner possible. For the Switch & Save campaign, GreeNYC focused on reaching New Yorkers while they were out and about (i.e. billboards, subway cars, bus panels, etc.), during commuting (drive-time radio) and via digital communications.

Messaging Strategy: Save Energy, Money and Face

Switching to energy efficient light bulbs is likely to be the single most cost effective way to reduce home energy use, yet New Yorkers are still purchasing traditional incandescent bulbs. Research indicated that the primary barriers to purchasing CFLs were the higher purchase price, insufficient knowledge of the energy benefits, and concerns over unflattering light. GreeNYC's media strategy, artwork and messaging for the Switch & Save campaign strategically targeted each of these barriers.

Campaign's Creative



Campaign Execution: Billboards, Subway, Bus

Partnerships

GreeNYC partnered with The Home Depot for the Switch & Save campaign. In addition to financial support for GreeNYC's campaign, The Home Depot's commitment to promoting energy efficiency, their respected presence in NY and their extensive selection of compact fluorescent light bulbs made them a valuable partner for the campaign. The Energy Star logo also appeared on media materials to encourage New Yorkers to purchase energy efficient CFL light bulbs.

Campaign Results

The goal of the Switch & Save PSA campaign was to educate and compel New Yorkers to make the switch to CFLs. Because it is difficult with currently available data and technology to attribute reductions in citywide residential energy usage specifically to CFL lighting usage, GreeNYC determined that the best way to measure its campaign's effectiveness was to evaluate its reach. As a result of the campaign, GreeNYC increased issue awareness by generating close to 600 million media impressions among New Yorkers.

Credit: Vitality Piltser

Context

New York City created PlaNYC in 2007 with a bold agenda to build a greener, greater New York and meet the challenges of a growing population, aging infrastructure, a changing climate, and an evolving economy. Since 2007, this effort has yielded tremendous results. The city has added more than 200 acres of parkland while improving existing parks, created or preserved more than 64,000 units of affordable housing, provided New Yorkers with more transportation options, enacted ambitious laws to increase energy efficiency in buildings and has reduced GHG 16 percent below 2005 levels.

The City is engaged in a multitude of activities to attain the goals of PlaNYC. These include policy changes, infrastructure development, and capital investments. GreeNYC develops and launches strategic education campaigns to engage New Yorkers and encourage the actions needed to support and help fully realize NYC's sustainability goals.

Resident compliance is an essential element to ensure the success and impact of several policies. For example, New York City is expanding its bicycle lane network; engaging residents will increase usage and amplify the positive benefits of this investment. While policy design and implementation is a long and complicated process, the lifestyles and day-to-day activities of individuals constitute a major share of GHG emissions and environmental quality challenges. This means that residents stand to make a considerable impact. For example, in 2011, energy use in residential buildings accounted for 37 percent of New York City's GHG emissions. When individuals and households change behavior, the impacts are felt much more quickly than policy changes. Moreover, a grass-roots movement that encourages individual actions may take effect more quickly than top-down enforcement of new policies. Activities targeting shifts in individual behavior are also lowering cost relative to large scale infrastructure or capital based investments.

Encouraging shifts in individual behavior is not just faster and cheaper than policy-related actions, but also more impactful. When behavior changes are achieved, individuals become more likely to engage in additional activities. For example, small changes in energy use based on cost savings can encourage shifts toward other sustainable behaviors. Individual changes tend to become ingrained. For example, faced by droughts, multiple cities in Australia used public education to encourage water conservation. Per capita household water use subsequently dropped from 80 gallons to 37 gallons per capita per day. When the water shortage was resolved, water use increased only slightly, stabilizing to 38 gallons -- well below the unsustainable 80 gallons per capita level.

To achieve New York City's sustainability goals, the City must engage and empower residents to act. To enhance the strategy behind GreeNYC outreach, the following three questions needed to be answered:

1. Of the hundreds of actions New Yorkers can take, which have the biggest impact on the environment and should therefore be targets of GreeNYC campaigns? For instance, would it be more impactful if New Yorkers were to switch to energy efficient light bulbs or start recycling more paper?

2. What messages carry the most effective motivators for driving behavior change? Do people value tangible rewards (e.g., financial) more than psychological ones (e.g., improved global climate in future)? Are New Yorkers compelled by financial benefits (e.g., savings in an electricity bill), health benefits (e.g., reduced air pollution) or environmental benefits (e.g., reduced greenhouse gas emissions)?

3. How can GreeNYC measure the success and quantify the environmental impact of its campaigns (e.g., by the number of New Yorkers the campaigns reach or the number of individuals that change their behavior as a result of the campaign)? What environmental benefits are created as a result of the shifts in behavior?

Measuring impact involves a citywide GHG inventory, which provides an annual breakdown of the sources of the city's greenhouse gas emissions. The analysis also requires thorough research into the marginal impact associated with each type of consumer action, such as the amount of energy saved when an individual switches from an incandescent to an energy efficient light bulb. To conduct this research, gather this data and generate a rigorous, step-by-step methodology to answer these questions, the Mayor's Office engaged Dalberg Global Development Advisors, a strategic advisory firm that works to address global challenges, and GlobeScan, a research consultancy, to conduct this study.

Study Methodology

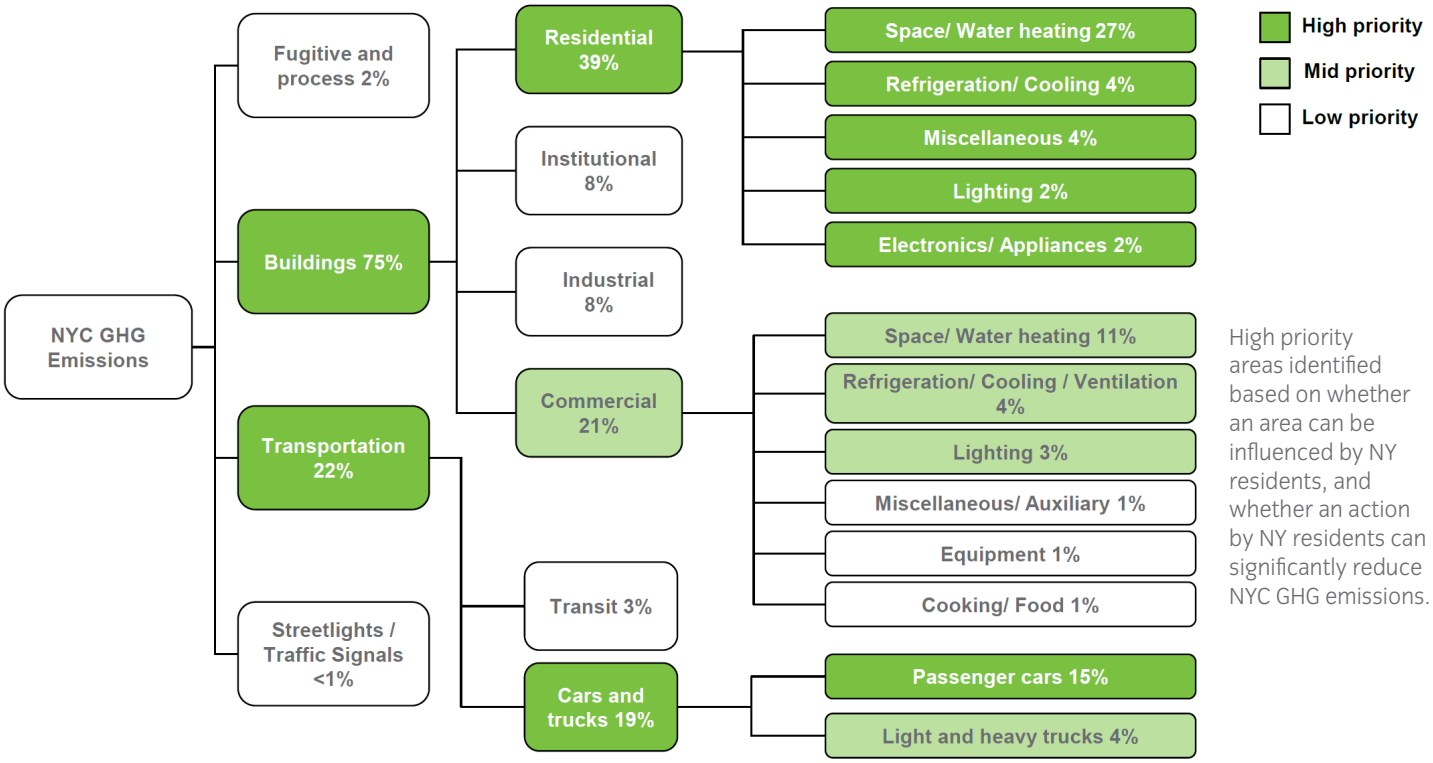
Over six months, Dalberg and Globescan conducted extensive academic research, interviewed field experts, gathered resident opinions in focus groups, administered a survey of over 2100 New Yorkers and consulted with leading New York City agencies and NGOs. The four phase process described below has provided GreeNYC with information essential to maximizing its resources and impact.

Phase 1: Identify Actions and Quantify Potential Impact

The City's annual inventory of New York City's GHG emissions served as the starting point to identify which individual behaviors correlate to the largest sources of greenhouse gas emissions and environmental quality degradation (see Fig. 3). For the purpose of this study, environmental quality was assessed based on air particulate matter, tonnage of waste generated, tonnage of recycling and tonnage of composting. Next, the team of consultants reviewed and analyzed PlaNYC goals to determine the areas where individual actions had the highest potential for contribution (e.g., individual action can contribute toward improved energy efficiency and increased recycling rates in residential buildings, but individual action does not build new subways or sewers). The research team then pinpointed over 200 actions that would reduce energy use, increase energy efficiency, or utilize more environmentally friendly resources to contribute toward these goals and toward sustainability more broadly.

Creating "day in the life" scenarios for New York renters, homeowners, commuters, students and others helped the team more accurately model the relationships between the impact of specific behavior changes, the portion of residents able and willing to change their behavior, and the extent to which their actions can reduce emissions. The potential impact of these actions was then estimated based on extensive academic research and consultations with multiple City agencies, research institutions and non-profit organizations. This included but was not limited to New York State Energy Research and Development Authority (NYSERDA), the New York City Department of Sanitation (DSNY), the New York

Figure 3: Example Fact Base - NYC Emissions stem mainly from buildings and transportation



High priority areas identified based on whether an area can be influenced by NY residents, and whether an action by NY residents can significantly reduce NYC GHG emissions.

City Department of Environmental Protection (DEP), Con Edison (privately-owned electric, gas and steam utility), Environmental Defense Fund (EDF), Columbia University's Center for Research on Environmental Decisions (CRED), GrowNYC, Natural Resource Defense Council (NRDC), The Urban Green Council, and Slow Food USA. All calculations were vetted with Mayor's Office sector analysts. This phase culminated in a list of actions ranked according to their potential to reduce greenhouse gas emissions and improve environmental quality.

Phase 2: Conduct Consumer Survey

To identify actions with the highest potential impact, the research team utilized scenario-based assumptions on potential impact, ranging from low (less than 1%) to high (greater than 75%) uptake. To more precisely determine existing engagement in these behaviors as well as possible future engagement, the second phase involved designing and conducting a representative survey of New York residents. The survey was administered online to 2,149 residents aged 18 and above living in New York City. Although internet panels have some limitations in providing a thoroughly representative population sample, evidence suggests that internet research is a reasonable indicator of consumer behavior in the United States. The research team set quotas on age, gender, borough, and education to mirror New York City demographics. The final data were weighted according to age, gender, education and borough to the 2000 US Census, and the 2008 American Community Survey, to correct any imbalances in the data.

The survey had three parts. The first part examined 16 high priority actions and endeavored to gauge the following:

- How many residents were already engaging in the action
- The reasons why these residents were engaging in the action
- The likelihood that those not currently engaging would do so
- What would motivate residents to modify their behavior

The second part of the survey tested general attitudes toward the environment, individuals' sense of responsibility toward environmental challenges, sentiments associated with recycling, donating, etc. The third part of the survey sought to better understand media habits in order to formulate an effective media strategy.

Phase 3: Analyze Data and Prioritize Recommendations

In this phase, data generated from the consumer survey was used to refine the impact of the 16 high priority actions tested, adjusting expected uptake according to survey results on the share of individuals already engaging in specific behaviors. Using additional data from the consumer survey, the team conducted a segmentation analysis of New Yorkers which allowed them to identify five groups of New Yorkers and their distinct environmental inclinations and media habits.

Phase 4: Develop Monitoring and Evaluation Framework and Synthesize Findings

In the last phase, the team developed a detailed monitoring and evaluation framework that would allow GreeNYC to measure and track results from specific GreeNYC activities. This framework identified the key indicators each campaign would measure and monitor, as well as measurement tools (consumer surveys, social media scans, focus groups, market research, partner interviews, etc). In addition, the findings from all earlier phases were synthesized into final outputs in this phase.

Note – The methodology used to calculate potential impact is analogous to a market sizing. These assessments take into account reported current penetration and likelihood of uptake; they are not adjusted for reporting bias and assume the sample surveyed is representative of the larger population. Given that the calculations are comparable to the size of the market, we believe they reflect the maximum potential impact. Actual impact would be contingent on the reach and messaging of the campaigns.

Study Findings

Part I: Highest Impact Consumer Actions

Through rigorous analysis, and based on the existing carbon footprint of the city, the study quantified the potential impact of over 200 actions to identify those that have the highest potential impact. Ranking individual actions according to their potential cumulative impact and based on citywide goals provides a quantitative framework for GreeNYC to determine the focus of public outreach campaigns.

Reducing Emissions

The top ten actions based on highest potential for impact have the potential to eliminate 4 million metric tons of CO_2e directly from New York City's carbon footprint (see Table 1). This removal would accomplish one-quarter of PlaNYC's emissions reduction goal, making these actions an important area of focus for GreeNYC.

Table 1: Actions with high GHG reduction impacts and likelihood of uptake by residents of NYC

	Action*	Impact, MTCO2e**
1	Replace conventional gas engine car with a gasoline hybrid	1,189,962
2	Switch to electricity produced from non-fossil-fuel or clean sources	859,940
3	Perform a home-energy audit and act on its recommendations	786,346
4	Replace conventional gas engine car with an electric vehicle or plug-in	437,390
5	Weatherize your home	407,929
6	Air dry clothes and use cold water in dishwasher and washing machine	108,724
7	Replace incandescent bulbs with compact fluorescent light bulbs (CFLs)	86,737
8	Eat produce in season and purchase it from farmer's markets, green carts, or coops	50,906
9	In winter, turn down the thermostat 10 degrees when leaving for work and again before bed	41,440
10	Optimize vehicle performance by tuning engine, inflating tires, and using correct motor oil	36,568
	Total	4,005,942
	Percentage of 2011 NYC Inventory***	7.5%

* To ensure consistency in calculation only actions tested in the consumer survey are included
** Metric Tonne Carbon Dioxide Equivalent
*** Inventory of New York City Greenhouse Gas Emissions 2008 (5.15 CO_2e)

Improving Environmental Quality

Along with greenhouse gas emissions, the sustainability of a city is inextricably linked to several environmental factors. Table 2 provides an overview of the actions that would do most to improve environmental quality in three important areas. These areas are not necessarily captured in the greenhouse gas inventory but are high priority because they benefit environmental quality related to waste management. Environmental quality can include several metrics such as air pollution, water pollution, waste generation and toxicity.

For the purpose of this study, environmental quality impacts were assessed to be meaningful to GreeNYC in three areas:

1. Waste: reduction in tonnage of residential solid waste generated
2. Recycling: increase in tonnage of recyclable residential solid waste being diverted from landfills
3. Composting: increase in the tonnage of = waste composted

Table 2: Actions with high waste reduction impacts and likelihood of uptake by residents of NYC

Sector	Action	Impact
Waste Reduction	Reduce textile waste: Repair and / or donate clothes	91,744 tons / year
	Save paper by going online: Opt out of junk mail, unwanted periodicals and paper billing	76,516 tons/ year
Recycling	Recycle paper: Separate paper and place paper curbside for recycling	56,541 tons / year
Composting	Compost food scraps at a farmers market, a backyard bin, or through a garbage disposal	57,717 tons / year

Part II: Highlights From The Consumer Survey

The consumer survey, developed under this study, helped GreeNYC to better understand the behavior patterns and motivations of New Yorkers, identify target groups and determine effective messaging tools for GreeNYC to encourage adoption of high impact behaviors. Over 2100 New Yorkers engaged in the online survey. The primary aims of the survey were:

- **Measure** the percentage of New Yorkers already engaging in the high impact actions
- **Identify the motivators** for those already engaging in the high impact actions
- **Determine** the likelihood of **participation** for those not yet engaging in the high impact actions
- **Establish media** use **patterns** to inform messaging
- **Assess public feelings** on environmental issues

The survey provided a wealth of information on New Yorkers' attitudes as well as their current and future behavior.

Engaging in High Impact Actions

What do New Yorkers currently do to improve the environment and why?

Of the actions tested, a significant proportion of survey participants reported they are already doing the following:

- Using energy-efficient light bulbs
- Manually adjusting thermostats up or down, depending on the season, to conserve energy
- Regularly maintaining their vehicles
- Combining errands into single car trips

While the actions identified benefit the environment, in most cases environmental concerns were not the key motivating factor driving New Yorkers. Primary motivations included cost savings as well as other non-altruistic motivators such as time savings, personal safety, health and personal comfort (see Table 3).

Figs. 4 and 5 illustrate the type of information generated on current behavior for each action, including demographics of those currently engaging in the behavior, their level of engagement, and the top motivators for engagement.

What would motivate New Yorkers to do more?

- New Yorkers are most motivated by cost savings. However, environmental benefits should not be overlooked, as environmental concerns are usually the second or third most important reason New Yorkers engage in sustainable behavior.

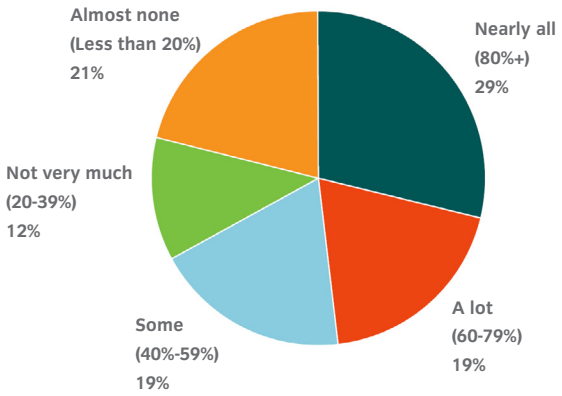
- Figs. 6 and 7 provide an overview of the information generated on likely future engagement in each action, including likelihood of uptake, top motivators that would drive the change in behavior, and demographics of New Yorkers with the highest likelihood of switching their behavior.

Table 3: Key Motivators in Driving Potential Green Behavior

	Action	Top Motivator	2nd Motivator
Energy efficiency	Energy-efficient light bulbs, Programmable Thermostats, Weatherizing Home	Cost Savings	Cost, Environment Personal Comfort, Convenience
Food	Eating local produce	Health	Environment
Transportation	Switching to fuel-efficient car	Cost Savings	Environment
Paper	Paper recycling	Environment	Obligation
Home appliances	Using cold water in dishwasher or laundry	Efficacy	Cost savings

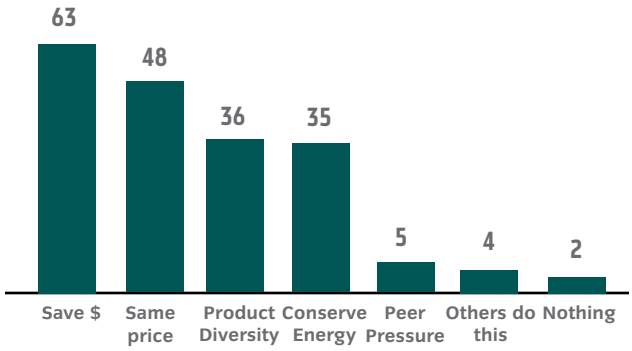
Survey: New Yorkers' Use of Energy Efficient Light Bulbs

Figure 4: New Yorkers Usage of Energy Efficient Light Bulbs as a Percentage of Total Fixtures



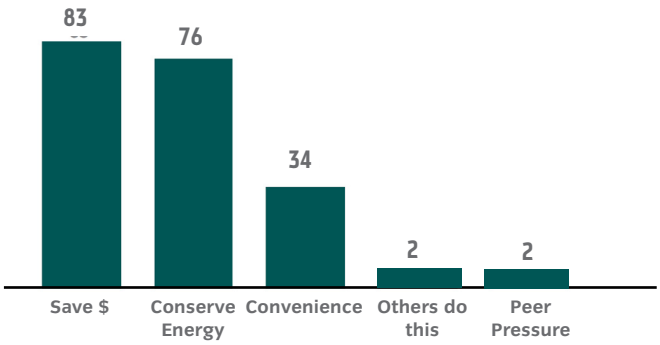
Almost 40% of New Yorkers reported nearly all the light bulbs in their home to be CFLs

Figure 6: What Would Motivate New Yorkers to Use More Energy Efficient Light Bulbs?



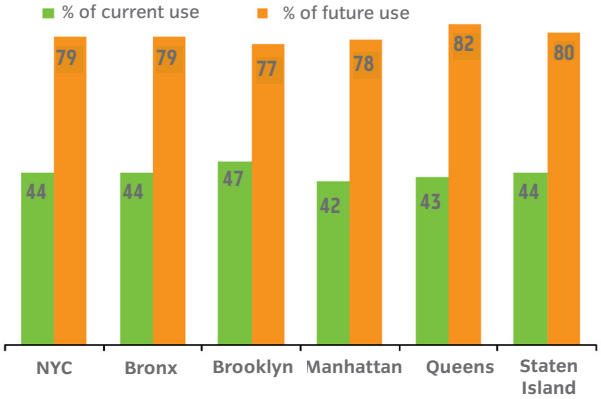
Motivators for New Yorkers who are not already predominantly using energy efficient light bulbs to switch

Figure 5: Why New Yorkers Use Energy Efficient Light Bulbs



Motivators for those New Yorkers already engaged in high impact action

Figure 7: Current Versus Future Uses of Energy Efficient Light Bulbs



The difference in bars represents the opportunity for behavior change campaign to have impact

Characteristics of New Yorkers most likely to use energy-efficient light bulbs:

- Living in Areas of New York outside of Manhattan
- Non-US born
- Non-Caucasian
- Married with children

Characteristics of those most likely to us energy-efficient light bulbs in the future:

- Female
- Over 55 years of age
- Caucasian or African-American
- Single, with no children

General Sentiments Regarding the Environment

What does "Green" mean to New Yorkers?

- Key environmental concerns for New Yorkers included air pollution, energy wasted in homes and buildings, and water pollution (see Fig. 8). While these issu were overshadowed by concern for the economy, unemployment, and the cost of living, other research shows that New Yorkers tend to be more concerned about the environment than most of the American population.

- Other environmental issues included inadequate waste disposal, climate change, and diminishing green space. Issues such as urban sprawl and access to locally grown food were of less concern to New Yorkers (see Fig. 9).

- These concerns were consistently expressed across all five boroughs.

- While New Yorkers rank the environment lower in importance compared to other issues such as the economy, when they are prompted about their concern about environmental problems, most say they are concerned (see Fig. 10). Environmental concern is higher in New York compared to Americans overall, based on GlobeScan's public opinion research in the United States.

Figure 8: Which of the following do you think is the most important problem facing New York City today (up to three selections)?

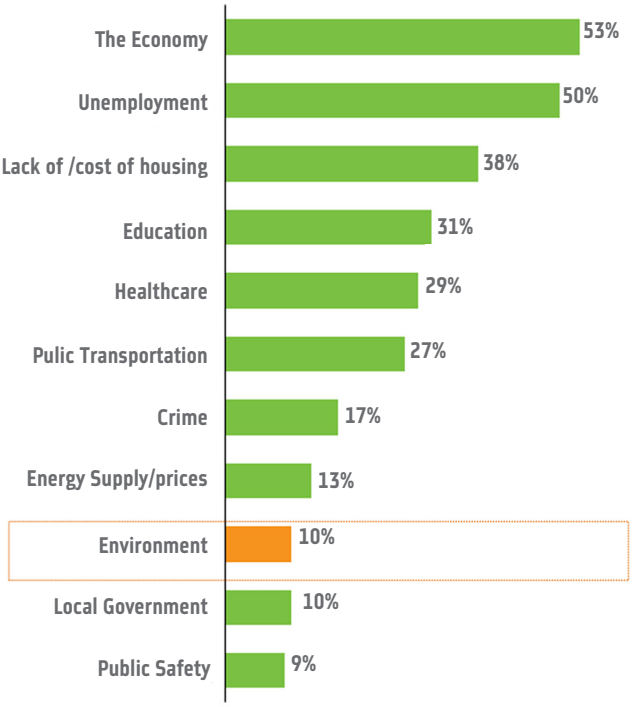


Figure 9: Which of the following do you think is the most serious environmental issue facing New York City today (up to three selections)?

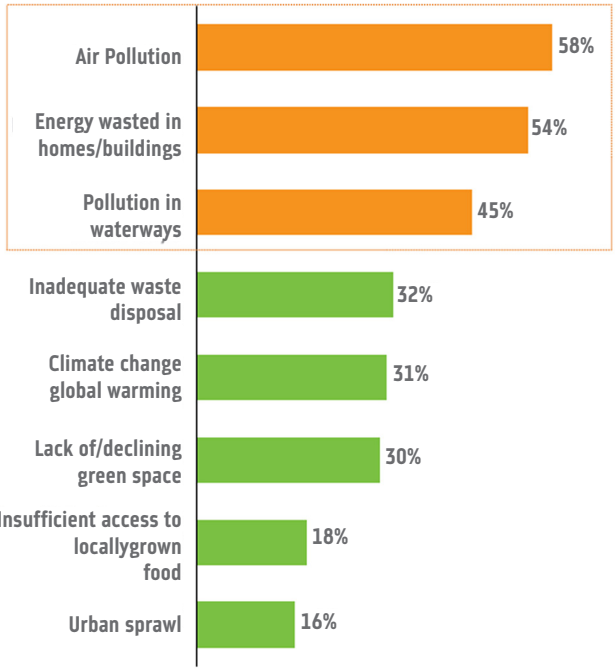
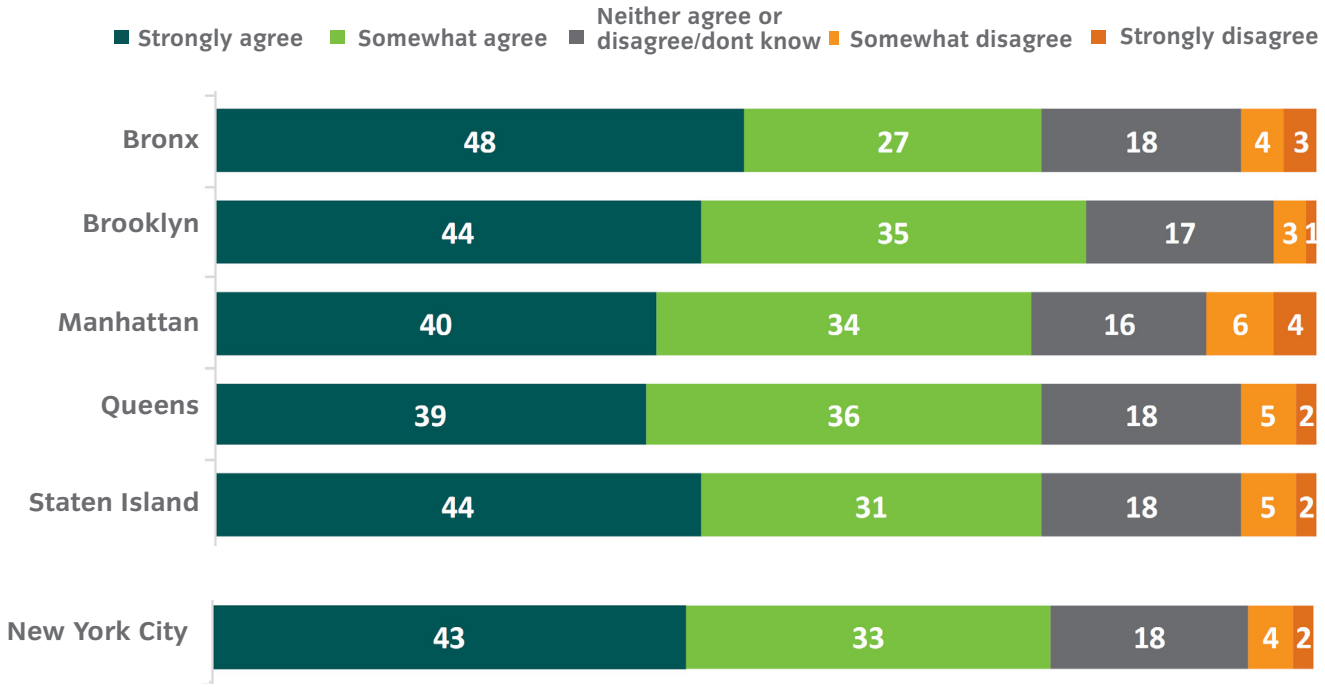


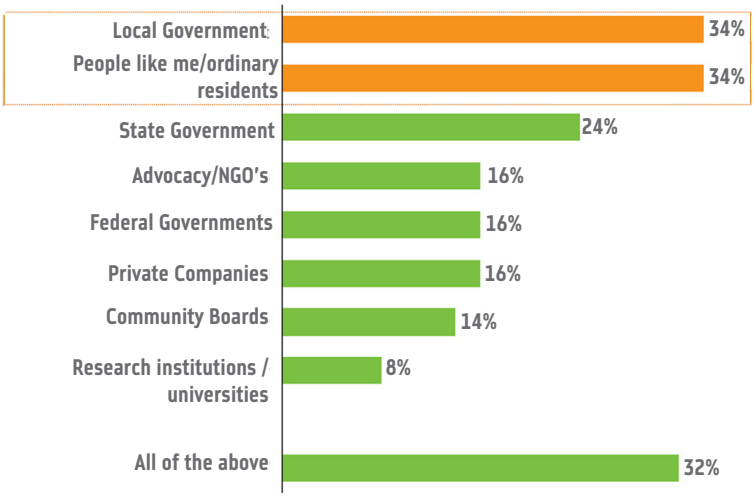
Figure 10: "I Am Very Concerned About Environmental Problems" (%, of Respondents, by Borough)



Who do New Yorkers perceive as agents of change?

- New Yorkers think that a collective approach is needed to improve the environment. They believe that government, the individual, civil society, and the private sector all hold potential and responsibility to enhance environmental quality.
- New Yorkers point to the individual and local government as the two stakeholder groups with the most potential to affect change, suggesting that New Yorkers feel empowered as individuals to bring about change, and also expect the City to do its part (see Fig. 11).
- These findings suggest that municipally-led campaigns for individual behavioral change are well suited to New Yorkers, particularly in the context of the City's own sustainability efforts.

Figure 11: Which of the following have the most potential to help improve the overall quality of the environment in New York City (up to three selections)?



Media Habits

The survey gathered considerable data about the media habits of New Yorkers. This type of information will allow GreeNYC to make strategic decisions about how to effectively use media to achieve behavior change goals.

What are the media habits of New Yorkers?

- The survey revealed that media has the strongest influence on New Yorkers' views about the environment followed by academics and scientists (see Fig. 12).
- More detailed information was acquired from subsamples, enabling GreeNYC to understand the nuances of New Yorkers' media habits with regard to the use of specific media channels (e.g., newspaper, internet news sites, radio).
- Newspaper and magazine readership varies by borough, but is not an important factor in internet blog readership, as Tables 4 and 5 demonstrates.
- This information, when paired with the segmentation analysis (discussed in the next section), will enable GreeNYC to run better targeted public education campaigns that will reach optimal audiences and maximize the likelihood of participation.

Figure 12: Which of the following has the strongest influence on your views about the environment (up to three selections)?

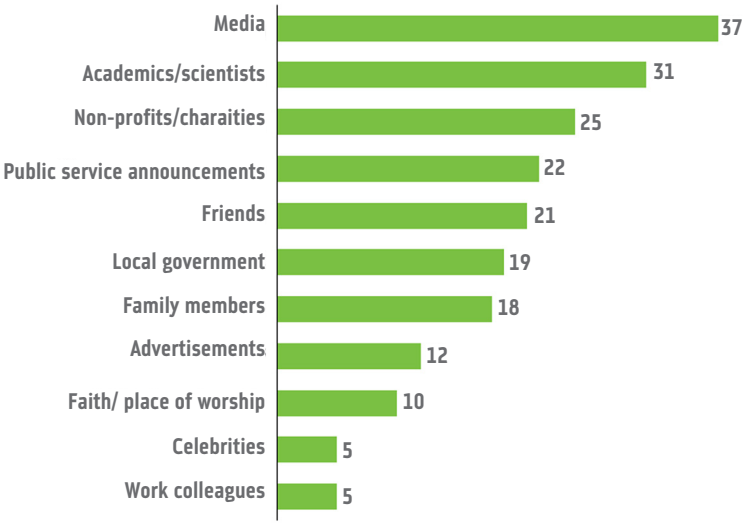


Table 4 : New Yorkers' Online and Print Media Preferences By Borough

The Bronx	Brooklyn	Manhattan	Queens	Staten Island
New York Daily News (62%)	New York Daily News (52%)	New York Times (70%)	New York Daily News (51%)	Staten Island Advance (48%)
New York Times (43%)	New York Times (40%)	Free NY papers (35%)	New York Times (40%)	New York Daily News (40%)
New York Post (40%)	Free NY papers (34%)	New York Daily News (30%)	New York Post (32%)	New York Post (35%)
Free NY papers (34%)	New York Post (29%)	New York Magazine (29%)	Free NY papers (30%)	New York Times (28%)

Table 5 : New Yorkers' Blog Preferences by Borough

The Bronx	Brooklyn	Manhattan	Queens	Staten Island
Huffington Post (39%)	Huffington Post (37%)	Huffington Post (42%)	Huffington Post (35%)	Huffington Post (29%)
Other (30%)	New York Times City Room (25%)	New York Times City Room (24%)	New York Times City Room (30%)	New York Times City Room (29%)
New York Times City Room (25%)	NY Magazine's Daily Intel (19%)	NY Magazine's Daily Intel (23%)	NY Magazine's Daily Intel (22%)	Drudge Report (24%)
Gothamist (23%)	Gothamist (17%)	Gothamist (19%)	Other (20%)	NY Magazine's Daily Intel (22%)
NY Magazine's Daily Intel (22%)	Other (14%)	Other (19%)	Gothamist (13%)	Curbed, Politico, Other (14%)

Segmentation Analysis

How Diverse are New Yorkers?

Not all New Yorkers think and act alike. While most are concerned about the environment and are willing to change their behavior, differences in attitude and current behavior imply that they will not all respond in the same way to specific messages. Segmentation analysis is commonly used by market research, communications and advertising professionals to target specific audiences. It distills a diverse population into a manageable number of groups of individuals with similar characteristics.

Data from the survey resulted in the identification of five distinct segments of New Yorkers:

- **Skeptics** are currently the largest and least environmentally active group, and indicate the least intention of changing. They are most motivated by cost savings and convenience.

- **Aspiring Greens** currently reflect average levels of engagement in green behavior but are the group most willing to change in the future. They are motivated by cost savings and environmental benefits. As the most willing to change and the most receptive to communication campaigns, this segment will be a key target audience for campaigns.

- **Young Urbanites** are similar to Aspiring Greens in their current behavior and willingness to become greener. They are also motivated by cost savings and environmental benefits. In light of their willingness to engage further, this segment will be a key target for campaigns.

- **Pragmatic Homeowners** exhibit average levels of activity and are willing to make moderate change. They are most motivated by cost savings and convenience.

- **Inadvertent Greens** are currently the most active segment but are less interested in further engagement. They are less motivated by environmental benefits than what their peers do.

The analysis provided information on the underlying demographics, preferences, likely motivations and media use of each segment to enable more targeted outreach and enabled a ranking based on current and intended green behavior, as outlined in Fig. 13.

Each segment was further profiled based on responses to the actions tested, indications of current and future behavior, as well as additional demographic layers (e.g., renters versus owners, marital status and income level). The revealed behavior patterns of each segment enable GreeNYC to optimize its outreach to specific segments of the population. Fig. 14. provides an illustration of such additional analysis for one of the segments: Pragmatic Homeowners.

Figure 13: Overview of Segment Characteristics

Current Green Behavior	Segment	Demographic features	Defining characteristics		
			Concern for Environment	Willingness to engage	Media Usage
MORE GREEN	INADVERTENT GREENS (9%)	• Male • Brooklyn • Young & middle-age • Affluent	Average	• Feel disempowered • Willing to pay for green • Expect technology will solve problems	Internet news sites and blogs
	PRAGMATIC HOME OWNERS (17%)	• Male / female • Queens / Staten Isl. • Older / married • Higher income • Homeowners	Average	• Feel empowered • Some skepticism on green problems • Care about cost and convenience	Television news and newspaper
	YOUNG URBANITES (15%)	• Female • Manhattan • Young / single • All are renters	High	• Feel very empowered • Critical of local governments and corps • Faith in self over technology • Green isn' t inconvenient	Internet news sites and blogs
	ASPIRING GREENS (27%)	• Female • All boroughs • Middle aged / married • Average income • Apartment dwellers	High	• Feel very empowered • Critical of private sector regard environment • Willing to be but when benefits are clear	Television news and newspaper, low internet
LESS GREEN	SKEPTICS (31%)	• Male / female • All boroughs • Single / younger • Renting apartments • Lower educational attainment	Low	• Low empowerment • Skepticism about environmental threats • Green = expensive and inconvenient	Internet news and television news

Figure 14: Deeper Look at Segments

INADVERTENT GREENS (9% OF NEW YORKERS)	
CURRENT GREEN BEHAVIOR	**DEMOGRAPHICS**
• Most likely to purchase green electricity • Most likely to have had a home energy audit and acted on recommendations • Most likely to have a programmable thermostat • Highest activism of any segment, with not much room for more • Primary motivators: Environmental benefits and peer pressure	• Majority are men (86%) • Found in all boroughs, over-represented in Brooklyn; not new to NYC • A mix of young and middle aged • Affluent, well-educated • Over-represented by Independents and Republicans • Most are owners, primarily in apartments but some in houses
ATTITUDES	**FUTURE GREEN BEHAVIOR**
• About average concern for the environment • Feel disempowered to effect positive change on the environment • Expect technology will solve environmental problems • Feel they are doing all they can to reduce their impact on the environment • Willing to pay more to be green • “Plugged in,” paying attention to news stories on the environment	• Switching to a hybrid or electric car • Purchasing green electricity • Performing a home energy audit

PRAGMATIC HOME OWNERS (17% OF NEW YORKERS)

CURRENT GREEN BEHAVIOR	DEMOGRAPHICS
• Donate and recycle • Try to combine errands in one car trip and maintain car (84% have cars) • Have taken steps to weatherize home • Most likely to manually adjust temperature • Most likely to have had home energy audit and acted on recommendations • Behavior is a function of being homeowners • Above average activism and willing to become greener • Primary motivators: Potential cost savings and convenience	• Equally male and female • Older (nearly half are 55+) • Married—likely parents of grown-up children • Higher income households • More likely in Queens and Staten Island; long-time NYC residents (20+ years) • Republicans appear in this segment more than in others • Majority are white / Caucasian • All are homeowners, living in a house, not apartment or condo
ATTITUDES	**FUTURE GREEN BEHAVIOR**
• About average concern about the environment • Feel empowered to effect positive change on the environment • Some skepticism about the seriousness of environment problems • Some concern about the inconvenience and costs of being green • Not certain if technology can solve environmental problems	• Buying green electricity • Performing a home energy audit • Buying energy efficient light bulbs • Buying more from farmers' markets • Reading newspapers online • Switching to a hybrid or electric car

YOUNG URBANITES (15% OF NEW YORKERS)

CURRENT GREEN BEHAVIOR	DEMOGRAPHICS
• Donate and recycle • Maintain car (31% have cars) and try to combine errands in one car trip • Among the most likely to read newspapers online • About average activism but very willing to become greener • Primary motivators: Potential cost savings and environmental benefits	• Dominated by women (68%) • Slightly over-represented in Manhattan; relative newcomers to NYC • Strongly Democrat and Independent (68%) • All are single and young (half are under 35) • All are renters, living in apartments
ATTITUDES	**FUTURE GREEN BEHAVIOR**
• Concerned about the environment • Feel empowered to effect positive change on the environment • Critical of local government and companies' environmental performance • Expect green products to deliver all the benefits of non-green products • Willing to sacrifice own consumption for future generations • Attitudinally, this group is similar to the Aspiring Greens; the main difference is that they are younger, more likely to be female, and all are renters.	• Switching to energy efficient light bulbs • Purchasing green electricity • Performing a home energy audit • Buying more from farmers' markets

ASPIRING GREENS (27% OF NEW YORKERS)

CURRENT GREEN BEHAVIOR	DEMOGRAPHICS
• Donate and recycle • Maintain car (64% have cars) and try to combine errands in one car trip • Most likely to have taken steps to weatherize home • Among the most likely to have energy efficient light bulbs • Average activism but the most willing to change behavior • Primary motivators: Potential cost savings and environmental benefits	• Slightly over-represented by women • Middle aged (around half are 35–54) • Married, either with grown-up children or none at all • Average household income • Predominantly Democrats and Independents • Found in all boroughs; long-time NYC residents (20+ yrs) • Segment with biggest proportion of African Americans • Nearly all living in an apartment (around half are owners)
ATTITUDES	**FUTURE GREEN BEHAVIOR**
• Highly concerned about environment • Strongest sense of empowerment to improve the environment • Critical view of private sector 's environmental efforts to date • Expect green products to deliver all the benefits of non-green products • Some willingness to pay more for green products • Prefer to repair rather than replace • Willing to make personal sacrifices for benefit of future generations • More faith in self than in technology	• Purchasing green electricity • Performing a home energy audit • Buying more from farmers' markets • Switching to a hybrid or electric car • Reading more newspapers online • Buying energy-efficient light bulbs

SKEPTICS (31% OF NEW YORKERS)

CURRENT GREEN BEHAVIOR	DEMOGRAPHICS
• Maintain car (48% have cars) • Try to combine errands in one car trip • Lowest activism of the five segments, but some intention to change • Primary motivators: Potential cost savings and convenience	• Equally male and female • Found in all boroughs, and relative newcomers to New York • More Asian-Americans in this segment than any other • Single and younger (48% of segment is under 35) • Highest proportion of lower educated New Yorkers (nearly 50%) • More likely renting, living in an apartment • Most are responsible for paying own electricity bills (71%) but most can't adjust the temperature (64% say they can't)
ATTITUDES	**FUTURE GREEN BEHAVIOR**
• Least concerned about environment • Divided on whether environmental threats are exaggerated • Low sense of personal empowerment • Positive view of private and public sector efforts to date on the environment • Think "being green" is expensive and requires too much effort	• Switching to energy-efficient light bulbs • Buying from a farmer's market

Credit: Roya Kazemi

Monitoring and Evaluation

To evaluate the effectiveness of GreeNYC campaigns, the research team developed a framework of indicators and tools to measure and quantify the specific impact of each GreeNYC campaign. These tools will help GreeNYC accomplish campaign goals, improve future campaigns and assess New Yorkers' contributions toward NYC's sustainability goals.

Defining and measuring a series of indicators for each campaign will help GreeNYC to better gauge NYC residents' awareness of the campaign issues and observe the progress residents are making in changing their behavior. An example of monitoring and evaluation for a future campaign targeting New Yorkers to switch to energy efficient light bulbs (CFLs) could use the following indicators to measure effectiveness and success and consequently demonstrate its contribution to NYC's sustainability goals.

- Awareness: Close to 600 Million media impressions were made
- Progress: There was a 12% increase in the number of New Yorkers reporting the purchase of energy efficient light bulbs as a result of the campaign and a 25% increase was witnessed in the sale of energy efficient light bulbs over a 1 year period post-campaign; and
- Impact: The estimated carbon impact from New Yorkers switching to energy efficient light bulbs is 56,700 $MTCO_2e$.

Credit: Roya Kazemi

Conclusion

New York City has created an agenda to achieve a more sustainable city that is well equipped to both address the challenges of a growing population and manage the vulnerabilities the city faces from climate change. The City has many tools to decrease emissions and improve environmental quality and is taking concrete steps to put these tools into action. This study has demonstrated that New York residents also play a significant role in supporting the City's efforts. With the ten highest impact actions, New Yorkers can reduce 7.5 percent of the city's ***carbon inventory*** and help achieve 25 percent of the city's greenhouse gas emissions reduction goal.

New Yorkers' actions can help realize policy goals or fill in the gaps created by absent or recently initiated policies. Individual actions can also generate impact quickly and at a lower cost than technological or infrastructure interventions. New Yorkers appear ready to take on these challenges, viewing themselves as leading agents of change along with local government. GreeNYC exists at the point where residents and government intersect and has an opportunity to direct its messages to receptive audiences using the demographic information the segmentation analysis uncovered. Armed with critical and sophisticated information from this study, GreeNYC can now pioneer a data-driven approach to public education that is coupled with the successful GreeNYC brand and strategy. This will enable the City to effectively engage New Yorkers in taking on actions that can have the highest possible positive impact on our environment.

Credit: Roya Kazemi

Glossary

Greenhouse Gas (GHG) - A gas that contributes to the greenhouse effect by absorbing infrared radiation, e.g., carbon dioxide.

PlaNYC – New York City's innovative and comprehensive sustainability plan to make New York a greener, greater city.

Carbon Dioxide Equivalent (CO2e) – A measure used to compare the warming effect of a greenhouse gas. A ton of CO2e is the quantity of any greenhouse gas that has the same warming effect as a ton of carbon dioxide.

Carbon Footprint – A measure of the total amount of carbon dioxide and/or carbon dioxide equivalent emissions associated with the lifecycle of a product, project, organization, individual, city, etc. over a given period of time.

GreeNYC - The public education arm of NYC's sustainability agenda which aims to educate, engage, and mobilize New Yorkers to take actions to shrink the citywide carbon footprint and improve environmental quality.

Renewable Energy – Energy that is sourced from a naturally occurring, theoretically inexhaustible source such as biomass, sunlight, wind, tides, etc. and is not derived from fossil or nuclear fuel.

Particulate Matter - A small discrete mass of solid or liquid matter that remains individually dispersed in gas or liquid emissions (usually considered to be an atmospheric pollutant).

Media Impression – An interaction of a radio, online, TV, print, or out-of-home (billboard, subway, bus) advertisement with an audience member of that medium.

Carbon Inventory – A verified archive of historical emissions data associated often associated with an organization or government.

Sustainable Food - Food that is grown, distributed, and transported using practices that limit negative impacts on the environment and health of consumers.

Credit: Roya Kazemi

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