

# Healthy Cities Start with Green Building



COLUMBIA UNIVERSITY | SCHOOL OF INTERNATIONAL AND PUBLIC AFFAIRS

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April 27, 2007

Written for: The Manhattan Borough President's Office

## **Office of Manhattan Borough President Scott Stringer**

(Source: MBPO website at: <http://www.mbpo.org/>)

“Over the past few years, New York City has enjoyed an incredible resurgence. That, combined with the major challenges of 9/11, means that we are suddenly rebuilding Manhattan. The Borough President's job is to make sure that communities are protected from powerful interests who, all too often in the process, come in, take what they need or build what they need--the community be damned.

The responsibilities and powers given to the Borough President offer a great opportunity to begin building coalitions so the people of this Manhattan can not only stand against the special interests, but defeat them.

There is a significant land-use component to the job--and as any Manhattanite knows, decisions on zoning and planning shape the future of our Borough. The Borough President reviews all public and private land-use projects in Manhattan and can recommend approval or rejection of those projects. With an appointment to the City Planning Commission, the Borough President can also play a proactive role in shaping the future of development in Manhattan. Also, the Borough President appoints most members of Manhattan's Community Boards and then provides support and oversight to those boards as they make crucial decisions affecting zoning and permits.

One primary responsibility of the Borough President's office is direct control over a portion of the city's capital and expense budget. In the last fiscal year, that total was over \$13 million. This money is to be spent on projects in Manhattan--and grant the Borough President a great opportunity to use that resource to better the lives of all Manhattan residents.

The Borough President is also charged with improving the quality-of-life in Manhattan. The office has oversight of services such as street repair, housing code enforcement and parks maintenance. The City Charter mandates the Borough President to monitor service delivery, an opportunity to address problems not only on a case-by-case basis, but also on a long-term basis. Then, the Borough President can use its role as Chair of the Borough Board to pool the resources of all of Manhattan's elected officials to not only address the issue, but also solve its root causes.

Through its appointments to some of the most important agencies in City government, the Borough President's office is on the frontline of issues ranging from education to waterfront development. The Borough President has an appointment to the City Department of Education's Panel for Educational Policy--along with three appointments to the Hudson River Park Trust (charged with planning the development of the park along the Hudson River). The Borough President also plays a role in health care delivery in Manhattan with appointments to advisory boards for Manhattan's municipal health facilities. Finally, there is the power that comes simply from being Manhattan's representative.

***“The Borough President can fight, organize and lead to bring about change in Manhattan.”***



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**Above and Right:** Green Building Technologies at work at the Solaire in Lower Manhattan



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## *Acknowledgements*

We would especially like to thank our Faculty Advisor Blaine Pope and the Manhattan Borough President Office's Director of Policy and Research Megan Shane.

We would also like to thank people interviewed for this report: Chris Benedict, Anthony Borelli, Stephen Colley, Ryan Galvin, Nicole Gotthelf, Linda Keane, Shaan Khan, Lee Kitson, Barry Mullen, Erik Olsen, Rachel Scheu, Dr. Sam Tsemberis, Marcel Van Ooyen, and Jordan Wyatt.

This report for the Office of Manhattan Borough President (MBPO) Scott Stringer proposes a new initiative, *“Healthy Cities Start with Green Building.”* The need for a healthier and more environmentally sound urban environment in Manhattan is widely recognized, and during his first year in office, Borough President Stringer pledged to address this need. Stringer is a long-time community advocate, a champion for the underserved members of his constituency. At the forefront of these community concerns are the inequality of environmental health and the need for affordable housing in Manhattan. These concerns, coupled with the recognition of broader citywide and global environmental problems, led the MBPO to look for solutions within the most prominent aspect of the urban landscape – the built environment.

The MBPO requested three specific outcomes from this effort. First, to provide an in-depth discussion of the context of green building policies applicable to New York City, including regulatory and economic incentives currently in place. Second, an analysis of the current and most relevant practices used for sustainable building across the United States. Finally, recommend immediate actions for the MBPO to implement further green building strategies and practices in New York City.

The term “green building” most commonly refers to buildings that incorporate any of the following five factors: energy conservation, water conservation, urban impact mitigation, sustainable building materials, and improved indoor air quality. To date, green building guidelines and implementation have been predominantly adopted in the commercial and high-end residential markets. Price premiums paid upfront for new technologies are limited to a niche group, further contributing to the perception that green building means costly new technological add-ons. Consequently, lower income communities have largely been left behind by the green building movement. This in turn feeds the cycle of relegating the most vulnerable population segments to continued exposure of environmental injustices and risks.

Manhattan’s growth projections underscore the need for environmentally responsible urban design and land use. The New York City census estimates that Manhattan’s population will grow 18.8% over the first thirty years of the 21<sup>st</sup> century and will total approximately 1.83 million people by 2030 [11]. According to the New York City Department of City Planning, the increased population will create demand for approximately 265,000 more housing units [12].

Within this context, we examined why more green building, particularly in the affordable housing market, has not taken root in New York City. Our findings indicate that, although many green building incentives already exist at the federal, state and local levels, the lack of education for industry professionals, lack of demand from users, and misperceived costs from developers hinder a wider adoption of these practices. These failures present opportunities for the MBPO to increase the visibility and accessibility of green building in New York City, and specifically within the borough of Manhattan. While the Office does not have direct legislative power, its educational and advocacy roles can contribute significantly to addressing these needs. Therefore, we recommend that the MBPO consider the following goals and strategies as part of the *Healthy Cities Start with Green Building* initiative.

***“‘Green building’ is a way of enhancing the environment. It benefits humans, the community, the environment, and a builder’s bottom line. It is about tailoring a building and its site to the local climate, site conditions, culture and community, in order to reduce resource consumption while enhancing quality of life.”***

*Alexis Karolides in “An Introduction to Green Building”*

**Goal #1-** Educate the public about the health, cost-savings and environmental benefits of green building, which in turn expands the demand for an enhanced built environment

**Strategy #1-** Maximize media attention for the green building campaign of the Manhattan Borough President's Office

Rationale:

To increase community awareness of its green building initiative, the MBPO should distribute its agenda on the topic and inform key stakeholders. It is important to succinctly combine the concepts of green building, community building, and community health in a simple and catchy sound-bite along with an easily recognizable visual or logo. Media can serve as a venue for educating the public about the activities of the MBPO and we recommend coupling pre-existing media opportunities for housing, education and health initiatives as a platform for green building. Because all of these issues are linked, it is convenient to combine green building concepts with other MBPO initiatives.

Tasks:

- ◆ Use a campaign title, such as: “Healthy Cities Start with Green Building”
- ◆ Create a memorable logo that includes recognizable symbols connoting sustainable building, community, and health issues
- ◆ Create exposure for the issue at media events that attract large numbers of constituents. Some suggestions include:
  - GreenHome NYC’s Green Building Forums on the 3rd Wednesday of each month (GreenNYC.org)
  - Combine green building issues with the West Harlem Special District campaign
  - Raise green building issues at future Mitchell-Lama conferences
  - Sponsor “awareness days” or “community days” with educational components: For example, sponsor a day where residents all paint rooms with low VOC paint



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## **Strategy #2- Green Building 101 presentation**

### Rationale:

Create a Green Building 101 presentation, modeled after the Land Use 101 presentation used to educate Community Boards on land use considerations and rules. The Green Building 101 presentation would be used to educate Community Board members on the benefits of green building. Educating the Community Boards as a first step will promote these techniques when Community Boards meet with developers and agencies responsible for building construction and renovation as well as expand green building knowledge into Manhattan's communities.

### Tasks:

- ♦ Create a PowerPoint presentation covering the health and environmental risks of conventional building in New York City—describe how green building techniques can address these issues, dispel common myths about green building, and encourage demand for green building construction
- ♦ Train relevant MBPO staff on this presentation
- ♦ Schedule meetings to present this to all Community Boards and relevant stakeholders



## **Strategy #3- Partner with the Council on the Environment of New York City**

Rationale: Partner with the not-for-profit organization Center on the Environment of New York City (CENYC). This organization is focused on NYC and education of other environmental issues, such as recycling and locally grown food. Their other major programs are the Open Space Greening Program and Greenmarkets. The Executive Director, Marcel Van Ooyen, is interested in partnering with the MBPO on the Green Building Initiative. His background includes writing Local Law 86 on green buildings, making him very knowledgeable and interested in this topic. Their successes in educating the public make them a beneficial partner in educating the public.

### Tasks:

- ♦ Start conversations with Marcel Van Ooyen on a formal partnership
- ♦ Cooperate to create educational material to be posted at Greenmarkets
- ♦ Add green building information on the CENYC website
- ♦ Work with CENYC staff to come up with other ideas to promote green building, to leverage their experience with other environmental education campaigns

## **Strategy #4- Have the Borough President's office meet with NYSERDA representatives to establish a program offering green building training and consulting services to affordable housing developers**

### Rationale:

In response to public outcry, Local Law 86 omitted affordable housing developers from its requirements of Leadership in Energy and Environmental Design (LEED) certification. It was argued that the high costs of certification and developers' thin profit margins made LEED certification an unreasonable burden for this group to bear. With low levels of expertise in green building methods it is more likely that developers will make costly errors while learning how to fulfill LEED rating standards. This problem can be addressed with development of a training and consulting program for affordable housing developers with officials at the New York State Energy Research and Development Agency (NYSERDA), based on the existing New Construction Plan. This program would give developers free access to NYSEDA's Outreach Project Consultants, engineers and architects who work directly on projects to assist in energy efficiency improvements and conduct LEED charrettes. Charrettes are meetings designed to help developers understand how best to attempt LEED certification.

### Tasks:

- ◆ Advocate for NYSEDA to develop a green building training and consulting program for affordable housing developers
- ◆ Work with NYSEDA to define areas most relevant to affordable housing developers in Manhattan

## **Strategy #5- Become an information hub for advancing green technology use, especially in affordable housing**

### Rationale:

One of the greatest barriers preventing green technologies from saturating the market is the lack of knowledge about green building technologies from industry professionals and consumers. A number of well-researched websites exist, but few are well known. Becoming an information hub will help to disseminate this information. In addition to expanding knowledge about green building in general, centralizing this information will help consolidate search efforts and make it easier for stakeholders to take advantage of obtainable opportunities, such as existing incentives .

### Tasks:

- ◆ Create a section on the MBPO website under "policy" and "housing" dedicated to green building that summarizes the policies and incentives available to developers. This would include links to other reputable websites with technical and market information such as [www.greenbuildingsnyc.com](http://www.greenbuildingsnyc.com).
- ◆ Issue a request to registered non-profit organizations via email to solicit contact information and ideas for collaborative projects to be posted on the website



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# Recommendations

**Goal #2-** Facilitate the entry of developers and owners into green building markets, especially in the low and middle income housing markets

**Strategy #1-** Lobby the New York City Housing Authority (NYCHA), the Housing Preservation and Development Authority (HPD) and New York City Housing Development Corporation (HDC) to include green building criteria in their programs. These agencies offer incentives and public funding for affordable housing in New York City

## Rationale:

These city agencies play a key role in the affordable market arena. Lobbying them for greater inclusion of green building criteria in their programs is crucial in order to make changes to existing affordable housing construction, renovation and maintenance practices. Specifically, these agencies need to understand the following key factors:

- ♦ Green building components offering significant environmental benefits can be obtained at low or zero-added costs to homeowners and developers.
- ♦ Long-term performance and reliability of basic city infrastructure –mostly energy and sewage- will improve with high-performance buildings.
- ♦ Green housing can create additional disposable income for households experiencing cost savings from lower energy and water bills, as well as from improved health and productivity.

## Tasks:

- ♦ Reach out to NYCHA and suggest they adopt a long-term commitment for offering high-performance and healthy housing for New York City's low-income households
- ♦ Request that the HPD inform and educate developers and property owners receiving funding through their major subsidized capital access programs, The New Construction Program, The Cornerstone Program, and The Home Improvement Program; emphasis should be given to the benefits of green building for households and property owners
- ♦ Initiate advocacy efforts for the adoption of best green building practices in the City's 10-year plan implemented by HPD, particularly for affordable housing in Manhattan
- ♦ Conduct outreach to key stakeholders to create local examples of affordable residential green building, particularly through the Cornerstone Program supporting multi-family projects



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**Left:** Green Building Construction workers in lower Manhattan. Above: Battery Park City in lower Manhattan



## **Strategy #2- Provide economic incentives that help overcome initial cost barriers to newcomers**

### Rationale:

A significant barrier to implementing green building practices has been the perception of high up-front costs. In addition, developers unfamiliar with green building practices incur additional costs while they learn green design and construction strategies. Providing financial support to overcome this initial cost barrier will facilitate the entrance of newcomers to the green building industry. After help through that initial learning curve, the developers will be able to continue green building techniques on their own at an affordable cost.

### Tasks:

- ◆ Advocate for a favorable property tax climate that prevents tax increases for owners using green building strategies to renovate their property. This avoids penalizing homeowners for green improvements that raise the property's market price
- ◆ Request that the Department of City Planning provide a density bonus for green affordable housing to incentivize the use of green building technologies for affordable housing developers, expanding their existing density bonus for affordable housing. One option includes providing density bonuses greater than 33% for green rehabilitations
- ◆ Request that the Department of Buildings provide fast-track permits and waive fees for new construction or rehabilitation of green affordable housing
- ◆ Assemble support from other stakeholders, such as developers and community groups, to advocate for these incentives alongside the Borough President's office

## **Strategy #3- Distribute Manhattan Affordable Housing Green Building Checklist**

### Rationale:

The checklist provided in Appendix D is designed to be a resource containing recommended practices highlighting important techniques from other green building systems, focusing on green building elements that can be accomplished with the limited budget of an affordable housing project to achieve relevant environmental and health impacts. They were developed to raise awareness of cost-effective, high impact elements of LEED, Green Communities, the HPD Sustainability Guidelines, and strategies that have been demonstrated in other green affordable housing projects.

### Tasks:

- ◆ Provide checklist as a reference for community boards highlighting elements from existing sets of green building guidelines
- ◆ Recommend developers refurbishing or building new affordable housing in Manhattan consider one of the green building systems from which these guidelines were drawn
- ◆ Encourage NYCHA to consider one of the green building systems from which these guidelines were drawn when beginning new projects

## Green Building Description

According to the United States Green Building Council (USGBC), best known for creating the Leadership in Energy and Environmental Design (LEED) certification program, the goals of green building are “to significantly reduce or eliminate the negative impact of buildings on the environment and on the building occupants” [13]. A similar description comes from Green Communities, a national program created by Enterprise Community Partners to provide funding for construction of green affordable housing projects. This program emphasizes “design and materials that safeguard the health of residents, and siting that provides close, easy access to public transportation, schools, and services in addition to the use of environmentally sustainable materials, reduction of environmental impact, and increased energy efficiency” [14].

The areas green building is most frequently expected to address are those outlined in the LEED certification requirements: energy efficiency, water efficiency, planning a sustainable site, indoor environmental quality, and conservation of materials through use of locally produced products and recycling [13]. Coincidentally, New York City is also facing energy, water and urban environment issues that can easily be addressed with smarter, greener design.



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**Left:** The Hearst Tower, New York City's first LEED Gold Office Building, opened in 2006.



©McGill School of the Environment

## Green Building for Affordable Housing in NYC

Affordable housing refers to any arrangement whereby a tenant can obtain housing below the prevailing market rate. In New York City, there have been numerous programs implemented, taking advantage of national, state and local programs. The main categories of affordable housing in Manhattan are public housing and the Mitchell-Lama and Housing Authority (HUD) Section 8 buildings. *Section 3* of this report covers the details of the programs and tenant eligibility requirements.

Several programs already exist to encourage the implementation of green building for affordable housing. The High Performance Housing Initiative from New York City's Department of Housing Preservation and Development (HPD) works with NYSERDA and aims to rehabilitate 5,000 of the City's seized buildings with a focus on improving energy and water efficiency. NYSERDA has committed \$7 million in energy-efficiency enhancements to be implemented in three phases and expects this project to “generate an estimated \$6 million in annual energy savings for both residential building owners and tenants” [17].

Another HPD program is the New Housing New York Legacy Project, a design competition for a mixed-income residential building to be built to LEED Silver standards on a parcel of HPD property in the South Bronx. The winner of the competition will receive the property for a nominal fee with the stipulation that it will be turned into a mixed-use development that includes affordable rental and homeownership housing for low-, middle-, and moderate-income levels [18].

## ***Major Barriers to Mainstream Adoption of Green Building***

In New York City, Local Law 86 is new legislation that requires the earning of LEED Silver certification for all non-residential city-funded municipal construction over \$2 million. Notably, there is a gap in the legislation that leaves out residential buildings including affordable housing. This occurred because affordable housing developers in the area believed the green standards would be too costly to reach. Affordable development contractors considered green building strategies to require a large capital investment they could not afford.

It is not yet universally cheaper to build green; most products, such as appliances, do not have an equally priced green equivalent. However, there are many variations of how to properly build green. As is demonstrated throughout the paper, depending on the design, net added costs can be very small or even non-existent. Moreover, most of the costs associated with building green decrease significantly as experience with green technology grows. Often green design is just good design, leading architects and consultants to refer to these structures as high-performance buildings [19, 20]. Achieving significant energy efficiency, for example, could be a matter of properly installed extra insulation and a properly sized heating/cooling system [19, 20]. Other components, such as green roofs and on-site power generation, do incur additional up-front costs, but pay off over the life of the building when operating and maintenance costs are considered.

## ***Successful Policies Around the Country***

There are numerous examples of green building projects that have been successful in both affordable and market-rate housing on a national scale. *Section 3: Green Building for Affordable Housing* and Appendix A detail these successes to provide a perspective of what has already been proven effective. Possible green building stimulators include requiring green building certification and relaxing zoning rules to offer density bonuses in exchange for green building components. Other incentives include direct financial assistance or loan programs and time-saving techniques such as expedited building permits. Another widely used incentive is to include tax exemptions and credits for certified green buildings. Similar concepts are included in the recommendations.

## **Top Eight Things Tenants Can Do to “Live Green”**

### **Live in NYC**

**It's that easy. The density and transportation system of NYC make it the most energy and resource efficient city in the country.**

### **Understand your energy use.**

**How can you reduce your energy consumption?**

**Look at your utility bills and find out when you use the most energy.**

### **Use sustainable and non-toxic products.**

**The information is on the bottle. Use non-toxic cleaning solutions and sustainable forest products**

### **Look for the Energy Star Label**

**Replace appliances and lighting with Energy Star products which are more energy efficient.**

### **Control your environment.**

**You can control the temperature in your living space by installing low cost, easy to use, thermostats and automatic radiator controls, simultaneously saving energy and increasing comfort.**

### **Switch to green power**

**Two major companies (ConEd and 1st Rochdale Cooperative) offer green power for only a few dollars more a month. It is easy to switch and supports renewable energy markets.**

### **Conserve Water**

**Install low-flow showerheads, faucets and toilets along with reducing water flow time.**

### **Of course . . . Reuse and Recycle**

**The city has restored recycling. Ask your super or building manager to recycle and check up on it.**

**Source: Green Home NYC**

**<http://www.greenhomenyc.org/page/tenants>**



**Above: Harlem brownstones, 126 street**

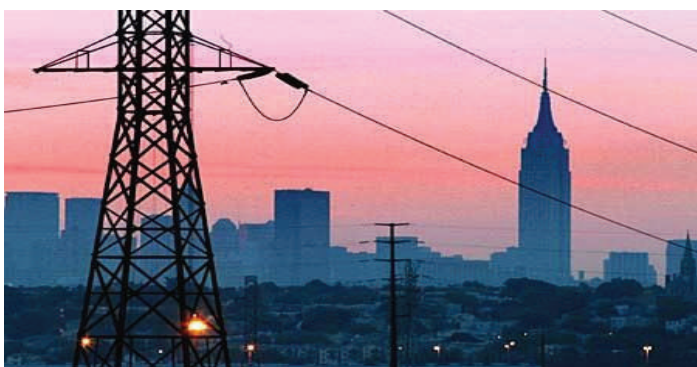


## Section 1: Problems and Solutions

The environmental impacts of mega-cities are becoming increasingly severe as populations multiply and resources are used more intensively. Cities are the world's largest emitters of carbon dioxide. They can cause significant destruction to surrounding ecosystems and ultimately pose risks to human health through exposure to pollutants. The environmental issues faced by New York City, as well as the health implications of its built environment, create a context for examining the use of green building.

The pressure on the built environment of Manhattan continues to grow. The New York City census estimates that Manhattan's population will grow a total of 18.8% to reach approximately 1.83 million people by 2030 [11]. According to the New York City Department of City Planning, the increased population will create demand for nearly 265,000 more housing units, many of which will need to be affordable units [12].

Many buildings in Manhattan are aging and require renovation. 77% of the buildings constructed during the last 200 years were built between 1900 and 1929 [21]. In 2004, the demand for housing led the Department of Housing Preservation and Development (HPD) to begin what will eventually be 5,524 gut rehabilitation and new construction units and 4,677 moderate rehabilitation units [22]. These additions to the built environment will impact the surrounding natural environment during potentially disruptive construction; when completed, they will further stress the city's utility systems with increased water and electricity demand. In this section we overview five key environmental problems faced by urban settlements: energy use, water use, urban surfaces, use of sustainable building materials, and indoor air quality.



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**Above:** The New York City skyline during the 2003 blackout

Electric Resource Net Need (2003–2008)	
Category	Capacity (MW)
<i>Projected Demand</i>	
1. Need To Meet Demand Growth	665
2. Need To Assure Market Stability	1,000
3. Need To Replace Aging Power Plants	2,115 <sup>a</sup>
Total Capacity Need	3,780
Less	
<i>Projected Supply and Distributed Resources</i>	
4. Power Plants Under Construction	(875)
5. Distributed Resources	(300)
<b>Net Capacity Need Through 2008</b>	<b>2,605</b>
<sup>a</sup> Assumes that NYPA's existing Poletti power plant is retired by 2008	

**Above:** New York Energy Task Force projected demand for electricity in New York City

### Energy in NYC

The term “energy crisis” is well known to many New Yorkers. Recent blackouts and other disruptions have brought attention to this concern. The New York City Energy Task Force (NYETF), a group of stakeholders created by the city to research and explore these issues, reports that current electricity demand in New York City for residential, commercial, and industrial is approximately 11,020 MW. By state mandate, New York City must get 80% of its energy from inside the city. This helps improve reliability and decrease distribution costs, but is increasingly difficult to achieve. In 2004 this regulation was met with only 71 MW to spare [23].

The NYETF estimates that energy demand will continue to grow in the coming years by a rate of 1.5% per year and that by 2008 approximately 3,780 MW will be needed to meet this increase [23]. Without a significant increase in energy conservation, energy efficiency and distributed resources, the NYETF predicts that new expensive generation and transmission facilities will be needed. Currently, new power plants under construction can meet about 875 MW of this need while newly developed distributed resources can provide a relief of 300MW. This leaves an unmet demand of 2500 MW that must be addressed.

Furthermore, since New York City represents 2% of total U.S carbon dioxide emissions, the city can potentially play a significant role by cutting back greenhouse gas emissions [24]. 79% of the carbon dioxide created during production of energy for buildings, so green building could help address this issue [24].

## Green Building Solutions to Energy

Green building incorporates many demand-side technologies that address load management and energy efficiency [25]. The New York City Energy Task Force (NYETF) estimates that increased energy efficiency could reduce future demand by approximately 300 to 800 MW [23]. Green building solutions for lighting inefficiency include natural day lighting and high-efficiency lighting systems that decrease energy use. High-efficiency lighting involves timers or sensors that reduce wasted energy by turning off unnecessary lights and fluorescent lighting. One compact fluorescent light bulb pays for itself ten times over throughout its useful life [26]. Green building projects also use appliances and materials certified by ENERGY STAR, a government program that rates the energy efficiency of heating and cooling products, window treatment, appliances and insulation. High efficiency heating and cooling equipment can save approximately 20% in energy costs a year [27]. Replacing a refrigerator bought in 1990 with a new ENERGY STAR qualified model would save enough energy to light the average household for nearly four months [27].



**Left:** 1 of 1.5 million light bulbs given out by Chicago's Department of Environment

Clean on-site generation involves cogeneration, micro-turbines and fuel cells, which are all technologies placed close to the demand location [23]. NYETF estimates that these technologies could potentially generate 3,276 MW of energy by 2008, improving on efficiencies from traditional generation plants by 40 to 60% [23].

**Summary of Distributed Resources Potential in New York City 2003–2008**

Category	Base Case (MW)	High Case (MW)
Peak Load Management	127	127
Energy Efficiency	300	868
Clean On-Site Generation	142	343
<b>Total</b>	<b>569</b>	<b>1,338</b>

**Above:** New York Energy Task Force study of potential for distributed resources up to 2008

During peak hours, the increased burden on the power plants means electricity is generated less efficiently, leading to more pollution and higher costs. Peak load management helps decrease energy demand during peak hours, greatly improving energy efficiency and reducing pollution associated with generation [23]. This decreased energy demand is achieved by scheduling energy use around peak demand times, particularly the middle of the day.

## Water in New York City

The average per capita water consumption in New York City is estimated to be approximately 200 gal/day [28]. New York City receives 90% of its water from reservoirs and aquifers in the Catskills/Delaware watershed. However, much of New York City's water infrastructure is aging, with some pipes and systems up to 150 years old [29]. Replacements and repairs are needed on the system but are often costly. Approximately 40 miles of old and leaky pipe are replaced each year [28]. It is uncertain what kind of stresses the increasing population and climate change effects could have on the supply of drinking water to the city. Drought or heavier precipitation could create new supply problems as well as treatment issues, which are explained in the *Urban Impact* section.

## Green Building Solutions to Water Efficiency

Green building can greatly alleviate the stresses on the water system by reducing first-use demand. Water management mainly involves "water cascading", which means matching the end use of water with the water quality [30]. This includes using less-treated water in toilets or for irrigation. This technique can reduce the need to treat water and reduce combined sewage overflow. It can also reduce the costs of water use by reducing maintenance costs, delivery, use, disposal and treatment costs. Other conservation techniques that can reduce wastewater include low-flow or dual-flush toilets and faucets with aerators.



©LostBrain.com



**Above and Left:** Water efficient toilets and fixtures can save tenants money and reduce maintenance costs

## Urban Impact

Two undesirable urban impacts associated with a heavily built environment include the heat island effect and combined sewer overflows (CSO). The urban heat island effect is a phenomenon whereby a city experiences elevated surface temperatures as a result of its built environment because impermeable surfaces, like cement and asphalt, absorb greater amounts of heat during the day than the naturally vegetated areas they replaced [31]. The built environment of New York City raises the average temperature in the area by approximately 7.2°F, with the highest temperature zones in midtown and lower Manhattan [31]. Rooftops compose 19% of New York City's surface area and are the main cause of the urban heat island effect [31]. The increase in temperature results in an increase in cooling costs and an increase in heat-related illness or death.

The second impact of the non-porous built surface is too much water runoff flowing into New York City's combined sewage system. During heavy rainfall, this combined system, which attempts to simultaneously handle all sewage and stormwater flows, is stressed beyond capacity. The result is that in a given year approximately 27 billion gallons of untreated wastewater are released into surrounding water bodies through the 450+ overflow sites [32]. This wastewater includes raw sewage as well as stormwater runoff with collected debris and pollutants from the streets. As a result of the pathogens and contaminants released by sewage overflow, many of NYC's water bodies have been declared "impaired" and unfit for human use. This has had significant impacts on beach access, fishing and boating, and has created foul odors near open bodies of water.

## Green Building Solutions to Urban Impact

Reductions in the urban heat island effect could diminish expenditure on cooling and public health. Strategies for reducing this effect include painting rooftops with light colors, shading walkways, and planting green roofs. Evapotranspiration from plants and soils on a planted roof can cool the surface of the roof by increasing the moisture availability [30]. This decreases the overall ambient air temperature and reduces negative heat related effects. A Penn State University study estimated that if 50% of the flat rooftop surfaces in NYC were covered by green roof vegetation the heat island effect could be reduced by approximately 1.4° F [30].

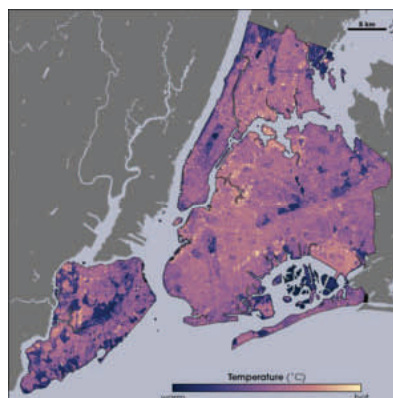
Green building could greatly decrease the amount of wastewater that goes directly to the combined sewage

system by promoting local capture and use of the storm water that falls upon a site. For example, approximately 20 million gallons of water will fall on a site the size of the World Trade Center every year [30]. If captured and stored on-site, this water can be employed for non-potable uses, reducing utility costs and demands on the water management system. Stormwater retention can be accomplished using methods such as green roofs or storage tanks located on rooftops. Water can be captured and stored on site by the soil and plants on a green roof and can be treated by on-site filtration systems for use inside the building.

## Building Materials

According to a study by the New York Department of Sanitation, construction and demolition materials account for more than 60% of the solid waste stream, which is 15 to 35% more than nationwide estimates [33]. This is the result of New York City's fully developed environment, which often requires major renovation for improvements or demolition for new construction. Construction and demolition waste refers to fill materials (concrete, dirt, stones), metals, asphalt, wood and other miscellaneous materials (carpet, lighting etc.). Due to lack of space and increased waste volume, New York City no longer hosts any landfills and must export its wastes to surrounding areas, greatly increasing the cost associated with waste removal and processing. Since the closure of Fresh Kills Landfill in 1996, costs of waste removal and disposal have risen annually by \$400 million [33]. This includes the increased costs of transporting waste materials as well as the taxes levied by other states for receiving the waste. Exportation also causes excess pollution as a result of increased diesel exhaust associated with transportation.

An additional environmental health concern associated with building materials is the quality and sustainability of the construction materials. Materials used in low-budget projects such as affordable housing are often less durable because initial savings are valued over reduced life-cycle costs. This means more frequent replacements of materials contributing to greater waste.



**Left:** Average surface temperatures in NYC illustrate the urban heat island effect. Source: NASA Earth Observatory.



## **Building Materials - Solutions**

Green building solutions can greatly improve the environmental problems associated with construction and demolition in New York City. The most general solutions involve the three “R’s”: Reduce, Reuse and Recycle. Reuse involves the use of existing materials that may be found on site or in recycling centers. Examples of reuse include both functional options such as steel beams and decorative options such as terra-cotta tiles [30]. Recycling involves instituting a waste management plan that specifies the processes of waste removal and recycling. The New York City Department of Design and Construction recommends separation of recyclable material on site to reduce travel and waste costs [33]. Reducing the use of construction materials can help to reduce environmental damage and maintenance costs.

## **Indoor Air Quality**

In the past, most measures of pollution exposure have focused on outdoor air pollution. However, as most urban residents spend 19-23 hours per day indoors, 14-16 of which are in the home, long exposure to even small concentrations of indoor air pollution can have a major impact on health and productivity [15]. The EPA reports three main causes of poor indoor air quality [16]. The first relates to the presence of air pollution sources, including environmental tobacco smoke; asbestos from insulating and fire-retardant building supplies; formaldehyde from pressed wood products; other organics released from building materials, carpet, furnishings, cleaning materials, restroom air fresheners, paints, adhesives, biological contaminants from dirty ventilation systems or water-damaged walls, ceilings, and carpets; and pesticides from pest management practices [16].

The second is associated with new uses of a building that were unanticipated or poorly anticipated when the building was designed or renovated [16]. In New York City, the competition for space demands individual buildings be used for both commercial and residential applications. Thus, inadequate ventilation systems can allow indoor air pollution to travel easily from a portion of the building being used for commercial purposes, such as a restaurant or dry-cleaners, into residential areas of the building. If the conversion from one function of the building to another is not done with proper modification of the ventilation system, indoor air quality can be compromised. Furthermore, improper design, operation, and maintenance of the ventilation systems can result in negative effects on indoor air quality [16].

Both commercial and residential buildings in New York City are particularly vulnerable to indoor air pollution due to the city’s urban density, high concentration of outdoor air pollution sources, and aging infrastructure. In many buildings the outdoor air intake vents are located near a source of contamination such as car exhaust, boiler room emissions, or dumpsters. Additionally, vents inside the building can be obstructed or improperly placed, preventing occupants from receiving fresh air. Improperly maintained ventilation systems can spread biological contaminants such as mold or fungi.

## **Indoor Air Quality - Solutions**

While the best way to combat indoor air pollution is good design and planning in the construction phase, indoor air quality can be improved at any point in the life cycle of a building using elements of green building design. The Environmental Protection Agency (EPA) suggests that source control is the easiest and most effective way to improve indoor air quality [34]. Source control can take place at all phases of the building life cycle. During construction and renovation, an important aspect of source control is the selection of building materials and furnishings that have low volatile organic compound (VOC) content. Carpets and paints are major sources of VOCs, although the VOC levels of paint are now displayed on the label. In general, latex paint tends to have a lower VOC content than oil based paints. Source control also does not require increasing ventilation, which saves energy.

While energy conservation is important, the safety of indoor environments must be ensured. Increasing ventilation in the home can be as simple as opening a window or using a window mounted fan or air conditioner. Kitchen vents and bathroom fans can also help to increase ventilation. It is especially important to increase ventilation during activities that may increase the level of air contaminants, such as cooking or painting. During the construction or renovation phase efficient ventilation systems such as air-to-air heat exchangers should be installed. These systems are designed to promote adequate ventilation while reducing unwanted heat loss.

During the design and construction phase it is important to design ventilation systems such that the intake is located far from sources of pollution and indoor vents are properly placed and not obstructed. Regardless of whether there is a state of the art ventilation system or a window fan, proper maintenance of filters is critical to ensure that biological contaminants are prevented from entering the building. (See Table 2)

<b>MOST COMMON POLLUTANTS</b>	<b>MOST COMMON SOURCES OF POLLUTANTS</b>	<b>STEPS TO IMPROVE IAQ</b>
<b>Radon</b>	Earth, water, building materials	Test your home, Contact a professional
<b>Tobacco Smoke</b>	Cigarette, pipes, Cigars	Don't Smoke, improve ventilation
<b>Biologicals</b>	Mold, pests (cockroaches, dust mites), pet dander ventilation/climate control equipment (air conditioners, humidifiers)	Increase ventilation, reduce moisture, maintain climate control equipment properly
<b>Carbon Monoxide And Nitrogen Dioxide</b>	Stoves, heaters, water heaters, chimneys, automobile exhaust, tobacco Smoke	Increase ventilation especially when cooking or using heaters, have chimney cleaned/inspected
<b>Organic Gasses</b>	Household products (paint, solvents, wood preservatives, aerosol sprays, cleaning supplies) building materials	Increase ventilation, use building materials that contain less organic compounds
<b>Respirable Particles</b>	Tobacco smoke, fireplaces, stoves	Increase ventilation, maintain/repair stoves properly, don't smoke cigarettes
<b>Formaldehyde</b>	Building materials, furniture, tobacco smoke	Use building materials that do not contain formaldehyde, increase ventilation
<b>Pesticides</b>	Pesticides and herbicides	Follow directions, only use outdoors, use non chemical methods of pest control
<b>Asbestos</b>	Damaged insulation, floor tiles, acoustic materials	Do not disturb material, contact a professional
<b>Lead</b>	Lead based paint, contaminated soil, water	Leave lead based paint undisturbed, contact a professional

**Table 2:** Simple steps to Improve Indoor Air Quality  
Source: <http://www.epa.gov/iaq/pubs/insidest.html>  
Note: See Appendix G for further reference on how to prevent these pollutants

**Below:** Household Products like lead-based paint, pesticides, and other chemicals can cause poor indoor air quality, Leading to increased rates of childhood



©Wisconsin Department of Natural Resources

“Don’t reinvent the wheel! There are people out there, who have been working on green building and education programs. Support these people, learn from them, and help them spread their message.”

—Linda Keane

## Section 2: The Business Case for Green Building

Green building has been considered a luxury good, a product that is too prohibitively expensive to be successfully used on projects with tight capital budgets or non-environmental priorities. This feeling is prevalent enough that the affordable housing development community has staunchly opposed any mandated green building requirements. However, this perception comes from the additional costs experienced by builders and architects during the early adoption of green building techniques, which in some cases were 15-20% more than the base estimate. In the early stages of adopting green building techniques, contractors lacked information on how to implement the recommended strategies and technologies, thus increasing the real costs of building green. Furthermore, most contractors or bidders were unfamiliar with the documentation process necessary to achieve LEED certification and perceived green building as risky and tedious [35]. Yet real costs of green building have declined as firms have become more familiar with the design and construction process.

### Costs of Green Building

Despite the perception of high costs, the real costs of green building depend on what is designed and implemented, and whether certification is pursued. At the low end of the cost spectrum are architects and energy consultants who believe in high-performance building practices to achieve the many benefits of green building without frills or added net costs. Especially in areas of energy efficiency and indoor air quality, simply ensuring good construction has been shown by architect Chris Benedict to achieve an 85% reduction of energy demand for heating and cooling.

When newer technologies and certifications are chosen, green building does create additional costs; however, those costs have declined as the industry gains experience. In more recent studies, architects and builders have identified up-front costs to be as little as 2-4% of total costs [35]. Even LEED, which is recognized as being a high cost certification, is becoming less expensive. In many instances, specific LEED credits are being achieved at no additional cost to the project. For instance, the analysis of 33 green buildings in California in 2004 revealed an average green cost premium of less than 2%, with only a 0.66% premium for buildings that achieved the most basic level of LEED certification [36]. According to this same analysis, the green building premium can be as little as \$3-5/sqf.

**Below:** Average premiums on the four LEED certification levels. Source: (Katz, 2003)

Level of Green Standard	Average Green Cost Premium
Level 1 – Certified	0.66%
Level 2 – Silver	2.11%
Level 3 – Gold	1.82%
Level 4 – Platinum	6.50%
Average of 33 Buildings	1.84%

These costs can be further reduced if the project does not pay for the paperwork required to receive official LEED certification, but merely uses the LEED system as a guide to green building.

Many observers have asked why green building is not more common if the costs to build green are so low [37]. To a certain extent, the pioneers of green building have capitalized on the higher willingness to pay of the upper echelon clientele. The image of green building as a luxury good has remained despite its applicability to other sectors. Nonetheless, we are increasingly observing a wider application of strategies and technologies to enhance building performance, even for affordable housing.

### Monetary Benefits of Green Building

Many organizations are beginning to recognize quantifiable benefits of green building, including capital cost savings, reduced operating costs, increased investment returns, increased productivity, staff recruitment and retention, and more efficient resource use [38]. For the past two years, Turner Construction collected comprehensive survey results gauging the opinions of several hundred senior executives in various organizations associated with the real estate and construction industry to examine their perception on the benefits and costs of green building. The results indicated that a majority of respondents agreed that high-performance buildings offer improved health and well-being of the occupants, increased building value, greater worker productivity, increased return in investment, and above average rents and occupancy rate. Many of these benefits are discussed in more detail in *Section 3 of this Report*.



**Left:** A LEED label on the Solaire, America's first environmentally responsible residential tower



Industry professionals are experiencing a wide range of costs and benefits of green building. In the analysis of the 33 LEED certified buildings in California, the Sustainable Building Task Force identified that the property developers and managers recognized the following percent-based benefits in comparison to non-green buildings [35]:

- ◆ Productivity and Health (70%)
- ◆ Energy efficiency (11%)
- ◆ Emissions (2% -without carbon regulation)
- ◆ Water efficiency (1%)
- ◆ Waste generation (0%)
- ◆ Reduced Operating and management (16%)

While some of these benefits are more certain than others, the general sense among industry players is that the additional financial and productivity benefits of green building largely pay back investments made during the design and planning stages of construction. Proprietors generally spend significantly more on operation and maintenance over the lifetime of the building than developers spend on the upfront costs of design and construction. Lifetime efficiencies yield a higher return on the investment than is traditionally perceived [39].

Chris Benedict, RA, has been in the green building business in New York City since 1996 and has worked on many affordable housing projects. According to her, design for significant energy efficiency is possible at the same net cost as traditional construction [19]. She reports that the key to encouraging green building is for architects and mechanical engineers to learn and understand energy loads and how to design efficient heating systems as well as efficient building walls [19]. Other sources support this perspective as well, providing similar examples of simple and inexpensive techniques for energy efficiency [42].

On the other hand, Ms. Benedict does see challenges that must be overcome. One such challenge is the lack of architects who know how to design with energy efficiency in mind, instead relying on more costly energy consultants [19]. This dilutes responsibility and fragments the design phase [19]. Ms. Benedict considers energy efficient design to be an integral part of her job, and personally tracks energy bills for her buildings so she can compare their monthly usage [19]. She has found that her buildings provide savings of up to 85% on energy used for heating and cooling [19]. Andrew Padian, an energy consultant at Steven Winter Associates, has also been involved in high-performance affordable housing projects and reports similar savings achieved without significant initial increases in cost [20].

Barry Mullen, the Vice President of Real Estate and Development for Mercy Housing Lakefront, has seen firsthand that if a building is going to be operated by the entity constructing it, there is interest in lowering operations and maintenance costs over the long term [40]. Mercy Housing Lakefront, based in Chicago, is dedicated to providing permanent support for the homeless. The project invested in green affordable housing units to try lowering operating and maintenance costs while improving the quality of affordable housing. This business plan has proven successful, and Mr. Mullen recently opened Mercy's third green affordable housing unit, Near North, on March 1, 2007[40].

## Lee Kitson

*President of Lee Kitson Homes and former co-chair of the NAHB Green Building Guidelines Stakeholders Group*

- ◆ Currently, universal demand does not exist for green products and technologies. If consumers do not ask for green products, it is much harder to move the green market forward. Contractors and developers *will* respond to consumer demand.
- ◆ Not all green upgrades are priced equally; sometimes it does cost more to build green. Sometimes green alternatives aren't readily available from the supply store, and you have to special order them. It is important to acknowledge these challenges.
- ◆ Education is very important in all fields to continue the green movement; encourage those with green building experience to share their successes and failures; utilize the media to educate people about the issue as well.
- ◆ Focus on an issue that the city is facing, and frame green building as the solution. Cities who have done this, like Austin and San Antonio, San Francisco, and Seattle show higher awareness about green building.
- ◆ The simplest modifications you can do to make a building greener are to change fixtures and appliances to more energy efficient alternatives and to re-insulate with better alternatives.

Source: *Personal interview by Julia Farber on 2/18/2007.*

## Linda Keane, AIA

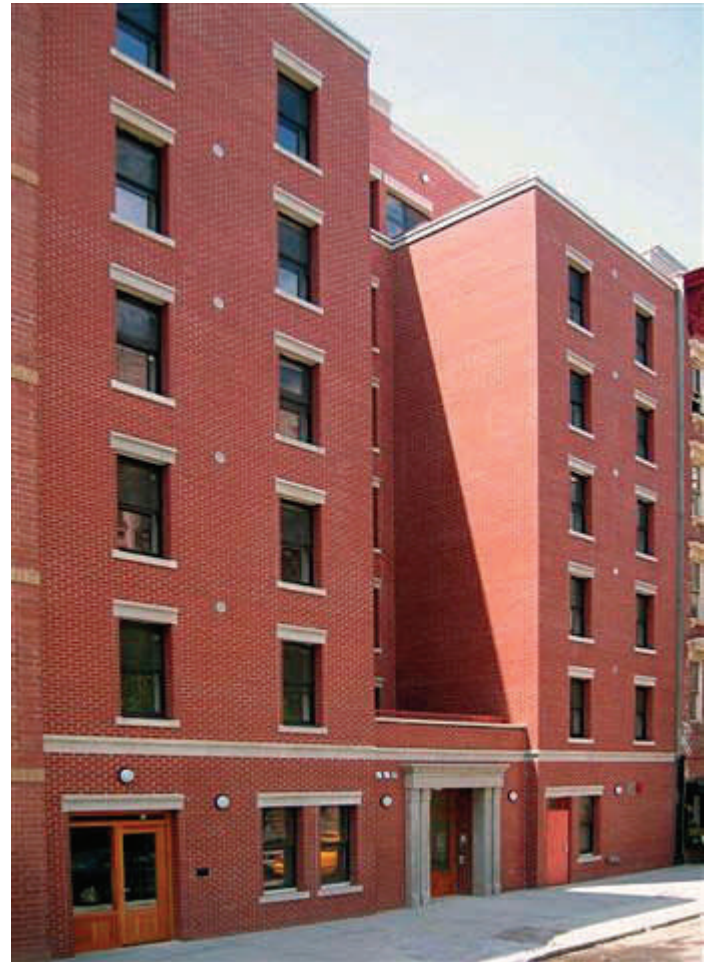
*Professor of Architecture, Chicago Institute of Art*

- ◆ The built environment has a huge impact on the planet, and it is something that we must be more cognizant about. Tony Spry said, “any act of creation is also an act of destruction.”
- ◆ The newest challenge to architecture is to make the built environment both sustainable and aesthetically pleasing. There is constant demand for out-of-the-box creativity.
- ◆ Communities should create a space for items generally used once a year, or once a lifetime (i.e. gardening tools) to share with others.
- ◆ To encourage green buildings, local politicians need to show that they believe in it.
- ◆ Smart incentive programs do work. Chicago’s fast-track permitting process has been successful. So has their green roofs grant program.
- ◆ The movement has to have support from above (government) and below (grassroots)
- ◆ Education is very important; if the consumer does not know about a certain green product, they can not want it. Campaigns can help.
- ◆ As affordable housing demand increases, it is important to try to keep these communities downtown, and not on the city outskirts near easily accessible to transportation. People who live in these units want the benefits of city living too.
- ◆ Don’t reinvent the wheel! There are people out there, who have been working on green building and education programs. Support these people, learn from them, and help them spread their message.

*Source: Personal interview by Julia Farber on 3/14/2007.*

Another example from Chicago is the Center for Neighborhood Technology (CNT), a 30 year old non-profit that promotes green building. Interested in demonstrating cost effective green building practices to its constituency, CNT decided that “if you are going to push others to ‘go green’ you have to be willing to do it yourself [41].” This was the major driving force behind CNT’s decision to achieve the LEED-platinum rating for its renovation in 2000. The project was certified under this category because the renovation standard had not been yet developed by LEED. Achieving the platinum rating cost \$1.2 million and required only readily-available technologies. For the three story building, this meant an average total project cost of \$82/ square foot; comparable to a project without the green design [41].

Despite the ability to build with green technologies at similar costs than in traditional construction, developers can take advantage of the additional willingness to pay of renters for green dwellings. So far, market premiums for green housing rentals and retail prices are well signaled in the marketplace. For instance, New York City’s traditional commercial builders have recognized additional rent premiums of up to 5% compared to similar dwellings in near-by areas [37]. A key assumption underlying market premiums is that the consumer recognizes the benefits of the green standards – such through LEED certification- and is willing to pay additional money for them.



©Henry Gifford

**Above:** 299 East Third Street, a good example of Chris Benedict’s work, this thirty-eight apartment new-construction project on the Lower East Side of Manhattan provides savings of up to 85% for heating and cooling of a typical apartment building for no additional construction cost.

## *Section 3: Green Building for Affordable Housing*

### Affordable Housing in New York City

Policy tools addressing housing affordability in the city target two distinct population groups. One set of government resources goes to supply government-owned housing units to households completely marginalized from the private market. These groups are usually comprised of vulnerable demographic groups such as women and the elderly. According to the S.L. Newman Real Estate Institute, three categories of demand for affordable housing demand can be identified in New York City [42]. The first group comprises income-eligible households, -those with income below 135% of area median income (annual income less than \$62,100). Most of these families are covered by subsidies granted by the Federal Department of Housing and Urban Development (HUD), which covers the difference between the value corresponding to 30% of their income and the total rent.

A second group comprises income-eligible households that live in deteriorated housing. Dwellings considered deteriorated have incomplete bathrooms, kitchens, or overcrowded conditions. About 5% of New York City housing stock falls in this category. A final group includes an estimated new 80,000 households (or 76% of total new households) that will be created in the metro area for the period of 2005-2010, of which only 25% are expected to afford market-rate housing dwellings. The NYC's Housing Authority (NYCHA) is the main entity responsible for covering programs under this profile in NYC. A total of 54,239 apartments in Manhattan classified as Public Housing are owned and operated by NYCHA (103 of these developments could be a reasonable target for a green building renewal educational policy.) Under this category, tenants in New York City are typically paying over 35% of their income in rent. The average family in conventional public housing has a median income is about \$18,334.

Various agencies in the city offer support tools covering affordable housing developments, including a full range of incentives for homeowners, tenants and developers of affordable housing, bond financing, and tax credits. In addition to economic incentives, some of the agencies encourage the preservation of affordable housing through education, outreach, loan programs and enforcement of housing quality standards.

In addition NYCHA has signed with the U.S. Department of Housing and Urban Development (HUD) a Capital Improvement Performance contract that includes installation of new boiler room plants, new lighting fixtures, and the replacement of hot water tanks. Furthermore, NYCHA has installed a total of 180,000 energy-efficient refrigerators. With over \$70 million in savings generated, the Refrigerator Replacement Program was completed in 2003 [51]. In addition, NYCHA's public housing developments are under continuous revision. In the past fourteen years, the agency has invested over \$5.4 billion in preservation investments. Greening the renovation programs of the agency could foster the adoption of high performance features into agency owned-buildings, as well as in the communities as tenants and their families become familiarized with these practices.

The Housing Choice Voucher Program, widely known as Project Based Section 8 Housing, is a nationwide program run by the HUD. The program addresses buildings that have traditionally been poorly maintained, experiencing foreclosures and sales. There is currently pending federal legislation (HR 44) to keep these buildings as affordable housing if they are sold. The New York City Department of Housing Preservation and Development (HPD) would take these buildings over and require significant renovation efforts. HPD also runs a Tenant Interim Lease (TIL) program that trains tenants to manage and operate co-op buildings, which are then sold to these tenant groups. As HPD will be requiring its projects to meet its own sustainability guidelines, these projects would incorporate green building elements. The agency's housing availability support tools cover the full range of incentives for homeowners, tenants and developers, (with the exception of bond financing and tax credits). The HPD encourages preservation through education, outreach, loan programs and enforcement of housing quality standards.

The Mitchell-Lama program is a New York state program created in 1955 to promote public-private partnerships, although most buildings are overseen by HPD in New York City. This program provides tax breaks for owners who charge low rent and remain in the program at least 20 years. Recently, many of these buildings are attempting to leave the program given the high real estate market and the expiration of their obligations. The city and the MBPO affordable housing analysts are working with the building owners and the public to find solutions to keep this affordable housing stock. There are grants available to encourage rehabilitation of these buildings and to discourage leaving the program.



A second series of incentives ranges from direct monetary subsidies to low-interest financing programs. Privately-supplied affordable housing in New York City is mostly developed with the aid of various incentives and support programs given by the city and state [43]. Direct monetary subsidies include capital grants intended for homeless and low-income working families. Developers can access a pool of incentives such as the New York City Housing Development Corporation's (HDC) activity bonds for multi-family affordable housing developments. These funds aim at fostering middle-income housing developments, for households earning up to 250% of the AMI. For rental projects, the agency grants up to \$45,000 per unit in bond financing, offered for both new and rehabilitated dwellings. Nonetheless, this agency's ability to issue bonds is tied to the state legislature, and its resources are limited [43].

In addition, the HDC has launched a Mixed-Income program that provides taxable bond financing for rental development projects containing at least 20% designated low-income units (income less than 50% of the AMI). They also provide direct subsidies of up to \$45,000. The agency is in charge of the Low-Income Affordable Marketplace program that combines tax-exempt bond financing, 4% Federal Low Income Housing Tax Credits and up to \$50,000 per unit direct subsidy and for some projects DHCR or HPD subsidies [DHDP44].

### *New Housing Marketplace Plan*

In 2004, Mayor Bloomberg's administration announced the New Housing Marketplace Plan which "pledged to create or preserve 65,000 units of affordable housing by 2008" [45]. This plan has since been raised to 165,000 units by 2013. HPD has been charged with implementing policies and incentives to reach this goal. With this 10 year plan, New York City is estimating it will mostly provide units to households under 68% of the area median income, while saving a portion for moderate and middle-income New York families. This context shows how the city is at a prime moment for instigating a wider adoption of green building technologies. Both new and rehabilitated dwellings in the city could be shaped by guiding principles and criteria serving the various property users and the general public. Through the inclusion of new strategies for enhancing the preservation efforts in the city's building stock, such as the assessment of preservation capacity and the Tax Credit Preservation Strategy, the city will enjoy policy alternatives to induce the adoption of technologies aligned with high-performance standards.

## **Green Building Programs and Policies in NYC**

A broad range of city, state and national policies and programs provide incentives to housing owners, developers and tenants to "go green." Additionally, there are also city and state policies that encourage or enforce green building standards, varying in their applicability to affordable housing.

### *Local Law 86*

Local Law 86 (LL86) represents the city's greatest effort to promote green building. Passed in 2005, LL86 requires all non-residential city-funded municipal construction projects costing over \$2 million to earn a LEED silver certification. Some projects affected by the law are not subject to the LEED requirements must still improve energy efficiency by meeting an Energy Cost Reduction standard set in the law[52].

While drafting LL86, local affordable housing proprietors voiced concern that they would not be able to afford LEED certification. Residential buildings were thus exempted from the law's requirements. There is not currently an adequate set of LEED standards that address the unique concerns of affordable housing. The USGBC acknowledges this shortfall and has stated it intends to work with the Green Communities program to develop a comprehensive set of standards [46]. Another challenge is that currently there is not a strong enough understanding among affordable housing developers to cheaply acquire LEED certification.

### *High Performance Housing Initiative*

Since 2004, HPD has initiated a set of programs to promote green building in affordable housing projects, including the High Performance Housing Initiative. Working with NYSERDA, this program aimed to rehab 5,000 of the City's in-rem buildings with a focus on improving energy and water efficiency. In-rem buildings are properties which, until the program was terminated in 1996, were seized by the city for tax delinquencies. NYSERDA has committed \$7 million of energy-efficiency enhancements for this project to be implemented in three phases, 100% of costs for the first 2,000 units, 80% for the next 1,500 units, and 60% for last 1,500, with the remainder of the costs to be provided by HPD [17]. The project is "expected to generate an estimated \$6 million in annual energy savings for both residential building owners and tenants" [17].

# Housing Legislation

## *New Housing New York Legacy Project*

This year, HPD co-sponsored a green building competition with the New York City Council, the City University of New York, and the New York chapter of the American Institute of Architects (AIA) called the New Housing New York Legacy Project [17, 47]. Competition guidelines required designing a mixed-income residential building built to LEED Silver standards. Additionally, this competition required the submitted project meet NYSERDA's Energy Star Multi-family Pilot Standards. The winner will receive a 60,000 square foot vacant parcel of HPD property in the South Bronx with a legally abandoned rail right-of-way [18].

The winner was Phipps-Rose-Dattner-Grimshaw's (PRDG) "Via Verde" project, a mixed-use housing project with 202 units that will include affordable rental and homeownership housing for low, middle, and moderate income levels [18]. As the winning architect-developer firm, PRDG will receive the property for a nominal fee with the understanding that the above guidelines will be met. PRDG hopes to achieve a LEED Gold rating, surpassing the Silver requirement [18]. They also want to implement enhanced ventilation in apartments, individually controlled heating and cooling systems, sun screens to shade building facades, and high performance windows [18].

## *New Construction Sustainability Requirements*

HPD's new Request for Proposals (RFP) for a mixed-use development in the cultural district surrounding the Brooklyn Academy of Music (BAM) is one of the first projects to require a new set of green building guidelines established by the department. The development is to consist of cultural, commercial, and residential spaces and is "one of the first developments to adopt HPD's New Construction Sustainability Requirements which mandate design practices and materials that ensure healthy indoor air quality, energy efficiency, water conservation and the use of environmentally preferable products" [48]. These requirements include a checklist of prerequisites and optional credit-based techniques arranged in the following categories:

- ◆ Smart Design and Site Practices
- ◆ Energy Efficiency
- ◆ Indoor air Quality
- ◆ Water Conservation
- ◆ Environmentally Preferable Products &
- ◆ Resource Conservation
- ◆ Construction Management & Principles
- ◆ Maintenance & Operations

According to HPD Press Secretary Amanda Pitman, the New Construction Sustainability Requirements are now required on all future HPD projects [49].

## **Diversity Houses, NYC**

This affordable housing development in New York has 35 units of housing for families earning 50% or less than the average income in the area. It is part of Enterprise Community Partner's Green Communities Program. In order to qualify, the project has included many low cost green building features:

- The apartments are individually sealed with trickle vents in the windows to provide fresh air ventilation
- Energy Efficient ventilation fans in kitchens and bathrooms
- Rooftop garden to improve energy efficiency
- High performance insulation
- Rooftop boiler
- Hardwood and ceramic tile flooring to reduce off-gassing

### **Project Financing:**

- Community Preservation Corporation \$2,300,000
- New York State Housing Trust Fund \$1,558,867
- General Partner Deferred Fee \$507,678
- LIHTC Equity through Enterprise \$7,526,000
- Total Development Costs \$11,892,545 [56]

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Several reasons support the adoption of city-wide green building requirements into these publicly-funded programs. First, efficiencies gained through the adoption of high-performance technologies and practices in the operation and maintenance of the buildings and apartments increase household expenditure capacity by lowering housing-related costs. Smarter homes reduce utility expenses for households, making the disposable income of tenants and owners available for mortgage payments. This is the case for most LEED certified buildings, which usually consume 30% less energy [35]. In this sense, high performance dwellings increase the credit worthiness of households, thus broadening the market range of debtors for housing. For instance, various cases around the country have created instruments such as energy-efficiency mortgages (EEMs) to reduce the income requirements on loans for families living in high-performance buildings [50]. On the other hand, these efficiencies improve the city's environmental quality, thus reducing the burden on the sewage infrastructure and electricity generation capacity.

## *421a & J51 Tax Exemptions*

The J51 program provides tax exemptions for rehabilitation of multiple dwelling buildings. A 421a tax exemption is similar to a J51, except for that it declines over time. In 2005, the city passed a law requiring that developments currently receiving 421a or J51 tax exemptions must install Energy Star appliances when replacing appliances. This law only applies to multiple dwelling buildings outside of the exemption zone between 14<sup>th</sup> and 96<sup>th</sup> streets.

## **New York State**

New York State has issued an array of incentives and programs to encourage green building. The bulk of these programs have been established through The New York State Energy Research and Development Authority (NYSERDA) which “funds research into energy supply and efficiency, as well as energy-related environmental issues, important to the well-being of New Yorkers.” [53] NYSERDA sets energy efficiency guidelines for state organizations and also administers the New York Energy Smart Program, which offers incentives to promote energy efficiency, as well as other green building practices, in new and renovated buildings.

## *NYSERDA - New Construction Program*

Despite its name, the New Construction Program offers financial incentives to improve the energy efficiency of both new and renovated buildings.

## **Additional Incentives under NYSERDA's New Construction Program:**

Capital Cost Incentives – “provides a flat monetary incentive for specific types of (energy efficient) equipment purchased and installed.”

Design Incentives – “provides assistance with the cost of outside design professionals for projects including LEED ® Rated buildings.”

Building Commissioning Services – “provides a detailed assessment of building systems and their performance to ensure that they are operating at optimal capacity.”

Green Buildings incentive – “provides an incentive (paying on a 50% cost-shared basis, up to a maximum NYSERDA contribution of \$50,000) for projects meeting various national green building standards” (Including LEED and Energy Star benchmarking)

Advanced Solar and Daylighting – “provides incentives of up to \$200,000 per project (capped at 60% of the estimated incremental capital cost) for design and installation of advanced solar and daylighting technologies in Custom and Whole Building Design projects.”

Phases of the program are issued in Program Opportunity Notices (PON). These annual PONs allocate \$12 million per period to help builders “conduct technical assessments of energy efficiency measures in building designs and to offset a portion of the incremental capital costs to purchase and install energy-efficient equipment that reduces electric energy consumption” [54]. To do this NYSERDA offers cost free consultation services by their Outreach Project Consultants (OPC): engineers and architects under contract with NYSERDA to assist in application completion, schedule and participate in Scoping Meetings, respond to applicant questions, and conduct LEED® charrettes (collaborative meetings involving project stakeholders to assess the necessary steps to achieve LEED certification).

Under this program, NYSERDA will also pay the first \$5000 of the cost of Technical Assistant (TA) services and half of the cost in excess of \$5000 up to \$100,000 [55]. These TAs conduct assessments of potential energy savings measures, conduct computer energy modeling, and may conduct benchmarking of the proposed project performance for comparison to ENERGY STAR 7 or other similar national standards.



# New York State Policies

In addition, NYSERDA offers assistance in LEED certification, Executive Order 111 assistance, New York State Green Building Tax Credit assistance, green materials recommendations, and commissioning and life cycle costing analysis to building design teams to help make new and rehabilitated commercial, industrial, and institutional buildings green.

## *NYSERDA - Green Building Tax Credit*

The New York State Department of Environmental Conservation (DEC), with consultation by NYSERDA, has been directed to administer the New York State Green Building Tax Credit, which “provides tax credits to owners and tenants of eligible buildings and tenant spaces which meet certain ‘green’ standards. These standards increase energy efficiency, improve indoor air quality, and reduce the environmental impacts of large commercial and residential buildings in New York State, among other benefits” [53].

NYSERDA provides the technical assistance required by DEC regarding the standards which must be met in order for a building and/or tenant space to be considered “green.” This program has been conducted twice since its inception in 2002. Each phase of the program has allocated \$25 million to be distributed to green building projects around the state.

The first phase featured no cap on the amount available to individual projects. It was thus distributed among seven projects through New York State, with three projects receiving funding in New York City. These projects included: 1400 5<sup>th</sup> (mixed income condominium building in Harlem - \$1.8 million tax credit), 20 River Terrace (market-rate condominium building in Battery Park City - \$2.7 million tax credit) and Octagon Park (mixed income apartment building on Roosevelt Island - \$5.6 million tax credit) [53].

## Green Building in Chicago

The Mayor’s office has taken incredible leadership on promoting green building in the city. Financial incentives for building green are offered in the form of grants, tax credits and product subsidies. Most importantly, to facilitate the adoption of green building technologies, the Department of Environment maintains and distributes a list of these financial incentives to building professionals and the general public [5]. The city offers housing developers and apartment-building owners incentives if they build “green roofs,” which are essentially roof gardens that help both insulate buildings better and improve overall air quality [7]. This includes the ability to obtain a \$5,000 grant to help with the planning and installation of the roof [10]. In the city’s central area district, a zoning density bonus currently exists for buildings with rooftop gardens.

In March 2006, it was reported that the city had more buildings with green roofs than anywhere else in the country, and because of these incentives, roofs had even begun to appear on affordable housing buildings [5]. Also initiated by the Mayor’s office, the Chicago Standard is a new set of construction standards for municipal buildings to guide the design, construction and renovation of municipal facilities in a manner that provides healthier indoor environments, reduces operating costs, and conserves energy and resources, all important for affordable housing. This standard is based on selected points from the LEED Green Building Rating System that are reasonable and appropriate for Chicago [5].

Chicago is slated to develop a residential green building standard to guide the design, construction, and renovation of city-owned and city-funded housing. It also can be used as a guideline for private residential development. A committee of representatives was formed to draft a residential green building standard that includes green building strategies organized in categories such as Energy Efficiency, Materials, and Health and Safety. Additionally, Green Homes for Chicago, a city program involving collaboration between the city, Neighborhood Housing Services of Chicago, and other partners to build and sell five energy efficient and environmental friendly, and affordable homes, was a successful way to promote awareness of green building for affordable housing in the city. The five Green Homes built were open to the public at a series of open houses held in 2003 to enhance public awareness and knowledge of residential green building.



**Above:** Chicago’s City Hall roof garden was planted in 2000 as a demonstration project to test the benefits of green roofs.

**Below:** Seattle's Denny Park Apartments

## Denny Park Apartments at a glance:

An excellent example of green affordable housing in Seattle, the Denny Park Apartments are located in South Lake Union- an area of Seattle currently undergoing rapid growth and expansion. The project provides 50 units of low-income affordable housing.

This affordable housing development in Seattle is part of Enterprise Community Partner's Green Communities Program. In order to qualify, the project has included many low cost green building features:

- To reduce storm water runoff, it was funneled into large planters placed around the base of the building; cost: \$15,000
- Metal roofing instead of composition shingles; cost: \$50,000 for an additional 30 year lifetime
- Centralized energy efficient boilers provide heat and water with less maintenance; cost: \$250,000
- Energy efficient ventilation fans for bathrooms and kitchens; cost: \$100 each

***Overall the project cost 3% more than the equivalent non-green project.***

The second phase of the Green Building Tax Credit has been distributed with a cap of \$2 million that any individual project can receive. When qualifying for these funds there are six different credit components for which a taxpayer might be allowed a credit. These include:

- ♦ Whole Building Credit Component (owner or tenant)
- ♦ Base Building Credit Component (owner)
- ♦ Tenant Space Credit Component (owner or tenant)
- ♦ Fuel Cell Credit Component
- ♦ Photovoltaic Module Credit Component
- ♦ Green Refrigerant Credit Component

The set of incentives, regulations, and programs in place to promote green building in affordable housing, as well as in other building types, is varied and growing in New York. It is clear that implementing green building practices are desirable to the public interest. This collection of programs displays an increasing awareness of that importance in federal, state, and local government agencies. Increases in programs such as these will be key in ensuring that green building benefits are shared with Manhattan's affordable housing residents.



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## Programs in Other Regions - Seattle

Like New York, rapid population growth is also expected in Seattle[1], increasing the demand for affordable housing units. Many of the initiatives undertaken in Seattle would be relevant to New York, including:

*Density bonus for green building:* This program enables developers achieving LEED Silver rating to increase square footage or building height for green development in Seattle's central core district.[3]

*Built Green Grant Program:* Eligible projects can receive up to \$15,000 to help offset the cost of attaining LEED certification within King County.[6]

*King County LEED Initiative:* The King County Department of Natural Resources and Parks provides grants of up to \$25,000 for LEED certification within King County for new construction, renovation, and even low-income housing.[9]



## *Conclusion*

Green building techniques have the potential to reduce the negative environmental and health impacts of the built environment in Manhattan. In addition, green buildings address operations and maintenance issues for affordable housing projects, keeping occupation rates high and life-cycle costs low. *Healthy Cities Start with Green Building* provides the Office of Manhattan Borough President Scott Stringer with a plan to educate the community and advocate for the inclusion of green building practices in affordable housing projects.

This report has outlined how education can demonstrate that the costs of green building need not be prohibitively expensive. As a result, reluctant affordable housing developers may discover that green design is actually in their best interest. The goal of this program is to spread the use of green building in Manhattan's affordable housing built environment using potential incentives and strategies that already exist, but have not necessarily been applied to promoting green building for affordable housing in Manhattan. This has the potential to improve water and energy efficiency, reduce strain on the city's infrastructure, reduce costs for building owners and occupants, improve the health of tenants, and reduce the strain that Manhattan places on the local ecosystems. Perhaps most importantly, however, this plan will help bridge the environmental equity gap between the rich and poor in Manhattan.



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